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Alexander Sudibyو  
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**COMPATIBILITY OF A WESTERN SYSTEMIC APPROACH  
FOR HANDLING COMPLEX, PLURALIST AND COERCIVE  
PROBLEMS IN DEVELOPING COUNTRIES:**

A case study of Micro Satellite Development in Indonesia

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A Thesis Submitted in Fulfilment of the Requirement for the Award of

**Doctor of Philosophy**

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Edith Cowan University

**September 2004**

## USE OF THESIS

The Use of Thesis statement is not included in this version of the thesis.

## ABSTRACT

In this era of globalization, there has been much western investment in the eastern world, increasing the number of large projects financed by internal and foreign investments. It was thought a challenging proposition to investigate whether systemic approaches could be used in eastern developing countries that are in transition between Toffler's first (agricultural focused) and second (industrial centered) waves of economic development.

For this purpose the Micro Satellite Development Project in Indonesia was used to investigate the feasibility of inclusive, western systemic approaches to large project management in a situation where only hierarchical, autocratic methods are the norm. The project chosen has impact on numerous Indonesian stakeholders in various aspects of their lives, such as science and technology, the natural environment, food supply, economic productivity, institutional and socio cultural practices, regulation practices and local government activities. However, the cultural difference to westerners is not just management practice but the philosophical background of the social milieu. Pancasila, the state philosophy of Indonesia, has an apparent support from the Indonesians. This is an important aspect of project development in Indonesia and as such might have become one of major constraints of the use of systemic approaches in Indonesia. This research investigated the potential of systemic methods operating within the philosophical constraint of Pancasila and their viability and acceptability. Normally, 'soft' systems approaches are inclusive of all worldviews expressed. Therefore, it seemed problematic that this inclusive philosophy would work with the constraint of another philosophical framework.

Among systemic approaches the Multi Methodological Approach (MMA) was considered appropriate to handle the problematic situation of this large project. However, in the Indonesian context it was found that some refurbishments were essential such as the need to insert a special engagement process, model validation and the basis for selecting respondents. Also in the engagement process, the interviewer, needed to identify with local (socio cultural) knowledge to better understand the interviewee's argument. It was found that respondents should be

introduced to how the research works, so they could better participate in the project and accordingly it can be seen as anticipation to the possibility of knowledge imposition. In the research, model validation included two steps. The first step was model evaluation or testing that was done by the investigator by using systems theory and the respondent's acceptable rules (in this case Pancasila). This was designed to get models with high confidence. The second step was interviewee's knowledge based judgment.

The basis for selecting respondents was the Stakeholder Dynamic Theory and O'Riordan classification of people's four groups philosophical stance. The results showed a generally positive acceptance of the systemic methods used and a compatibility with Pancasila, at least at the level of praxis. The models produced were largely accepted by the respondents as the representations of their views. There were also indications showing that systemic approaches can be used to transform Pancasila values and goals into realistic and acceptable actions. Therefore it appeared to be fruitful to use systemic approaches to develop models that can be used as the basis for an integral and comprehensive amendment of the Indonesian constitution that now is in public debate. This is illuminating as intuitively it would appear to be prone to failure to use inclusive, non-power dependent methodologies in a hierarchically conscious society, especially when the survey sample included participants as diverse as an army general and a local fisherman.

## DECLARATION

I certify that this thesis does not, to the best of my knowledge and belief:

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## LIST OF ABBREVIATION AND ACRONYMS

ADCS	Attitude Determination and Control System,
AITEI	<i>Asosiasi Industri Telekomunikasi dan Elektronika Indonesia</i> , Indonesia Association of Electronic and Telecommunication Industry.
ARF	Action Research Framework
ASSI	<i>Asosiasi Sistem Satelit Indonesia</i> , Indonesia Association of Satellite System.
BPPT	<i>Badan Pengkajian dan Penerapan Teknologi</i> , Agency for Assessment and Application of Technology
BAPEDAL	<i>Badan Pengendali Dampak Lingkungan</i> , Agency for Controlling the Environmental Impacts
CATWOE	Clients, Actors, Transformations, Worldviews, Owners and Environments
CCD	Charge Couple Device
CGI	Consultative Group on Indonesia
CSH	Critical Systems Heuristics
Depanri	<i>Dewan Penerbangan dan Antariksa Nasional</i> , Aeronautics and Space Council
Depen	<i>Departemen Penerangan</i> , Information Department
Deplu	<i>Departemen Luar Negari</i> , Foreign Department
DLR	<i>Deutsche Forschung Raumsfahrt</i> , Aerospace Institute of Germany
DPR	<i>Dewan Perwakilan Rakyat</i> , House of Representatives
DRN	<i>Dewan Riset Nasional</i> , National Research Council
ESA	European Space Agency
FAS	Federation of American Scientists
FPA	Forest Planning Agency (Indonesia)
GaAs	Gallium Arsenic (solar cell)
GATT	General Agreement on Tariffs and Trades

GBHN	<i>Garis Garis Besar Haluan Negara</i> , Broad Guide Lines of State Policies
GSO	Geostationary Satellite Orbit
GST	General System Theory
INCS	<i>Konsep Kedingtaraan Nasional Indonesia</i> , Indonesia National Concept on Space
IMF	International Monetary Fund
IP	Interactive Planning
ISRO	Indian Space Research Organization
ITB	<i>Institute Teknologi Bandung</i> , Bandung Institute of Tehnology
ITS	<i>Institute Teknologi Surabaya</i> , Surabaya Institute of Technology
ITU	International Telecommunication Union
JICA	Japan International Cooperation Agency
KADIN	<i>Kamar Dagang dan Industri</i> , Chamber of Commerce and Industry
Kimpraswil	<i>Pemukiman dan Prasarana Wilayah</i> , office of the minister for housing and regional infrastructure.
Lapan	<i>Lembaga Penerbangan dan Antariksa Nasional</i> , Indonesia Aeronautics and Space Institute
LEMHANNAS	<i>Lembaga Ketahanan Nasional</i> , National Resilience Institute
LIPI	<i>Lembaga Ilmu Pengetahuan Indonesia</i> , Indonesia Institute of Sciences
LSA	Local Systemic Action research
LSM	<i>Lembaga Sosial Masyarakat</i> , Social Advocating Institution
MBO	Management By Objective
MMA	Multi Methodological Approach
MMES	Multi Mission Equatorial Satellite
MNRT	<i>Menteri Negara Riset dan Technology</i> , State Minister for Research and Technology
Meneg LH	<i>Menteri Negara Lingkungan Hidup</i> , State Minister for Living Environment
MPR	<i>Majelis Permusyawaratan Rakyat</i> , People's Consultative Assembly
MTCR	Missile Technology Control Regimes
NASA	National Agency on Space Administration (USA)

NASAKOM	<i>Nasionalisme Agama Komunisme, Nationalism, Religion, Communisme</i>
NiCD	Nickel Cadmium (battery)
NKRI	<i>Negara Kesatuan Republic Indonesia, Unified State of the Republic of Indonesia</i>
OBC	On Board Computer
OR	Operation Research
PAD	<i>Pendapatan Asli Daerah, Local Growth Product</i>
PT.CMI	Compact Microwave Indonesia Corporation
PT.Bukaka Teknik Utama	<i>Perseroan Terbatas Bukaka Teknik Utama, Bukaka Teknik Utama Corporation</i>
PT.DI	<i>Perseroan Terbatas Dirgantara Indonesia, Indonesia Space Corporation</i>
PT.INTI	<i>Perseroan Terbatas Industri Telekomunikasi Indonesia, Indonesia Telecommunication Industry Corporation</i>
PT.LEN Industry	National Electronic Industry Corporation
PT.PSN	<i>Perseroan Terbatas Pacific Satellite National, Pacific Satellite National Corporation</i>
Pustep	<i>Pusat Studi Ekonomi Pancasila, Pancasila Economy Study Centre</i>
RPT	Rich Picture Tables
RPV	Remotely Piloted Vehicle
RS	Remote Sensing
RUUK	<i>Riset Unggulan Kemitraan, Cooperative Competitive Research, research projects having competitive advantages for increasing domestic interactions</i>
RUUK	<i>Riset Unggulan Kemandirian Kedirgantaraan, Space Self governing Competitive Research, research projects having competitive advantages with regards to self governing of space.</i>
RUUK	<i>Riset Unggulan Kemasyarakatan dan Kemanusiaan, Humanism and Public Competitive Research,</i>
RUSNAS	<i>Riset Unggulan Strategik Nasional, National Strategic Competitive Research, research projects that nationally having competitive and</i>

	strategic advantages.
RUT	<i>Riset Unggulan Terpadu</i> , Integrated Competitive Research
RUTI	<i>Riset Unggulan Terpadu Internasional</i> , International Integrated Competitive Research; reseach projects that internationally having competitive advantages
SA	System Analysis
SAST	Strategic Assumption Surfacing and Testing
SD	System Dynamic
SDM	System Dynamic Model
SE	System Engineering
SODA	Strategic Options Development and Analysis
SPSAI	<i>Sistem Pengembangan Satelit Ala Indonesia</i> , Indonesia version of satellite development system
SSD	Social System Design
SSM	Soft System Methodology
SWOT	Strengths, Weaknesses Opportunities and Threats
TSI	Total System Intervention
TT&C	Tracking Telecommand and Control
UAV	Unmanned Air Vehicles
UGM	<i>Universitas Gadjah Mada</i> , Gadjah Mada University
UHF	Ultra High Frequency
UN-OOSA	United Nations Office On Space Affairs
USA	United State of America
UUD' 45	<i>Undang Undang Dasar 1945</i> , Indonesian constitution year 1945
VSD	Viable System Diagnostic
VSM	Viable System Model
VHF	Very High Frequency
WMD	Weapon of Mass Destruction
WSSD	World Sustainable System Development
WTO	World Trade Organization

## Chapter 1

### INTRODUCTION

#### 1.0 General overview

This thesis investigates the use of a western systemic approach to a complex problem in an eastern developing country (Indonesia) within a philosophical constraint known as Pancasila<sup>1</sup>. The project compares the assumptions of a systemic approach and Pancasila. An assumption is made that every Indonesian holds Pancasila as their ideal. This thesis provides its judgmental compatibility analysis based on the views of Indonesians who participated in practicing the systemic approach as participants of this research. The vehicle for this research was a large, complex project called Sipesmik: this is a national Indonesian project for micro-satellite development system.

There are various system related terminologies such as the 'system approach', the 'systems approach', the 'systemic approach' and 'systems thinking'. This thesis treats these as synonyms. However, the 'systemic' approach will be used here to include approaches that consider the whole entity being investigated in contrast to the conventional, analytical, scientific approaches. The following paragraphs elaborate further the notion of systemic approach used in this thesis.

There are many views describing the nature of systemic thought. For instance, Minati and Collen (1997) contrast the notion of 'set' and 'system'. A set consists of a number of elements such as a number of discs in a bowl. A structured set consists of a number of elements that have relationships with each other such those in a car. When the engine of a car is turned on, this car is a system but it is a closed system because a car does not automatically interact with its environment, it just releases its waste. When its fuel runs out then it stalls and return to the status of a structured set. It becomes an open system when there is a driver, who gives input (puts in the gasoline) and controls the function of all components, so that the system is 'alive'.

---

<sup>1</sup> Pancasila is explained fully in Section 1.2

The interaction with its environment is done by virtue of the driver. A similar situation occurs to humans: a living human being is a system and a human body is a structured set. This biological system gave Bertalanffy (1951, 1969) the idea of studying modern systems. Because a living human being is a system operating within a social system, it can be seen as an element that interacts with its physical and social environment. This social system is very complex and motivated Klir (1991, p 5-9) to develop a formula so that people can learn about systems. He defines a system as:

$$S = (T, R)$$

where:

S = a system,

T = a set of certain things ('thinghood'),

R = a set defined on T ('systemhood')

This equation can help people to differentiate between systemic thought and traditional science. The latter is concerned with 'thinghood' which is the characteristic of individual elements in a system while systemic thought is concerned with 'systemhood', that is, the relationships and interactions between elements within a system. Using this formula, people can design a system through identifying the 'thinghood' and the 'systemhood'.

Within the umbrella of systems thinking, Ulrich (1988) identifies three classes of systems; *hard*, *soft*, and *critical* systems<sup>2</sup>. In this thesis, only the latter two are regarded as truly systemic. In some developing countries where the military are in, there is a tendency toward systematic, 'hard' systems thinking becoming the preferred approach in solving national problems. A significant difference between the soft and critical systems in one side and the hard system in the other side is the interpretive nature of the former that acknowledges the important role of participants' preferences in the system.

Another factor that influences the comparison between western and eastern ideas is the developmental stage of the nation involved. Toffler (1985) theorizes that world

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<sup>2</sup> The term 'hard' systems refer to a more or less conventional positivist approach to problem solving whereas 'soft' and 'critical' systems tend to be more interpretive and inclusive in nature. Characteristics of each of these classes can be seen in Table 2.3.

economic development can be classified into three waves: agricultural settlement, industrialization and information technology. The more advance the development is, the more significant the role of people's preference in the effectiveness and efficiency of production. Representing the third wave are the developed countries, whilst the second and first waves can be observed in developing countries. However, Indonesia can be represented as being at various stages within Toffler's framework. Furthermore, geographically Indonesia belongs to the set of eastern world countries, whilst the systemic approach has its roots in a western cultural foundation. Caceres (1998) and Hofstede (1994), indicate that cultural phenomena lead to differences between the logic of westerners' and easterners<sup>3</sup> thinking, that accordingly may cause differences in their preferences.

The above situation challenged this researcher to investigate this related cultural phenomenon and the use of a western systemic approach for a national, complex problem in an eastern, developing country (Indonesia). The case study used as a vehicle to test this idea is described below.

### 1.1. The case study: the Sipestmik project

On the 3<sup>rd</sup> and 4<sup>th</sup> of February 1998, Depanri, the Space Council of Indonesia, organised the 'First Indonesia National Congress on Space'. The congress recommended to the President of the Republic of Indonesia as the Chairman of Depanri who promulgated agreed manuscripts that contained space policies and programs for Indonesia. One of those manuscripts is the 'Indonesia National Concept on Space' (INCS). In accepting the recommendation to be Chairman on the tenth of December 1998, the President promulgated the manuscripts (see Depanri, 1998a).

The INCS states that the development of the '*national space*' of Indonesia will be carried out through the development of its seven components: *human resources, manufacturing industry, service industry, science and technology, natural resources, political and legal aspects* and *institutional aspects*. Thus, this area can be seen to be a large topic for research. So when scoping this research, it was suggested by the State

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<sup>3</sup> Discussion on this distinction can be seen in Section 2.4.



Minister for Research and Technology of the Republic of Indonesia, through the Chairman of LAPAN, the Indonesia National Institute of Aeronautics and Space, (whose other function is the Secretary of Depanri) that micro satellite development be the topic. Therefore, the sample case used in this thesis is Sistem Indonesia Pengembangan Satelit Mikro (Sipesmik), which is the Indonesian system in developing micro satellites.

To give attention to systemic significance, the starting point to assess Sipesmik is to regard it as a socio-technical management problem. A different worldview, such as treating it as a pure technical management problem or a pure social management problem, would certainly result in different solutions. However, treating it as a pure technical management problem would not consider the social aspects of micro satellite development. In contrast, treating it as a pure social management problem would not consider its technical aspects. Micro satellites will be developed in support of creating and maintaining sustainable food supplies in Indonesia (Lapan, 2002). The development and use of micro satellites includes both technical and social aspects. This is clearly stated in the expected outcomes of the project, which include both those aspects (see section 2.2).

In assessing the socio-technical management aspects of Sipesmik, one can draw extensively upon established management and organisation theory. In particular, Flood and Jackson (1991, p.37) describe five tools of insight observation of an organisation, these being:

- Machine metaphor or closed system view, which views an organisation as a machine that operates in a routine and repetitive fashion and performs predetermined sets of activities, seeking rational and efficient means of reaching preset goals and objectives.
- Organic metaphor or open system view, which views an organisation as an organism that is a complex network of elements. These elements interact within an environment from which they draw inputs and dispense outputs, forming highly organised feedback loops. As an organism, an organisation is homeostatic or self regulating. The organisation is also capable of surviving and adapting to its environment.

- Neurocybernetic metaphor or viable systems view, which views an organisation like a human whose brain is a tried and tested control system, thus it has an ability to communicate and learn.
- Cultural metaphor, which views an organisation as having a corporate culture that is a shared or socially constructed reality of values and beliefs, which determines how an organisation reacts as a conservative restraining or generates innovation.
- Political metaphor, which views an organisation as social relationships between individuals and groups. Competition occurs between these individuals and groups that involve the pursuit of power, based on which political characteristic of the perceived power of an investigated situation can be classified into unitary, pluralist and coercive situations. These classifications are made in term of the issues of interest, conflict and power.

Any of these metaphors might highlight significant difficulties or issues that an organisation faces. However the metaphors are not designed to solve such difficulties or issues. Therefore, Flood and Jackson (1991) suggest the use a systems methodology to tackle these issues that is consistent with the metaphor employed. The system of 'systems methodologies' assumes that each problem has intrinsic properties, whether it is a complex or simple situation. Based on this assumption, the existing methodologies are classified in terms of political characteristics of the participants involved in the problematic situation. In contrast, Hutchinson (1997) states that a problem does not have any intrinsic property, it is the investigator who judges how the problem is to be tackled; hence the metaphor chosen.

The system of 'systems methodologies' does not however suggest a methodology appropriate for handling a problem such as Sipesmik that has a large number of interacting and often conflicting elements. Fortunately, Hutchinson (1997) had developed a Qualitative Systems Methodological Approach to Environmental Problems<sup>4</sup> that was judged as having similar characteristics to this situation. This approach basically can be identified as Local Systemic Action research (LSA) (Flood, 2001), which is the use of Total System Intervention (TSI) (Flood and Jackson, 1991),

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<sup>4</sup> This further referred as the Multi Methodological Approach (MMA).

in the context of action research. Additionally TSI has a western cultural foundation and does not consider eastern world culture (*Ibid*), whilst Indonesia, is commonly classified as an eastern world country (Soejadi and Wibisono, 1986). Moreover based on Ulrich's (1988) classification of systems thinking, TSI can be classified into critical systems thinking (Flood and Jackson, 1991) that holds interpretive characteristic in nature. Therefore Sipesmik can be selected as the appropriate sample case for this research.

To provide the context for the thesis, the following sections introduce Pancasila, the notion of systems approach, and the research questions including the scope of the study, the significance of research questions, and the structure of the thesis.

## 1.2 Pancasila

The word Pancasila was derived from two Sanskrit words, 'panca' which means five, and 'sila' which means principle. Pancasila reflects five inseparable and interrelated principles (Depen, 1996).

- 1) *Belief in the One and Only God.* This 'sila' reaffirms the existence of God, the belief in the life after death and the belief that pursuit of these sacred values will lead the people to a better life in the hereafter. Therefore it becomes the source of the four other principles.
- 2) *Just and Civilised Humanity.* This 'sila' requires that human beings should be treated with due regard to their decorum as God's creatures. It also stresses that Indonesians do not tolerate physical and or mystical domination of human beings by their own people or by any realm.
- 3) *The Unity of Indonesia.* This 'sila' symbolises the concept of nationalism, of love for one's realm and nation state. This principle foresees the need to always promote national unity and integrity. It requests Indonesians to avoid superior feelings based on ethnic reasons, ancestry or skin colour. By respecting one another, the social differences in daily life (between ethnic groups, beliefs, customs, professions etc.) should become the colour of the national unity and integrity.

- 4) ***Democracy Guided by the Inner Wisdom in the Unanimity Arising out of Deliberations amongst Representatives.*** This 'sila' describes the special type of Indonesian democracy where decisions are made through deliberations amongst the people's representatives. This principle requests of each people's representative to always keep in mind that democratic right must always be put into effect with the deeper consideration of accountability to God Almighty. This consideration is in accordance to one's own assurance and spiritual belief with respect for the values of man's decorum and truthfulness, and with a view to preserve and strengthen national unity and pursuit through social justice.
- 5) ***Social Justice for the Whole of the People of Indonesia.*** This 'sila' calls for a dynamic and progressive way of distributing happiness to the whole population.

Pancasila has been philosophically and politically agreed upon by Indonesians since the 18<sup>th</sup> of August, 1945, and reaffirmed on the 5<sup>th</sup> of July, 1959, through a presidential decree. Pancasila is a 'social contract' or 'social agreement' among the founders of the Unified State of the Republic of Indonesia officially known as Negara Kesatuan Republik Indonesia (NKRI) (Ongkhokham, 2001). Pancasila holds high values and goals for Indonesians, but there have been many subjective interpretations and even manipulation of Pancasila that has destroyed the image of Pancasila.

Sukarno, the first president of Indonesia, reduced the five principles or Pancasila, to three principles or Trisila: (1) The belief in the One and only God, (2) Internationalism and (3) Democracy. He further reduced Trisila to one principle or Ekasila which is Gotongroyong or collectivism where the first 'sila' of Pancasila was omitted. However, it has been agreed as the source of the four other principles of Pancasila. By reducing the five principles to one principle, Sukarno introduced a new ideology known as Nasionalisme-Agama-Komunisme (NASAKOM) which stands for Nationalism-Religion-Communism (Lane, 1991). This was a fundamental failure by Sukarno with regard to Pancasila, as it led to a totalitarian approach. Furthermore Sukarno stated that he was the '*penyambung lidah rakyat*' or public speaker<sup>5</sup> (Kuntowijoyo, 2001a), suggesting from the fourth principle of Pancasila that power is

<sup>5</sup> This means that whatever Sukarno said in public was taken as the voice of the 'people'

held by the public. Since Sukarno considered himself 'the public speaker' then 'what he says is true' and therefore everyone shall obey 'what he says'. This is a violation of democratic principles.

To impress the public and to gather support, Suharto (the second president of Indonesia) contrasted NASAKOM ideology with the Pancasila ideology. Since Pancasila has broad support in the society (Lane, 1991), Suharto obtained great success in marketing this. However, like his predecessor, Suharto used Pancasila to control the public which contradicts with the second 'sila': 'Just and civilised humanity' that stresses that Indonesians should not accept the physical and or mystical domination of human beings by their own people or by any realm. In support of this, the following is a quotation from Lane (1991, p.8):

*"During 1980s the government<sup>6</sup> began a campaign whereby more and more people were compelled to go to a Pancasila course. This was obligatory for all civil servants, including teachers, academics and military personnel. .... Failure in the examination at the end of a Pancasila course could result in dismissal from one's job ..... On top of this the government also pushed through the DPR<sup>7</sup>, a law requiring all social and political organisations to adopt Pancasila as their official ideology. This became known as the Azas Tunggal (Sole Philosophy) law, also referred to as the Law of Social Organisation ....."*

These courses were designed as a tool of the repression of democracy (Suseno, 1999) to control people. Manipulating Pancasila into a state ideology resulted in the image of Pancasila becoming blurred. All political ideologies have methodological failure, since the practitioners of these ideologies insert the terms 'true and false' into practical politics, where the praxis term of 'good' and 'bad' are more appropriate. Since this practice is attractive to group(s) of people who grasp political power and have the ambition to control the public, such groups tend to incorporate the notions of truth and falsity into practical politics (Suseno, 2000). When truth and falsity are used in the praxis then the political elites of the government becomes totalitarian.

<sup>6</sup> The word 'government' can be read as 'Suharto', since he was the president at that time.

<sup>7</sup> DPR = Dewan Perwakilan Rakyat (the Peoples' Representative Council)

However, there are still a large number of high profile thinkers who are optimistic about the survival of Pancasila as a set of state based principles, since it holds the high values and goals of the Indonesian people. Pancasila has a long history in Indonesia (Moedjanto, 2000). It embodies the worldview and philosophy of Indonesians but there is a need to accommodate Indonesians' worldview at the praxis level.

Openness is likely to be the public choice to revitalise the political life in Indonesia (Lane, 1991). However, such a democratic culture needs to be built up from almost zero (Suseno, 1999). Even though optimism has been shown by Mubyarto who has introduced an economic application of Pancasila known as *Teori Ekonomi Pancasila* (Pustep, 2003; Jegalus, 2002) that is characterised as follows:

- (1) The economic, social and moral condition of the people stimulates the national economy.
- (2) There is a strong will of the community to create and maintain social justice and not to allow economic imbalance and social injustice.
- (3) With economic nationalism in the globalisation era, there is urgency for creating a national economy that is strong, competitive and will stand alone.
- (4) A democratic economy is a communal and familial economy, where 'Koperasi' or cooperative corporate, in conjunction with other cooperative efforts, are the spirit of the personal and public economy.
- (5) The balance, harmony, efficiency and justice characterises the relationship between national planning, economic decentralisation and autonomy (wide, free, and responsible). All this is directed towards achieving social justice for the whole population of Indonesia.

The above reflection provides five strategic points with regard to Pancasila:

- (1) Pancasila holds the expressed values and goals of Indonesian life, it embodies the notions of 'true and false' but not praxis terms of 'good and bad' therefore Pancasila is at the level of philosophy.
- (2) History shows that treating Pancasila as the state ideology has failed in the past, when the elites within the government have become totalitarian which contradicts the democratic nature of the fifth principle of Pancasila.

- (3) The praxis level is concerned with 'good and bad'. There is a need to openly develop this level by introducing the high values for daily life and the achievement goals held by Pancasila.
- (4) Pancasila should be used as the common denominator, so that all methods or methodologies align in correspondence, consistence and coherence (see chapter 3) with it.
- (5) Among Indonesians, there is optimism that Pancasila will survive.

The points above bring into question whether a western systemic approach that has been developed for a western cultural context is compatible with Pancasila. At a philosophical level, western culture can be represented by Christianity, Judaism, Islam and secular rationalism, all of which place importance on the existence of Truth which is accessible to true believers (Hofstede, 1994), while eastern culture can be represented by Hinduism, Buddhism and Taoism each of which are more concerned with exploring ways in which a person can improve him/herself through alternative ways of living involving ritual and meditation (Caceres, 1998).

In fact, Pancasila is more representative of western than of eastern culture, because of importance it places on the existence of Truth, as seen in the first principle 'The belief in the One and Only God' which becomes the source of the other four principles. This is supported by the fact that more than 88% of Indonesians are Moslems, about 10% are Christians and about 2 % are Hindus or Buddhists (Deplu, 2003, JICA, 1999) thus more than 98% of Indonesians belong to western religions. Therefore a western systemic approach may be compatible with Pancasila.

However, a part of Pancasila is also representative to eastern culture. For example Pancasila acknowledges persons who improve themselves by exploring alternative ways of living through ritual and meditation. This commitment is embodied in the second principle: 'Just and Civilised Humanity'. This principle even supports exploring ways of living that do not include a belief in God (Kuntowijoyo, 2001a). This is possible because Pancasila itself is both philosophical and a political consensus (Soejadi and Wibisono, 1986). Therefore a western cultural application of Pancasila, which encompasses a systemic approach, may assist Indonesia in relieving some political burdens.

### **1.3 Research questions and scope of the study**

The above reflections provide the basis for the topic of this thesis as: **The Compatibility of a Western Systemic Approach for handling Complex, Pluralist and Coercive Problems in Developing Countries - A case study of Micro Satellite Development in Indonesia.**

This thesis has three main aims:

- To investigate whether a western systemic approach will successfully produce solutions to such complex problems as Sipesmik in an Indonesian context.
- To investigate whether the generated solutions are acceptable to Indonesian stakeholders.
- To investigate whether a systemic approach can be used to transform the high values and goals held within Pancasila into realistic and acceptable actions.

Much of systems thinking assumes the involvement of stakeholders in the problem investigation, thus it was asked whether stakeholders of Sipesmik will participate in generating solutions? Assuming they will participate in the solutions generation process. Possible solutions generated by the use of a systemic approach are conceptual models. Will they be accepted in the Indonesian context? Also, can the approach help transform the ideals of Pancasila into realistic and acceptable actions?

The above reflection led the author to formulate the research questions, as follows:

- Can a western systemic approach be successfully used to define solutions of complex pluralist and coercive problems in a developing eastern world country such as Indonesia?
- Will the solutions generated in this context be acceptable to Indonesian stakeholders?
- Can these systemic methods be used to transform the high values and goals held within the state philosophy of Indonesia 'Pancasila' into realistic and acceptable actions?



There are three limits to the scope of this research.

- **The first** is that only micro satellite development in Indonesia is considered, although several factors in this domain can be applied to other domains in Indonesia and to space science and technology in general and to other countries.
- **The second** is that the solutions are restricted to the qualitative and conceptual models of Sipesmik problems. Although these models will form the basis for further quantitative models that can be developed with other specific knowledge.
- **The third** is that Pancasila is a philosophical and political consensus of the founders of NKRI (the Unified State of the Republic of Indonesia). Whether all Indonesians keep Pancasila in their mind as their ideals is arguable.

#### 1.4 Significance of the research questions

Most planners are guided by instructions or goals set by the decision makers (top down planning). This happens in Indonesia particularly because Pancasila is treated as the state ideology. A political ideology like Pancasila is believed to be true by peers or those in control, and then others are asked to believe that it is true (Suseno, 2000). For example, Pancasila is believed to be true by the founders of NKRI, and others are asked to follow the same ideology. When everyone follows the ideology then everything is derived from it. This mechanistic logic shows why top down planning dominates in Indonesia national development.

No legal document formally promulgated treating Pancasila as the state ideology of Indonesia. However there are documents such as *Wawasan Nusantara* (Djuanda, 1957; Soewarso, 1984) that uses Pancasila as if it is the state ideology of Indonesia. *Wawasan Nusantara* is a document describing Indonesians vision for their country. *Wawasan Nusantara* is mentioned in a number of legal documents such as the Indonesia law 24, year 1992, regarding space management (Penataan Ruang). *Wawasan Nusantara* is also mentioned in six consecutive Garis Garis Besar Haluan Negara (GBHN) or the Broad Guidelines of State Policy (1973-1978; 1978-1983; 1983-1988; 1988-1993; 1998-2003). Although it appears that 'Pancasila is the state

ideology of Indonesia', there are thinkers who question its validity. Even the present GBHN (1999-2004) does not mention *Wawasan Nusantara* that treats Pancasila as the state ideology of Indonesia.

This research can be seen as a response to those who are concerned with the danger of ideological manipulation for the sake of personal or group interests such as Wibisono (1986) and Suseno (2000). It will also be a response to those who are concerned with the revitalisation of Pancasila values in daily life and in achieving the goals held by it, such as Kuntowijoyo (2001a, b), Moedjanto (2000), Nugroho and Mahzar (Kompas, 2003).

As a developing country Indonesia has received development aid from donors that, among others, have formed the Consultative Group on Indonesia (CGI) whose members are mostly developed countries. This aid consists of loans, grants and technical assistances, and is approved yearly by the CGI members. The sum ranges from 3 - 4 billion (US \$) a year that equals to 1-2 % of the annual Gross Domestic Product of the country. However, it is important due to its role in overcoming the yearly fiscal deficit (Kompas, 2003). These donors are primarily concerned with the effective use of the aid in alleviating poverty in Indonesia (Kassum, 2001). Germany belongs to this group and interests in helping to support the development of micro satellite for sustainable food supply in Indonesia (Lapan, 2002).

A closing remark given by Kassum (2001) who chaired the eleventh CGI meeting implied that both the donor community and the government of Indonesia were concerned with:

- a) Effective use of the aids in alleviating the poverty;
- b) Empowering and investing in the poor;
- c) Justice as the key factor of retaining social cohesion and stability;
- d) Effective coordination within a good governance;
- e) Real integrated action within the complexity of the situation, where each of the sectors should interact with one another.

As shown by Hutchinson (1997), the systemic approach can result in conceptual models that guide in the facilitation of integrated action within a complex situation,

leading to public empowerment, effective coordination and use of resources to create and sustain high economic productivity. As this research uses a similar meta-methodology to develop models for developing micro satellite project and sustainable food supply, it can also be seen as an attempt to respond to the concern of both developed and developing countries alike.

## 1.5 Structure of the thesis

Since this research takes micro satellite development as the case study, its background as a space project development will provide solid foundation for further deliberation. This project can be seen as a derivative action of the INCS. Therefore deliberation on INCS will provide complete background in regards to why micro satellite development is needed. Although it can be seen as a derivative action of INCS, in practice this project gets its initial financial support from the office MNRT. In this context it is included in projects that are categorised in the bottom up approach scheme, since it is not included in the National Strategic Competitive Research (RUSNAS) initiated by the office of MNRT, which represents the top down approach.

As a derivative action of INCS, the micro satellite project is a project that was generated through mechanical logic of Pancasila – UUD'45 - *Wawasan Nusantara* - *Ketahanan Nasional* - INCS - Space Policies - Space Projects (see further deliberation in chapter 2). However *Wawasan Nusantara and Ketahanan Nasional* is no longer included in the present GBHN (1999 – 2004). This may see micro satellite development not belonging to the RUSNAS category. All of the above will be clarified in Chapter 2 that discusses space project management in Indonesia. In this chapter the theoretical compatibility of the systemic approach with Pancasila will be assessed, within which a suggestion that critical systems thinking approach may be most compatible with the principles of Pancasila, is elaborated.

Further chapters will present how to research a project using critical systems thinking and what are the differences between researching a project this way compared to other approaches. This deliberation leads to an introduction of a Multi Methodologies Approach (MMA) (Hutchinson, 1997) and its required adaptation to investigate the research questions, and based on which the methodology of this research was

developed. This methodology indicates that there are five stages of investigation: select approach to research questions, generate solutions, judge the solutions, revisit the research questions and identify future actions.

The structure of the thesis is as follows:

**Chapter 2** presents three sub topics, the INCS and space policies, the management of micro satellite project, and the theoretical compatibility assessment of the systemic approach and action research with Pancasila.

**Chapter 3** outlines the nature of large project planning and the use of systems approaches in Indonesia.

**Chapter 4** introduces the research methodology used.

**Chapter 5** includes the summary of the data collected, and the root definition of the ideal system,

**Chapter 6** models the tasks that are needed to satisfy the requirements of the ideal system.

**Chapter 7** describes the Sipesmik models validation results and their evaluation.

**Chapter 8** re-visits the research questions, and discusses whether western systemic approaches can be successfully used to define solutions within the constraints of the high values and goals held by Pancasila and realistic and acceptable actions produced.

**Chapter 9** evaluates the research especially that regards Pancasila and the methodology used.

**Chapter 10** assesses the result of the research, presents some reflections and conclusions, and discusses possible related future research.

## Chapter 2

### SPACE PROJECT MANAGEMENT IN INDONESIA, PANCASILA AND THE CONTEXT OF THE RESEARCH

#### 2.0 General Overview

Section 2.1 introduces the Indonesia National Concept on Space (INCS), within which the notions of 'national development' and 'national space development' for Indonesians are discussed. Also, this section identifies policies on micro satellite development that were derived from the INCS. These policies have become Lapan's foundation in initiating a micro satellite development. Section 2.2 outlines this project.

Sections 2.1 and 2.2 indicate that the approach used in managing large projects in Indonesia can be categorized as top down which differs to that of Local Systemic Action research (LSA). As represented by a Multimethodology approach – MMA – (the one used in this thesis was developed by Hutchinson (1996))<sup>1</sup>, the LSA appreciates stakeholders' views, based on which conceptual models of realistic actions are developed. Section 2.3 evaluates and critiques the approach used in large project management in Indonesia. This section also contrasts bottom up and top down approaches, and identifies their limitations and promises. This section ends with indications that the combination of those approaches is considered most appropriate to actual national development projects (see 2.1).

Within the top down approach Pancasila is treated as the ideal or philosophical basis (Depanri, 1998a, b, c, d), since it is the state philosophy of the country. This indicates that Pancasila has a special position within the Indonesians' life since it holds the high values and goals of the Indonesians. Therefore to be acceptable, an approach introduced to the Indonesians should be compatible with Pancasila. Since LSA is a combination of systems thinking and action research, therefore sections 2.4 and 2.5 are consecutively set to discuss the compatibility assessment of systems approach and action research with Pancasila. Section 2.6 presents the summary of the chapter.

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<sup>1</sup> It will be identified further as the Multi Methodology Approach (MMA)

## 2.1 INCS

The INCS (Depanri, 1998a) states that space and earth compose a unified whole. Hence, in managing space usage, Indonesians should consider that space is for all peoples of the world. Also, INCS specifies that they should consider not only Indonesian interests but also the world interests including the existing agreements between states and international practice in space usage.

The INCS acknowledges different a legal status between air space and outer space, and regulates rights and obligations differently. Air space above a national territory includes the national jurisdiction of the covered state, while outer space is a common area.

The INCS states that its foundations are Pancasila, UUD' 45 (The Constitution of the Republic of Indonesia)<sup>2</sup>, *Wawasan Nusantara* (Nusantara Views)<sup>3</sup>, and *Ketahanan Nasional* (National Resilience Acknowledging these foundations, it confirms that the national space of Indonesia consisting of air space and outer space should be (Depanri, 1998a, p.9):

- a) used conforming to the values and goals held within Pancasila and the UUD'45;
- b) managed to achieve a unified whole (politics, economy, social and culture, resilience and security) of Indonesia;
- c) directed to fortify national resilience;
- d) managed in such a way that other nationalities can use them;
  - a. for peaceful purposes,
  - b. for human kind interest,
  - c. in a manner not contradictory with national interest and
  - d. in conformance with international laws and regulations;
- e) in conformance with environmental preservation and sustainable life.

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<sup>2</sup> The Constitution of the Republic of Indonesia is usually referred to as the 1945 Constitution (UUD'45). This is partly because the constitution was drafted and adopted in 1945 when the Republic was established, and partly to distinguish it from two other constitutions which were introduced in free Indonesia (Depen, 1996)

<sup>3</sup> *Wawasan Nusantara* is a conceptual outlook on Indonesia and its existence within various other states (Suryohadiprojo, 2002). This outlook was launched by The National Resilience Institute (LEMHANNAS) an Indonesian institute responsible for national resilience.

The operational principles (*Azas*) of INCS are (Depanri, 1998a, p10):

- a) **uniformity and unification of design** (of thought, of behaviour and of action) that were generated based on familial spirit that creates responsibility, motivation and driving force for Indonesians to use space;
- b) **Prosperity and security** (as the basic values for managing and regulating national life).
- c) **Consultation and cooperation between countries** to maintain the use of space for human prosperity and for an orderly world, based on freedom, eternal peace and social justice.

The INCS implements two basic concepts of viewing the space. First, it views the space as 'an area' that belongs to 'a unified whole' that consists of **space, earth** (ground and waters) and **living creatures**. Based on this view, 'national area' includes 'ground', 'waters' and 'space' areas. Those areas should be a 'unified area', where 'Indonesia's living creatures' live and grow in concordance with the nature (space and earth). This view implies that Indonesians are capable or shall be made capable to use space for their living (achieve goals and actualise aspirations).

Secondly, it views space as 'a living space'. As a 'living space', the national space of Indonesia consists of (*ibid*, p.12):

- a. The *wadah* (container) that consists of ground, waters, and space.
- b. The *isi* (contain) that consists of Indonesians' aspirations in space usages to realise goals held within the introduction of the UUD'45 i.e. to actualise the state of Indonesia that is free, unified, jurisdictional, just and prosperous.
- c. The *tata laku* (behaviour) that can be seen as processes or results of interactions between the *wadah* and the *isi*, which includes spiritual and physical behaviours. The spiritual behaviour is represented by the culture of space usage. The physical behaviour is represented by 'space management and regulation', the basis of which are prosperity, security, consultation and cooperation.

The INCS holds five basic teachings that national space is (*ibid*, p 14):

- a) **a unified area** that means that ground, waters and space are viewed as a unified whole that is a gift of the Almighty God that should be used to sustain the nation.
- b) **a unified nation** that means that the space usage is viewed as a vehicle for Indonesians, who based on 'collective spirit', 'identity', and 'awareness', 'willingness' and 'political stance' to which all Indonesians are entitled in creating and maintaining 'self sustainable and competitive' national space.
- c) **A unified politics** that means that space usage is viewed as a nation's prime effort in arguing political right for Indonesia's jurisdiction on national airspace and for the realisation of international acknowledgement of Indonesian's interest in outer space as a whole.
- d) **A unified economy** that means that space usage is viewed as an economical subsystem that harmoniously integrates with other subsystems of national development for improving public prosperity.
- e) **A unified socio culture** that means that space usage is viewed as a process of unification in which various socio-cultural elements integrate harmoniously to improve public culture and intelligence in an era of advancement.
- f) **A unified defence and security** that means that space usage is viewed as an effort in increasing the defence and security of the country, which is harmoniously embedded within efforts of increasing prosperity within a framework of implementing the Hankamrata<sup>4</sup> doctrine.

The INCS holds both: inward and outward views. The inward view is to guarantee the nation's uniformity and unification of space usage. The outward view is to guarantee Indonesia jurisdictional enforcement within its national airspace, and obtain international acknowledgement of Indonesia's interest in outer space as a whole, through an increasing sensitivity and anticipation capabilities to the trend in worldwide development.

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<sup>4</sup> Hankamrata is a 'Total People's Defense and Security' doctrine (Dupont, 2001) where public becomes one of the prime components of a national defense and security system.



The INCS's position within the Indonesian space administration is the master doctrine that should continually be developed through logical assessment and implementation process to respond advancement and trends of space usages. This position brings the INCS of having four functions i.e. (Depanri, 1998a, p.16)

- a) INCS provide guidance and rules that are the driving, motivating force behind the usage and the preservation of space
- b) INCS is a method of managing space activities, which is comprehensive and integral in formulating national policies and national strategy for the usage and preservation of space.
- c) INCS is a part of a national life system in forwarding public community views, designed to attract public participation in the usage and preservation of space for achieving national goals.
- d) INCS is a basic frame for Indonesians in defining the direction and targets in space usage and preservation through stepping stones indicated in Repelita (Five Years Plans).

#### **National development**

National development is the development of Indonesians as individuals and the development of the whole people of Indonesia (Depanri, 1998c), It is a multi-step process of a continuous change, designed to promote advancement towards intended goals held within the introduction of UUD'45. It advances, improves and uses national potentials as a whole for achieving national goals that include the two basic aspects of prosperity and security, for which national space should be harmoniously advanced, improved and used. The role of national space can be seen in its support to realise unification in the sense of politics, defence and security, economics, and socio-cultural issues.

#### **National space development**

INCS is implemented through national space development (Depanri, 1998b), and in the form of space usage that includes two factors that have close relationships with one another i.e.

- a) space as an area within which natural resources exist

- b) science and technology as the primary tool for space usage

Based on this understanding the national space components are identified. Those components are human resources, science and technology, manufacturing industry, services industry, natural resources, political and legal aspects, and institutional aspects. Those components are developed in a harmonious and integrated relationship with other components of national development (Depanri, 1998a, p.21), within direction as the following:

- a) **Human resources** will be developed to being self sustainable, high quality and competitive people with various capabilities including scientific and technical, political and legal, and management.
- b) **Space science and technology** will be developed for creating application advancement, and for mastering and improving space science and technology, which are needed for increasing prosperity, cultural advancement, and competitiveness, and for stimulating a continuous national development.
- c) **Space manufacturing industry** will be developed for creating a space engineering industry, for fulfilling domestic demand and for competing foreign products on international market.
- d) **Space services industry** will be developed to create a space service industry, for fulfilling domestic demand, and to compete with foreign products on the international market.
- e) **Natural resources** that are in the ground, waters and space will be developed and sustain, so that they will be available as needed for the use of space.
- f) **Space political and legal aspects** will be developed for jurisdictional enforcement within the national airspace and for international acknowledgment of national interest in the usage of space as a whole, which is supported by national and international laws and regulations.
- g) **Space institutional aspects** will be developed to create high productivity of space usages, which are supported by organisations, coordination mechanism within space activities and also within national development as a whole.

#### **Micro satellite policies derived from INCS**

Depanri (1998b) has developed a general policy for national space development for 25 years (1999 to 2024). As discussed earlier in this section, that national space of

Indonesia is being developed through its seven components. The main component that has been explicitly appointed to develop micro satellite is manufacturing industry. However, it is clearly indicated that the science and technology component and the services industry component should provide support to manufacturing industry component with regard to micro satellite development. The science and technology component is selected to provide support to space vehicle (including satellite) development run by the manufacturing industry component. The services industry component is appointed to develop satellite orbiting services, and other various services that relate to micro satellites capabilities such as remote sensing, communication, navigation and geodetics. There is no explicit policy mentioning micro satellite within the policies dedicated to the four other components of the national space (human resources, natural resources, regulatory and institutional components). However as parts of the national space each of those components should take part in the micro satellite development according to its competencies.

## 2.2 Micro Satellite Development Project

The project was initiated by Lapan through '*Proyek Riset Unggulan Kemandirian Kedirgantaraan*' (competitive research project for self-governing of space) in the fiscal year of 2002. This project produced a 'Proposal on The Development and Application of National Satellites of Indonesia', describing background and justification of the project, the strategy and steps of small/micro satellite development, the outputs and the organisation of the project (Lapan, 2002).

The **background** states that satellite system is an appropriate infrastructure for Indonesia development, especially due to its geographic condition that is a tropical maritime continent. Indonesia has experience in operating satellite systems for more than 25 years, and was the third country after USA and Canada using satellite technology for domestic communications. However, Indonesia's satellite system has great dependency on foreign products. This challenges Indonesia to incrementally lessen such a dependency through space technology innovation. Small/micro satellites have become the first preference to be developed. The reason is that they are technologically relative simple, so it should be easier to master compared to large

satellites. The investment needed is smaller; however, various capabilities can be incorporated into a small/micro satellite (*ibid*).

The justification confirms that satellite system is a strategic national asset that stimulates higher economic productivity, and is advancing a number of sectors such as: agriculture, transportation, communication, meteorology and natural disaster management, education and human resources, health and space exploration. It is also expected to stimulate higher business and job opportunities especially in regard to small industry having a high technological basis such as software applications and remote sensing services. It identifies risks that will be faced with the absence of satellite technology innovation such as: continuous high dependency on space application to other countries, and the loss of opportunities to manufacture products with high added values that relates to satellite technology application.

The strategy chosen to develop small / micro satellite is as follows (*ibid, p.10*):

- a. Accept technology cooperation offer from the Germany for designing, and manufacturing, integrating and testing the system,
- b. Take benefit of the present space cooperation between Indonesia and India that relates to space vehicle operation.
- c. Intensify small satellite development cooperation with Malaysia to benefit on space technology demonstration and operation,
- d. Benefit from finance provided by the Ministry of Research and Technology of Indonesia, which are allocated for RUSNAS (research projects that nationally having competitive and strategic advantages), RUK (research projects that having competitive advantages in increasing domestic interactions), RUTI (research projects that having competitive advantages in increasing international interactions) and Lapan budget.

The satellite subsystems include (*ibid, p13*):

- the command and data handling,
- the determination and control satellite behaviour,
- the telecommunication, the power supply,
- the payloads,

- the mechanical structure, and
- Earth stations.

The satellite that will be developed has been baptised MMES (Multi Mission Equator Satellite). Its mission is space remote sensing to create and maintain sustainable food supply, and digital store and forward communication demonstration technology. Its mission payloads are High Resolution Multi Spectral Earth Imaging that was designed for crop monitoring, using spectral bands: 0.4  $\mu\text{m}$ - 0.5  $\mu\text{m}$ ; 0.6 $\mu\text{m}$  – 0.7 $\mu\text{m}$ ; 0.8 $\mu\text{m}$  - 1.0 $\mu\text{m}$ , and optical focal length of 560 mm. It also brings a CCD (Charge Coupled Device) array sensor of 1024 x 1024 pixels. The general specifications of the MMES space craft are listed in table 2.1.

**Table 2.1 General specification of MMES space craft**  
(Source: Lapan, 2002, p.31)

Space craft mass	50 kg (platform: 35 kg; payload 15 kg)
Dimension	600 x 400 x 400 mm <sup>3</sup>
Power	300 W GaAs solar cells NiCD battery
Attitude Determination and Control System (ADCS)	3 axis stabilised, gravity gradient, magnetorquers, magnetometers, sun sensors
Pointing accuracy	$\pm 0.1^\circ$
Orbit	Equatorial, circular 14 rev/day
Frequency band	U/L: 144 to 146 kbps D/I: 435 to 438 kbps
Transmitters	UHF (9.6 - 19.2 kbps)
Receivers	VHF (9.6 kbps)
Main computers	OBC 186 (primary) OBC 386 (secondary)

The steps for micro satellite development consist of (*ibid*, p.17):

1. The visibility study that has three main targets to select the system's concept, to demonstrate the visibility of the project design and analysis, and to define

the technical solution and its details in order to achieve realistic performance, schedules, plan and financial arrangement.

2. The **detailing of the design** so that necessary research development, manufacturing, integration and test can be comprehensively planned.
3. The **research and development, manufacture, integration and test** will benefit the German partner.
4. The launching will benefit the **piggy backing facility** provided by the Indian partner.
5. The **preparation of satellite mission operation** includes, launching, transfer orbit, mission activation and routine operation.

The expected outcomes of the project are (*ibid*, p.19):

1. Higher human resources capability in satellite technology,
2. Higher capabilities of professional laboratories,
3. Higher capabilities of industries of high technological basis,
4. Higher capabilities of industries of satellite technology spin off,
5. Larger number of space publications and patents.
6. Higher economic productivity stimulated by space applications.
7. Lesser dependability to space foreign products.

Organisation of the project consists of three levels (*ibid*, p 20):

1. The steering institution is the State Ministry for Research and Technology (MNRT). It has the role of steering the project including to setting up the mission and the strategy of the project.
2. The coordinator is LAPAN. Its functions include planning, coordinating, and evaluating, results' applications and budgeting of the project.
3. The implementation groups are:
  - a. Process group
    - i. LAPAN (The Indonesia National Institute of Aeronautics and Space)
    - ii. LIPI (The Indonesia Institute of Sciences)

- iii. BPPT (The Agency for Assessment and Application of Technology)
- iv. ITB (Bandung Institute of Technology)
- v. ITS (Surabaya Institute of Technology)

**b. Production group**

- i. PT. LEN Industry (National Electronic Industry Corporation)
- ii. PT INTI (Indonesia Telecommunication Industry Corporation)
- iii. PT DI (Indonesia Space Corporation)

At the 17<sup>th</sup> of April 2003, the MNRT established a steering committee for micro satellite development that consists of 15 members as listed in table 2.4. The position of the members implies that they represent executor institutions that consist of two groups: process group (see table 2.4 numbers 1- 10) and product group (see table 2.4 numbers 11-15).

**2.3 Evaluation and critique**

**a. Approach**

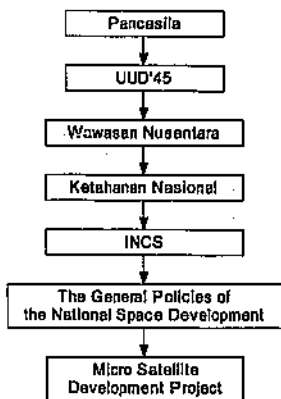
From section 2.2 it can be seen that the approach implemented in creating the micro satellite project seems to be using the 'top down approach'. Figure 2.1 presents the derivation flow from *Pancasila – UUD'45 – Wawasan Nusantara – Ketahanan Nasional – INCS – The General Policies of the National Space Development – Micro Satellite Project*. Although INCS (Depanri, 1968b p.16) states that INCS '.....sebagai bagian dari sistem kehidupan nasional dalam menyalurkan aspirasi rakyat ..... untuk menuju pencapaian tujuan nasional.....' (is a part of the national living system in forwarding public aspirations ..... to achieve national goals). However, it does not provide a mechanism to actually forward public aspirations.

As it was described in section 2, national goals are stated in the 'Introduction' of UUD'45, and the way to achieve those goals is described within the main body of the UUD'45. Here public aspirations are put forward through its representative in the DPR (People's Representative Council). However, INCS does not describe how public aspirations will be forwarded or processed. Assuming that there are aspirations coming from the public who participate in the micro satellite project, there is no clear mechanism in the INCS established to recognise such aspirations.

This kind of 'feedback mechanism' or 'recursion' seems to have also become a concern of the President of the Republic of Indonesia, who within her speech in commemorating the independence-day (Office of MNRT, 2002) stated that in order to increase the science and technology capability and culture, a number of competitive research programs, have been established i.e. *Riset Unggulan Terpadu* = RUT (Integrated Competitive Research), *Riset Unggulan Terpadu Internasional* = RUTI (International Integrated Competitive Research), *Riset Unggulan Kemitraan* = RUK (Cooperative Competitive Research), and *Riset Unggulan Kemasayarakatan dan Kemanusiaan* = RUKK (Humanism and Public Competitive Research). These research programs are included in the financial support scheme (incentive scheme) provided by the office of the MNRT (State Minister for Research and Technology) and competitive. This scheme can be seen as a **bottom-up** approach that complements *Riset Unggulan Strategis Nasional* = RUSNAS (National Strategic Competitive Research), which initiative comes from the office of MNRT that represents the **top down** approach.

However, that kind of partnership approach (bottom up and top down approach) does not seem to be integrated, and whether that combined approach generates something solid and well integrated is arguable. When they are not well integrated and do not become a unified whole, efficient and effective science and technology development in Indonesia may have performance difficulties.





**Figure 2.1 Micro Satellite Project as a derivative action of INCS (Source Depanri 1998b)**

**Note**

1. *Pancasila is the state philosophy of Indonesia*
2. *UUD'45 is the Basic Law, year 1945*
3. *Wawasan Nusantara is the Nusantara views of Indonesians*
4. *Ketahanan Nasional is a doctrine concerning the national resilience*
5. *INCS is the Indonesia National Concept on Space*
6. *The General Policies of the National Space Development are policies derived from the INCS for the period of 1999 – 2004*
7. *Micro Satellite Development Project is the investigated project*

**b. Project Implementation Actions**

Seen from the fact that the MNRT's decree regarding the steering committee was formally settled, the above organisation of a project was assumed to be the valid one for this research. Table 2.2 shows the list of institutions that should participate in the Steering Committee of the project. This indicates that the project includes various sectors such as research and development, science and technology (MNRT, LAPAN, BPPT, LIPI), higher education (ITB), and the space (PT.DI), electronic (PT.LEN Industry), telecommunication (PT. CMI), and engineering industries (PT. Bukaka Teknik Utama). Also, seen from the mission statement and the expected outputs, they imply that this project is a **large project with multi stakeholders** involved with such things as food management (production, distribution and consumption), education, research and development, space industries, space spin off industries including publications and patents, national trade and the economy at large.

However, the management of this project might assume that to generate those outputs, only those who are involved in production and operation of a satellite, as executors of the project, need to be included. Therefore, they might also assume that once a satellite is in operation, it will automatically stimulate the identified sectors to positively react (as they are supposed to be by the management of the project) so that the 'expected outputs of the project' will be generated by them. These assumptions

may accordingly cause difficulties in controlling the processes in generation of the expected outputs, since they occur mainly out side of the conventional boundary, such as the management of food (that includes production, distribution and consumption of foods) that is fully out side of the conventional organisational boundary space.

**Table 2.2 Steering Committee Member of Micro Satellite Development Project**  
(Source: MNRT Decree no. 44/M/KP/IV/2003, dated 17 April 2003)

No	Position	Position in the committee
1	The State Minister for Research and Technology (MNRT)/ Executive Chairman of National Space Council (Depanri)	Committee cover-man/ adviser
2	Head of LAPAN/ Secretary of Depanri	Program responsible man/ committee member
3	Head of LIPI	Committee member
4	MNRT Deputy for RIPTK program	Committee member
5	Executive Secretary of LAPAN	Committee member
6	Deputy Head of LAPAN for Remote Sensing	Committee member
7	Deputy head of LAPAN for Science, Space Assessment and Information	Committee member
8	Deputy Head of LAPAN for Space Technology	Committee member
9	Deputy Head of BPPT for Engineering and Planning	Committee member
10	Rector of ITB	Committee member
11	The Prime Director of PT. LEN Industry	Committee member
12	The Prime Director of PT.DI	Committee member
13	The Prime Director of PT. CMI (Compact Microwave Indonesia Corporation)	Committee member
14	The Prime Director PT. PSN (Pacific Satellite National)	Committee member
15	The Prime Director of PT. Bukaka Teknik Utama	Committee member

However, sustainable food is stated as the main mission to be supported by the project, which implies that the type of satellites developed should be those that have characteristics that appropriately fulfil the need to create and maintain this objective. Furthermore, 'sustainable food' is 'sustainable development' seen from a special frame 'food'. This means that basically the project is directed to support sustainable development at large, which is something that *'...improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends'* (CoA, 1992, p. 8), and whose objectives are to enhance individual and community wellbeing by sustainable economic development, intergenerational equity, and protecting biological diversity and maintaining ecological systems.

The above interpretation of the mission is inferentially supported by the other expected outputs of the project that include higher human resources capability, higher capabilities of professional laboratories and of industries, higher economic productivity and lesser dependability on foreign space products.

The mission, the background, the justification and the expected output inferentially requires this project to be managed in a holistic manner. However, this project as it appears from the above evaluation is not yet organised as it should be. Therefore, the use of the systems approach may help show on how to design and manage it. However, as shown in section 2.1 that as everything is supposedly derived from Pancasila, the use of the systems approach in Indonesia is problematic. When a theoretical assessment shows that it appears to be compatible with Pancasila then operational investigation is advisable.

### **c. The contrast of 'top down' and 'bottom up' approaches**

As illustrated in figure 2.1, a top down approach tends to practice a mechanistic logic that follows a hierarchical derivation of an ideal, vision or settled objective into actions or projects. An example of this kind of approach is the strategic management (see section 3.1). This approach recognizes environment as the resources supplier and the receiver of outputs and other disposals of the investigated system. Through environmental scanning, the system investigator gathers inputs for identifying the 'opportunities' and the 'threats' of the system. Combining these environmental inputs

with the knowledge about the investigated system, which includes its strengths and weaknesses, the system's investigator develops policies and strategies to improve the system's situation. This type of approach was implemented in Indonesia when Depanri established the *Pembangunan Jangka Panjang Tahap II Bidang Kedirgantaraan*, The Second Stage of Long Term Development Plan in Space, 1999-2024 (Depanri, 1998b).

It appeared in this approach, that public have no access in the decision making process. They seem to be more an object rather than a subject of the development. However considering the notion of national development (see section 2.1), it is inferentially included that the public should also become the subject of the development where they should participate in and have the access to decision making process. While the bottom up approach as represented by the MMA, appreciates public views and includes them in the conceptual models of realistic actions. Moreover, the public has the right to validate them, and used them as guidance for improving the situation. When the improvement process is used as a medium for knowledge generation, this systemic approach can be combined with a special framework such as Action Research Framework (ARF) developed by James and Smith (1999). That also comes from the bottom up approach camp.

The above reflection leads to the conclusion that for the actual national development concept (see section 2.1) a combination of top down and bottom up approaches is more appropriate than each one of those approaches separately. This combination puts the public as both subject and object of the improvement. However as seen in figure 2.1, the top down approach assumes that everything is allegedly derived from Pancasila. In contrast, with the bottom up approach everything is apparently derived from public views. This reflection indicates that the use of a combination of systems approach and action research in Indonesia is problematic. When a theoretical assessment shows that they appear to be compatible with Pancasila then operational investigation is advisable. The following sections (2.4 and 2.5) consecutively present theoretical investigations whether systems approach and action research are possibly compatible with Pancasila.

## 2.4 Systems approach and Pancasila

Theoretical investigation of systems approach with Pancasila in this research was executed using the concept of correspondence, consistent and coherence (see Appendix 3). Correspondence evaluation focuses on the agreement between the basic idea of Pancasila and systemic thought. Consistent evaluation focuses on the agreement of structure and parts with Pancasila. Coherence focuses on the agreement of the functions of the whole structure and each part that compose the structure with Pancasila.

### Correspondence

As described earlier in chapter 1, the systems approach and Pancasila have similar basic philosophical underpinnings in western culture, which places the existence of truth as important. The similarity of their basic philosophy is already discussed in section 1.1, whilst the wholeness character of the systems approach is also discussed earlier in section 1.2; the following discusses the wholeness character of Pancasila which can be seen from the essence of each of the five principles it holds.

**First principle:** *Belief in the One and Only God.* This implies the existence of God the creator and thy creation, and also implies that there is a relationship between the creator and the creation, where one holds power over another, which in system science terms can be seen that the creator is 'the supra system' when thy creation is identified as 'the system'. This is an implementation of system thinking concept of system and subsystems.

**The second principle:** *Just and civilised humanity.* This principle implies that within 'the system' the interaction between humans should be in just and civilised relationships. They are also supposed to act in a just and civilised manner with regards to others being within 'the system' that should be regarded as part of 'the supra system'. Systemic thought is also inclusive and emancipatory in nature.

**The third principle:** *The unity of Indonesia.* This principle implies that within the system, there is a subsystem identified as 'Indonesia' where the Indonesians are

supposed to be actors of the subsystem, who should promote the national unity and integrity in a just and civilised manner within 'the subsystem' that should be regarded as part of 'the system' and as part of 'the supra system'.

**The fourth principle:** *Democracy guided by the inner wisdom in the unanimity out of deliberations amongst representatives.* This principle implies that as actors of 'the subsystem', Indonesians practice democracy that is guided by the inner wisdom in the unanimity out of deliberations amongst representatives. It should be noted that this kind of democracy should promote national unity and integrity in a just and civilised manner within 'the subsystem' that should be regarded as a part of 'the system' and as a part of 'the supra system'.

**The fifth principle:** *Social justice for the whole of the people of Indonesia.* This principle implies that as actors of 'the subsystem', Indonesians should practice dynamic and progressive way of distributing happiness to the whole population of 'the subsystem' that should be regarded as part of 'the system' and as part of 'the supra system'.

#### **Consistence**

As described above, Pancasila views the world as consisting of 'the supra system' and 'the system'. Table 2.2 shows that systems approach seemingly regards only 'the system'. However, one of the systems thinking levels (critical systems) acknowledges 'ethics' that can adopt norms derived from relationship between 'the supra system' and 'the system', therefore it can be seen that at this level, the systems approach appears to be consistent with Pancasila.

Within the system there are some parts that can be seen as systematic and pursue a mechanistic paradigm with instrumental logic, which implies the need to manage scarceness with an emphasis on efficiency. 'Hard systems thinking' is concerned with this type of part of 'the system' (Ulrich, 1988).

Within the system there are also some parts that the process is seen to be more systemic than systematic, and pursue an evolutionary paradigm where strategic actions are generated by operating management complexity with emphasise on

effectiveness. Soft system thinking is concerned with this type of parts of 'the system'. *ibid*)

Also, within 'the system' there might be some parts where the situations are conflictive due to the involvement of different values. Excellent communication is needed to bring together the parties involved. Critical ideas of reason may help the investigator to better communicate with each party involved in the problem, so that management of conflict can take place to establish agreed norms that become the common denominator to be obeyed by all parties involved. Critical system thinking is concerned with this type of parts of 'the system' *ibid*).

**Table 2.3: Characteristics of systems thinking levels**

(Source: Ulrich, 1988)

Levels	Character 1	Character 2	Character 3	Character 4	Character 5
<b>Hard system thinking</b>	systematic	mechanistic paradigm	instrumental	efficiency emphasised	management of scarceness
<b>Soft system thinking</b>	systemic	evolutionary paradigm	strategic	effectiveness emphasised	management of complexity
<b>Critical system thinking</b>	critical to ideas of 'reason'	normative paradigm	communicative	ethics emphasised	management of conflict

The above deliberation shows that based on mechanistic western logic, it appears that the systems approach is not consistent with Pancasila, since only one part of systems approach (critical system thinking) is in agreement with Pancasila. But it can be consistent based on eastern logic (Taoism). It appears to have indications that it can be used as a partner of Pancasila at the praxis level, as part of a continuous flux (Caceres, 1998). Each level of the systems approach (soft, hard and critical) has its speciality for handling special part of the investigation. The incorporation of those levels will provide the possibility to interplay with one another to produce the whole improvement. As reference, Taoism, recognizes 'yin' and 'yang' elements in human

body. According to western logic, if 'yin' is true and opposite to 'yang', then 'yang' must be false (mechanical causality with echoes of Cartesian Rationalism). Taoism teaches that: although 'yin' is true, and 'yang' is its opposite, 'yang' may also be true. Since 'yin' and 'yang' interplay and produce a whole.

### Coherence

The first principle of Pancasila: *The belief in the One and Only God* is concerned with both 'the supra system' and 'the system'. As discussed earlier that only critical systems thinking appears to be concerned with relationships between 'the supra system' and 'the system'. Therefore only at this level does the 'Systems Approach' appear to have the potential to be seen as consistent with the first principle of Pancasila.

The second principle of Pancasila: *Just and civilised humanity* is concerned that humans should interact with one another in a just and civilised humanity also humans should act with other beings in a just and civilised humanity. Based on its underlying philosophy, it is only critical systems thinking that appears to emphasise the ethical element concerns with this matter (see table 2.2).

The third principle of Pancasila: *The unity of Indonesia* is concerned with dynamic pluralism to achieve common goals: a just and prosperous community. Indonesia comprises of more than 1000 ethnic groups each having different customs, languages and or dialects, which potentially lead to conflictive situations. The concern of Pancasila in this regard is more explicit within a pledge known as *Bhinneka Tunggal Ika (unity in diversity)*. This implies that Pancasila acknowledges the existence of pluralistic and conflictive situation as a stimulant for advancement.

As shown by Hutchinson (1997), the only level of systems thinking that could be used to eliminate conflictive situation and to maintain dynamic pluralism was critical systems thinking represented by the MMA. This appears to show that only the Critical Systems Thinking has the potential to be compatible with the third principle of Pancasila. Moreover, it also has the potential to be technically needed in implementing this principle at praxis level.



The fourth principle of Pancasila: *Democracy guided by the inner wisdom in the unanimity out of deliberation amongst representatives*. This principle is concerned with democracy. Critical systems thinking can be seen to be emancipative, reflective and adaptable, which symbolises democracy. Moreover, critical system thinking can be seen as an attempt to give participants more control over their situation. '.....obviously, emancipation can never be achieved unless those involved participate in the process' (Levin, 1994, p.28). This implies that 'critical systems thinking' appears to have the potential to be compatible with this principle.

The fifth principle of Pancasila: *'Social justice for the whole of the people of Indonesia'*. This principle is concerned with creating and maintaining the social justice for the whole people of Indonesia. To create and maintain social justice people need power and ethical norms as common denominators. The only level of system thinking that is concerned with the effect of power and ethics of a situation is critical system thinking. It attempts to establish what the situation ought to be in terms of social justice (Ulrich, 1987). Besides that, critical system thinking accommodates and supports other system ideas (Jackson, 1994) as it allows users to be critical of various methods used and the assumption made, as well as social consequences of the system investigated. All of these indicate that 'critical systems thinking' appears to have the potential to be compatible with Pancasila.

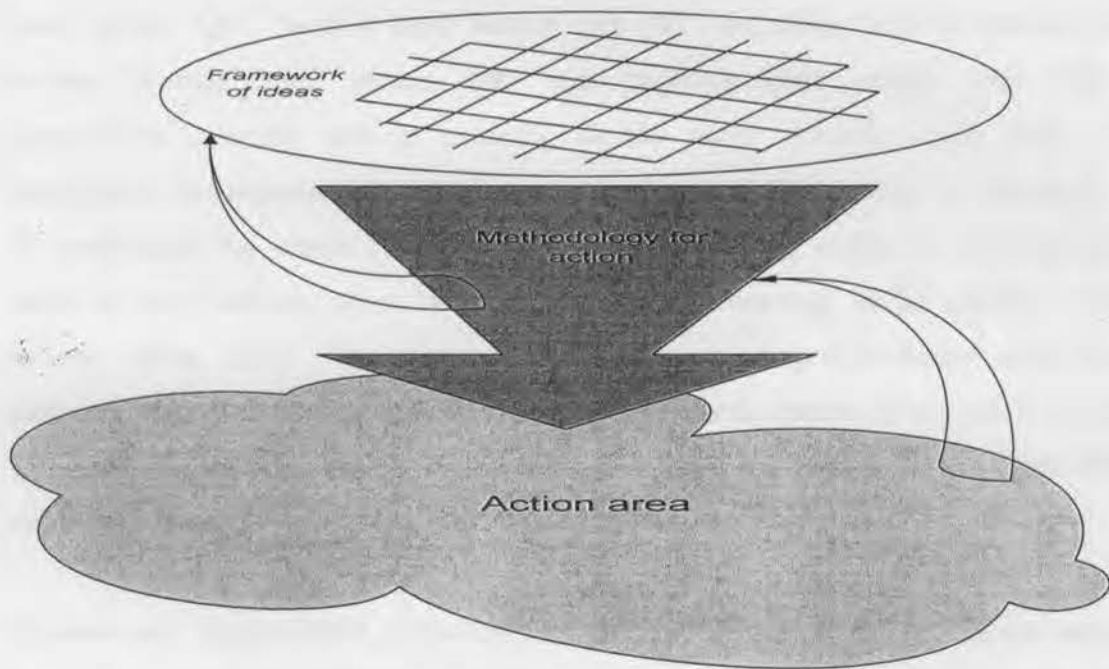
As discussed in section 1.4 that due to the situation of the case study, the MMA (Hutchinson, 1997) is appropriate to handle problems such as this. However, it is a combination of systems thinking and action research. Therefore, it was thought necessary to also theoretically investigate its compatibility with Pancasila. The following sections present this investigation.

## **2.5 Action research and Pancasila**

Science is socially constructed, which is subject to re-interpretation, revision and enrichment. This provides opportunities of combining action and research, that encompass practical benefit through actions and obtaining science based on research. It is postulated that the main criterion of action research is to obtain useful knowledge that is creditable although the sources include unrecognised worthy sources like the

rebel, the heretical, the indigenous, and the common folk (Borda 2002 p.29)<sup>5</sup>; and it **commits to serve praxis usage**. This indicates that action research appreciates all collected views, and it treats them equally for practical and scientific purposes. The practical benefit is the **transformed situation** (social practice, social media, social structure and individual's knowledge) and the social science benefit is the **knowledge** that relates to such a transformation (see figure 2.3).

Some writers are convinced that its roots come from the work of Kurt Lewin in the 1940s (Flood, 1999). In fact it became a 'global movement' in 1970's when there was a need respond to real life problematic situations. Also there was an overwhelming recurrence of structural crises almost everywhere in the world. This produced a need for knowledge and techniques effectively committed to social and political action in order to induce the needed transformations of the existing situations. This kind of response seems to occur in all over the world such as in India, Colombia, Brazil, Mexico, French, Switzerland, Germany and USA (Borda, 2002).



**Figure 2.2 Action research model**

(Adapted from: Checkland and Holwell, 1998 p.22)

<sup>5</sup> The rebels are those who show resistant against the established authority. The heretical are those who hold an uncommon opinion. The indigenous are those who are the natural inhabitant of the area. The common folk are those who belong to common people of the area.

Seen from the scientific point of view, Checkland and Holwell (1998) critique action research as having a serious deficiency. It has omitted the need for a declared-advance intellectual framework of ideas, which is needed to define and express what constitutes knowledge about the situation. However, Checkland (1995) has recommended a very general model of organised use of rational thought and an essential form of reasoning for action research, which has been used for management sciences and in systemic thinking. Figure 2.2 presents that recommended model of action research, which in systemic thinking is known as '*interpretive-based systemic theory*'.

Interpretive-based systemic theory is concerned with situations defined through action research concepts. A specific action concept can only be recognised in a thorough observation of a certain set of social rules that lead to social practice, where behind it, there is a constitutive meaning (Checkland, 1995). Different culture may have different constitutive meaning of a certain action. Such as for Indonesian 'nodding head' means 'OK', 'waving head' means 'Not OK'; for others (such as French) in reverse 'waving head' means 'OK' and 'nodding head' means 'Not OK'. Constitutive meaning puts in meaning to the social practice, since there is fundamental assumption that underlies what is done and what makes it meaningful. To understand the whole concept of interpretive thinking within an investigated situation, one requires appreciation of constitutive meaning, social practice and actions taken (*ibid*). Therefore, to achieve an interpretive-based systemic understanding, it is necessary both to study the cultural aspects of any situation as well as the interpretations and perceptions that individual people form within the cultural context

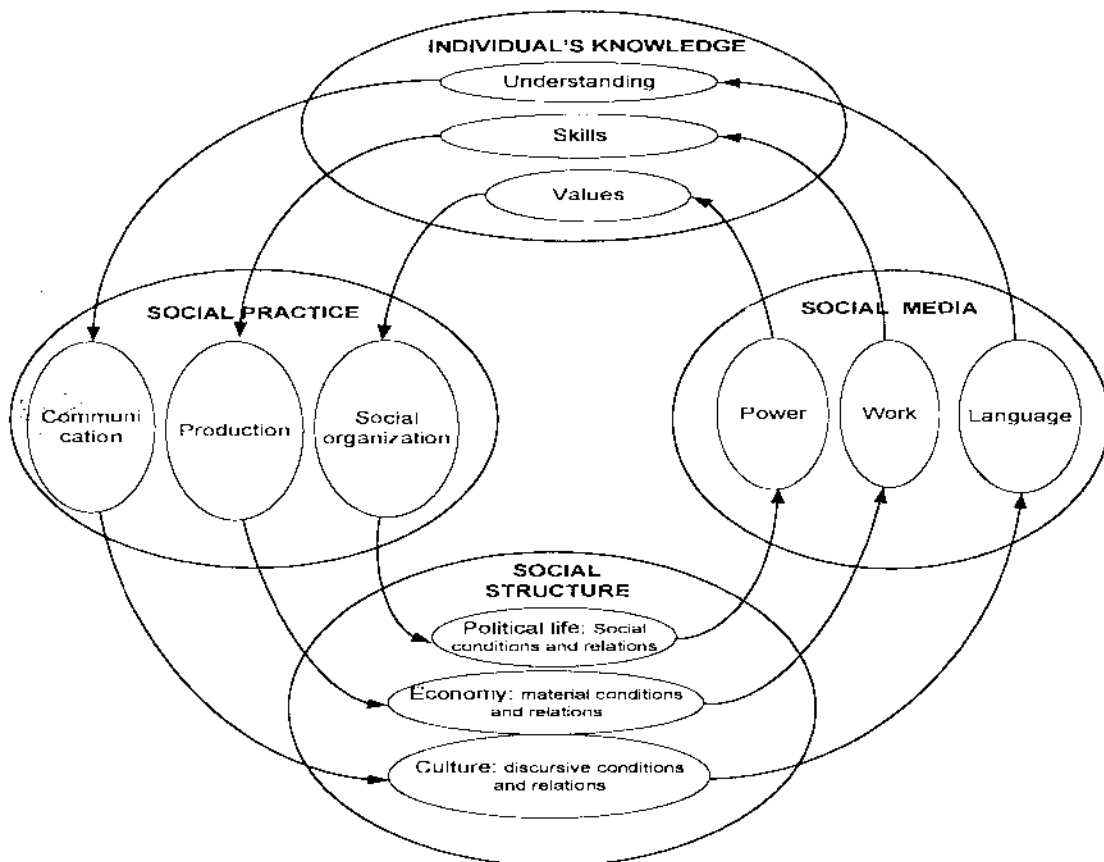
Kemmis and Taggart (2003, p.384-390) recommend that action research should have key features of self reflective spiral (here the author would preferable cycle to spiral) that consist of at least seven characters:

- a. *social process*. The argument comes some part derives from Habermas (1992) who recognises that no individuation is possible without socialisation, and no socialisation is possible without individuation. The

other part is from Kemmis and Taggart themselves that the processes of individuation and socialisation continue to shape individuals and social relationship in all the setting in which one find oneself.

**b. participatory.** Action research engages people in examining their knowledge (understanding, skills and values) and interpretive categories (ways they interpret themselves and their action in the social and material world). Therefore people can do action research only on themselves, individually or collectively. They do not do for others.

**c. practical and collaborative.** Action research engages people in examining the social practice that links them with others in social interaction. Therefore action researcher aims to work together in reconstructing their social interactions by reconstructing the acts that constitute them.



**Figure 2.3 The cycles of critical and self action and reflection**  
 (Adapted from: Kemmis and Taggart, 2003, p.387)

- d. emancipatory.* Action research aims to help people recover and release themselves, from the constraints of irrational, unproductive, unjust and unsatisfying social structure that limit their self-development and self-determination. People have to search ways to survive or best work within such a situation and as much as possible to restructure a shared social life.
- e. critical.* Action research aims to help people recover and release themselves from the constraints embedded in social media through which they interact: language, modes of work and social power. Therefore people should consciously reconsider unproductive, unjust, unsatisfying ways of interpreting and describing their world, ways of working, and ways of relating to others.
- f. recursive (reflective, dialectical).* Action research aims to help people to investigate reality in order to change it, also to change it in order to investigate it, in such a way so that they form a spiral like cycles of critical and self-critical action and reflection (see figure 2.3). This spiral like cycles includes individual knowledge (understanding, skill and values), social media (language, work and power), social structure (culture, economy and political life), and social practice (communication, production and social organisation). It looks like a spiral since the more it moves around it generates better and better individual practice, social practice, social structure and social media. However, as an effort may not always have success. Figure 2.3 presents the spiral like cycles of critical and self-action and reflection. Imagine, seen from behind it looks like a spiral, since it moves upwards (better and better), but seen from the top it looks like a circle, the author prefers the latter (represented in figure 2.3).
- g. having aims to transform both theory and practice.* Through action research people consciously transform a situation to another situation. In 'learning by doing' people benefit in that they gain individual knowledge, and increase abilities in social practice, social structure and social media (see figure 2.3). Whether it is a success or fail in achieving better situation,

people always gain something new. They do not regard either theory or practice as pre-eminent in their relationships of one another. They aim to develop and articulate one in relation to another.

**Table 2.4 Compatibility of Action Research with Pancasila Principles**

	1 <sup>st</sup> Principle: Belief in God	2 <sup>nd</sup> Principle: Humanity	3 <sup>rd</sup> Principle: Unity of Indonesia	4 <sup>th</sup> Principle: Democracy	5 <sup>th</sup> Principle: Social Justice
<b>Social process</b>	NIP	NIP	NIP	NIP	Guaranteed
<b>Participatory</b>	NIP	Guaranteed	NIP	Guaranteed	Guaranteed
<b>Practical and collaborative</b>	NIP	NIP	NIP	NIP	Guaranteed
<b>Emancipatory</b>	NIP	Guaranteed	NIP	Guaranteed	Guaranteed
<b>Critical</b>	NIP	Guaranteed	NIP	Guaranteed	Guaranteed
<b>Recursive</b>	NIP	NIP	NIP	NIP	Guaranteed
<b>Theoretical and practical.</b>	NIP	NIP	NIP	NIP	Guaranteed

*Note: NIP = No Incommensurate Points this means that there is no principle that contradict one another.*

*1<sup>st</sup> Principle: Belief in the one and only God*

*2<sup>nd</sup> Principle: Just and civilized humanity*

*3<sup>rd</sup> Principle: The unity of Indonesia*

*4<sup>th</sup> Principle: Democracy guided by the inner wisdom in unanimity arising out of deliberations amongst representatives.*

*5<sup>th</sup> Principle: Social justice for the whole of the people of Indonesia.*

*The term 'Guaranteed' is used to emphasize that that action research principle, is included within the identified Pancasila principle.*

The above review on action research shows no incommensurate-points with the principles of Pancasila. Table 2.4 shows not only that there is no commensurate point, but also provides indications that action research principles are guaranteed by Pancasila principles to be practiced in Indonesia.

Practicing action research in Indonesia gives possible ways of articulating a popular habit of Indonesian that is commonly called as '*gotong royong*' (collective works),

with a scientific development mission. *Gotong royong* is a working action that depends on the capability each member of a village, group or family to participate in an action whether it is an agricultural job (from land preparation up to harvesting), a party, building or renovating a house, village cleaning, and so on. Although within *gotong royong* transfer of knowledge occurs from the seniors to juniors, but increasing knowledge does not yet become its special concern. However, the existence of *gotong royong* can be seen as an indication of possible acceptance of the use of action research in Indonesia.

## 2.6 Summary

The formal guidance of space development management in Indonesia is the INCS. It was promulgated by the President of the Republic of Indonesia, as the Chairman of Depanri on the 10<sup>th</sup> of December 1998. It consists of basic idea, character, basic concept, basic teaching, and direction of view, position and function of the INCS.

Guided by the INCS, Depanri has established the General Policies of National Space Development in Indonesia for the period of 1999 – 2004, which include targets and programs of national space development on human resources, science and technology, manufacturing industry, services industry, natural resources, political and legal aspects, and institutional aspects. Capability in manufacturing, launching and operating micro satellites to support national development is one among a number of targets that will be developed by Indonesia.

The Micro Satellite Development Project was initiated by LAPAN, and was adopted by the MNRT as one among other projects that are categorised as bottom up approach projects, which complete the top down approach projects initiated by the Office of MNRT within the RUSNAS scheme. The organisation of the project consists of two levels, the steering committee and the technical committee. Both of them are composed of representatives from various institutions and corporations, appointed by the MNRT as Executive Chairman of the Depanri.

The project description implies that the Micro Satellite Development Project should be managed in a systemic way but evaluation shows that it was not yet organised as

implied. Therefore, the use of systemic approach may help show how to manage it in a holistic manner. However, the project's philosophical basis is Pancasila; therefore, there seemed to be a need to theoretically investigate whether systems approach can be used in the Pancasila context. The above theoretical investigation provided a positive signal for further practical investigation.

The similar character of action research with '*gotong royong*' leads to name it as the '*gotong royong research*'. The introduction of this term was intentionally directed to avoid psychological effect coming from the word 'action' (*aksi*), a term that has a traumatic connotation that relates to the communist purge of 1965. Therefore using the term '*gotong royong research*' with the Indonesian public will give greater advantage than 'action research'. It was expected that using this term and uncovering indications of possible compatibility of action research with Pancasila, would lead to a greater acceptance of participants regarding the use of action research in Indonesia.

The indications of compatibility of systems approach and action research with Pancasila could also be similar with those of the Multi-methodology approach used by Hutchinson (1997), since the latter approach is a combined method of systems approach and action research.



## Chapter 3

### SYSTEMS THINKING USAGE IN LARGE PROJECTS

#### 3.0 General overview

A large project refers to a one with a large number and various types of stakeholders such as Waduk Jatiluhur Project in West Jawa (Kimpraswil, 2003). This project has the aim to establish an artificial lake that was designed to be beneficial for various usages such as agriculture (irrigation), flood control, electricity (water power based electric generation), tourism, sport, and fishing grounds. Those impacts spread over a large geographic area (three provinces: West Jawa, Banten and Jakarta) and a large population with various interests. Due to the large impact to people and their physical, social and cultural environment, such a project has by definition, a large number of stakeholders. The types of interested groups and individuals can be classified based on: power, urgency and legitimacy (Mitchell *et al*, 1997). This will become one of the reasons for the refurbishment of the Hutchinson's (1997) MMA<sup>1</sup> that will be discussed in section 3.3.

Sipesmik was designed to have a large impact on various sectors and cover the whole area of Indonesia (Lapan, 2002) whose population is more than 225 millions. Therefore, it can be categorized as a large project. Section 2.1 described the approach used in generating and managing the Sipesmik project as top down approach by strategic management. To clarify this, section 3.1 is set to discuss strategic management used by Depanri. As described in section 2.1, due to the limitation of the approach used, and its practices, this research found the use of strategic management and its practice by Depanri was inappropriate in the context of the actual national development, since it appears that the role of clients is more and more decisive with regards to the effectiveness and efficiency of an organization. The research used systems approach as represented by an MMA that can be categorized as bottom up approach, whether it can help complete the approach for becoming in compliance with the criteria as inferentially requested by the actual national development concept, i.e. the public becomes both subject and object of the development

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<sup>1</sup> The Hutchinson's (1997) MMA will be identified as the 'MMA' in this document.

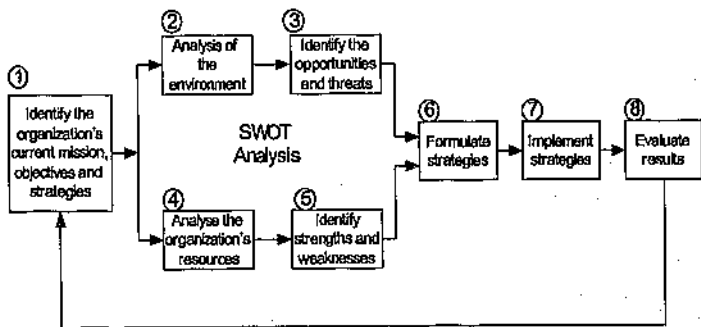
The MMA implements Total System Intervention (TSI) that was introduced by Flood and Jackson (1991). It incorporates the SSM, CSH, VSD and SD (see section 1.2). SSM was introduced by Checkland (1972, 1981). It encourages its users to compare the 'real world' and the 'ideal world'. Their deviations should become the basis in defining the necessary actions to create an achievable ideal world. This world is illustrated in the conceptual models produced. Ulrich (1987, 1993) developed CSH to encourage its users to be critical in investigating a problem situation and consider the power aspects of it. For this, a list of questions is provided, so that a project investigator can map the investigated situation in a critical manner. The resulted map should be used as the basis for establishing policies and strategies of actions to improve the situation. The models that include policies and strategies of actions resulted by the use of SSM and CSH can be compared to a directive plan (Robin, 2000) for a project, which covers the whole process of managing a project but in general representations.

VSD was developed by Beer (1984, 1993) to produce a generic model of the functions needed to produce a 'viable' system. Information flows within an organization are modelled in order to understand how organisation can learn, adapt and remain viable. SD (previously called Industrial Dynamics) was developed by Forrester (1958) who used 'Feedback Control Theory' in simulation models of organizations. Further discussion on VSD can be seen in the Appendix 3, and section 3.3 outlines reasons why these methodologies were not used in this research

The focus of this chapter is to outline a combination of the SSM and CSH with special concern on their usages in large projects. A reflection on this is provided in section 3.4. However to provide the basis, section 3.2 was set to introduce the MMA, and its refurbishment is explained in the section 3.3. This refurbishment suggests some steps to be inserted in the MMA investigation steps that one of them is discussed by section 3.5. Section 3.6 ends this chapter by a summary. The next section is set to clarify the strategic management used by Depanri in managing programs and projects in space.

### 3.1 Strategic management

Based on traditional concepts, managers see a plan as an extension of an organization's past (Robin, 2000, p.277). However, environmental shocks (Toffler, 1980) such as technological advancements and changes, globalization, energy crises, and deregulations demoralize that concept and force managers to make the necessary changes. For this, managers need a systematic means of analysing its environment for assessing its strengths, weaknesses, opportunities and threats, from which its future will be built. Figure 3.1 illustrates a strategic management process with iteration; a modified version of Robins et al (2000). Its starting point is evaluating the present status of the organization, especially its current mission, objectives and strategies. Then analysing the environment, from which the opportunities and threats are identified. Through analysing the organization's resources, from which its strengths and weaknesses are identified. Based on its strengths, weaknesses, opportunities and threats, the new strategies are established. After having been implemented, the results of strategies are evaluated to be input for a new recursion that starts with identifying the current mission, objectives and strategies and so on as illustrated in figure 3.1.



*(This feedback is not present in conventional methods)*

**Figure 3.1 Iteration in Strategic Management Process**

(Source: Robins et al, 2000, p.277)

Note: SWOT = Strength, Weaknesses, Opportunities and Threats

Depanri established its 25 year plan (1999 to 2024) on space development, by practicing strategic management. This can be inferred from the stepping stones of the assessment (Depanri, 1998b) that are as follows:

1. Notion and direction of national space development that was derived from the INCS,
2. Prediction on the national space development results up to the end of 1998,
3. Challenges, constraints and opportunities within 25 years a head,
4. Targets and policies for national space development for 25 years a head.

As compared to strategic management steps illustrated in figure 3.1, the above stepping stones indicate that although both of them use different terms, they still use a similar framework. This can be clarified as follows:

- Step 1 can be considered as comparable to step 1 in figure 3.1. The 'Notion and direction of national space development' (that was derived from the INCS) can be seen as the organization current mission, objectives and strategies.
- Step 2 can be comprehended as alike to step 4 in figure 3.1. The prediction on the national space development results up to the end of 1998 can be judged as similar to organization resources.
- Step 3 can be judged as similar to step 3 and 5 in figure 3.1. Challenges, constraints and opportunities within 25 years a head, can be valued as similar to strengths, weaknesses, opportunities and threats.
- Step 4 can be seen as comparable to step 6 in figure 3.1. Targets and policies can be seen as akin to strategies.

The above reflection indicates that Depanri has implemented strategic management in projects within the national space development context. From figure 3.1, it can be seen that top down approach characterised this approach, within which no indication of public involvement in the decision making process. However, the actual national development concept (see section 2.1) inferentially provides the liberty for public to select what they think appropriate for them to do, within the national development framework

The concern of the national development concept appears to be relevant to the fact that actually Indonesians can be classified into three groups based on Toffler's (1980) evaluation of the world development. The first group consists of those who are still in the first wave. They are now involved in advancing agricultural activities, where some of them are still practicing shifting cultivation (Sunderlin, 1998). The government encourages them to settle in fixed agricultural spots (FPA, 2001). The second group composed by those who are in the second wave. They are busy with industrialization or business of mass production, such as cars, motor cars, bicycles, garments, foods etc. The third group is made up of those who are already in the third wave. They are akin with information based business such as stock exchange and other virtual based businesses.

In fact Sipesmik is concerned with all of these groups. Systems approach may help them interplay one another so that one can do what one prefers but one's result accomplishes the need of others. The following sections will investigate whether methodologies incorporated within the MMA comply with that expectation.

### **3.2 The Multi Methodological Approach (MMA)**

The MMA can be summarized as the following. The starting step is that the investigated situation is going to be considered as complex, pluralist and coercive. To cope with this situation, CSH and the SSM are combined and used to explore the problem. CSH is thought appropriate to aid in enlightening the coercive aspects (see table 3.1).

The list of interview questions specified by the CSH were designed to collect qualitative data on 'what is' and 'what ought to be' the system from those who are involved in and affected by the project. SSM provides tools provides to process data acquired by the use of CSH, and to develop conceptual models from root definitions. To implement conceptual models in the real world, hard systems concepts can be used. VSD can be used to develop organization models for the project. Also, SD can be used to display the causality relationships of the identified tasks that should be executed to achieve the objectives of the conceptual models.

**Table 3.1 Types of complexity of a problem situation and the suggested methodologies (Source: Flood and Jackson, 1991, p 42)**

SYSTEM COMPLEXITY	PERCEIVED POWER		
	Unitary	Pluralist	Coercive
<b>Simple</b>	<b>Simple-unitary:</b> 1. Operation Research (OR) 2. Systems Analysis (SA) 3. Systems Dynamics (SD) 4. System Engineering (SE)	<b>Simple-pluralist</b> 1. Social System Design (SSD) 2. Strategic Assumption Surfacing and Testing (SAST)	<b>Simple-coercive</b> 1. Critical Systems Heuristic (CSH)
<b>Complex</b>	<b>Complex-unitary</b> 1. Viable System Diagnostic (VSD) 2. General System Theory (GST) 3. Socio Technical System Thinking (SST) 4. Contingency Theory	<b>Complex-pluralist</b> 1. Interactive Planning (IP) 2. Soft Systems Methodology (SSM)	<b>Complex-coercive</b> ?

The starting point in selecting the methodologies (CSH, SSM, VSD and SD) come from the investigator who assumes the problem type most appropriate. To help in providing an answer, Hutchinson (1997) uses three types of tools. The first is the System of Systems Methodologies (Jackson and Keys, 1984; Flood and Jackson, 1991) to match a methodology with a problem type (see table 3.1). The second is the work of Oliga (1988) who describes the philosophical foundation of each methodology. The third is the work of Lane (1994), who uses Burell and Morgan's grid to magnify the paradigms underlying each methodology (see table 3.2)

Table 3.2 shows that no suggested methodology for problem situation having the characteristics of complex and coercive. The CSH considers subjectivity and social conflict as the basis for problem solving assessment therefore it is classified in table 3.2 as a radical humanist. The SSM is in the interpretive mode, whilst the VSD and the SD are in the functionalist mode. This because the CSH considers that social conflict and subjectivity as the basis for problem assessment, and the SSM views that keeping the status-quo and subjectivity are dominant, whilst the VSD and the SD are

in the objectivist strain. This table leads to arrange the investigation stages of the MMA as presented in figure 3.2.

**Table 3.2 Paradigms used in each of methodologies selected for MMA**

(Summarized from: Oliga, 1988; Lane 1994)

<p style="text-align: center;"><b>Functionalist (Objective Regulation)</b></p> <p><b>View</b> is driven by the need to keep the status-quo, so that the society run as it is.</p> <p><b>Assumption:</b> social reality has an objective existence</p> <p><b>Methodologies:</b> VSD, SD</p>	<p style="text-align: center;"><b>Radical structuralism (Objective Radical)</b></p> <p><b>View</b> is driven by the need to change the situation of the society from the domination of powerful elements in the society to a new situation.</p> <p><b>Assumption:</b> social reality has an objective existence</p> <p><b>Methodologies:</b> none is used</p>
<p style="text-align: center;"><b>Interpretive (Subjective Regulation)</b></p> <p><b>View</b> is driven by the need to keep the status-quo, so that the society run as it is.</p> <p><b>Assumption:</b> individual or social consciousness is determined by the views of individuals.</p> <p><b>Methodologies:</b> SSM</p>	<p style="text-align: center;"><b>Radical humanism (Subjective Radical)</b></p> <p><b>View</b> is driven by the need to change the situation of the society from the domination of powerful elements in the society to a new situation.</p> <p><b>Assumption:</b> individual or social consciousness is determined by the views of individuals</p> <p><b>Methodologies:</b> CSH</p>

The brief description above indicates that among the methodologies incorporated in the MMA, there are two methodologies that have the possibility to be in accord with the criterion that public is both subject and object of the development. Those are the SSM and the CSH, since both of them assume that individual or social consciousness is determined by the views of individuals (see table 3.2). This assumption appreciates individual views based on which improvement of the situation is designed. Keeping the status quo is the stimulant within the SSM context. Within the CSH context, the freeing from powerful domination is what encourages situational improvement.

### THE MMA INVESTIGATION STAGES

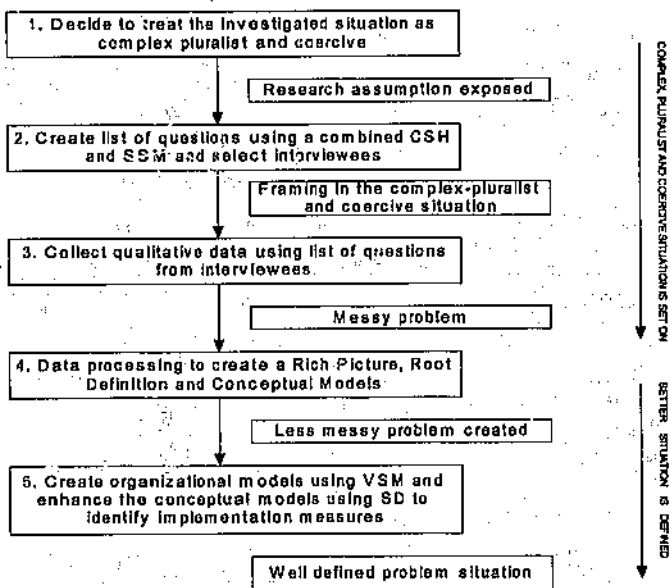


Figure 3.2 Investigation stages of the MMA  
(After Hutchinson, 1997, p.77)

The problem arose of which one of them will be suitable in the Indonesian context. The presence of the reformation movement that caused the demise of Suharto in 1997, Habibie in 1998 and Abdul Rachman Wahid in 1999 from presidential office may indicate that the CSH might be appropriate in representing the stimulant for change. Since it appears that the stimulant was freeing the people from domination of a powerful element in the society. However, it is arguable that the preference of most Indonesians is drastic rather than incremental changes. Therefore SSM might represent a better vehicle for improvement. The fact that Megawati has stayed in presidential office from 1999 may indicate incremental changes have substituted the eagerness to rapid changes as occurred in the period of 1997 to 1999.



Therefore, it was judged that the most appropriate approach was to base the initial modelling on SSM and CSH. But considering the possible characteristics of the investigated situation, as complex, pluralist and coercive, the use of MMA is promising to make those involved in the situation interplay with one another to produce the whole process as requested by the national development concept. Thus a refurbishment of the MMA is thought necessary. The following section discusses this refurbishment.

### 3.3 Refurbishment of the MMA

#### 1) Change the reason to select interviewees

To select interviewees based on their philosophical stance is very difficult if at all possible (Hutchinson, 1997). An investigator only recognizes an interviewee's philosophical stance after the interview is done. However, a classification of philosophical assumptions or positions is helpful to evaluate whether the selected interviewees does or does not represent the whole spectrum of philosophical stances available.

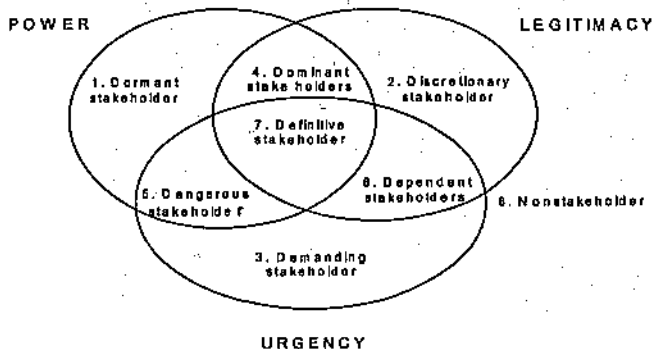
As a consequence of action research, the boundary of research using the MMA may have dynamical character, since it involves stakeholders' participation. As the process evolves starting from:

- critical questioning to diagnosis the problem issue or intention for change,
- proposing and implementing action, and
- evaluating the results of that action,

the stakeholder status of a person, may change, due to which the boundary of the investigated situation may enlarge or reduce. The core of this evolvement process is reflection that may lead to one or more cycles of action (Walker and Haslet, 2002) and each cycle may use difference criteria in support of the decision made, which may cause the inclusion of new stakeholders and or exclusion the existing stakeholders.

According to Mitchell *et al* (1997) the changes in stakeholder status of a person in a project depends on one or two of three relationships attributes: power, legitimacy and

urgency<sup>2</sup> that one holds. Based on which they classify stakeholder into seven types and a non-stakeholder (see figure 3.3). A dangerous stakeholder is a person who has the power and the urgency (see number 5 in figure 3.3). A dormant stakeholder is a person who has the power but does not have the legitimacy and the urgency (see number 1 in figure 3.3). A definitive stakeholder is a person who has the power the legitimacy and the urgency (see number 7 in figure 3.3). A non stakeholder is a person who does not have any of those elements (see figure 8 in figure 3.3). However the status of a person may one day be as a non-stakeholder but tomorrow a dangerous stakeholder or the other. Therefore to grasp the holistic characteristics in composing interviewees (respondents), they should include both stakeholders and non stakeholders. However to identify them in the real world is not easy. Also some of those terms can give a negative image to those who are classified into them, especially those of dormant and dangerous. It needs to recognize their representations in the real world and get more positive terms.



**Figure 3.3 Stakeholders' types**

(Source: Mitchell, et al, 1997, p. 874)

<sup>2</sup> Power relates to decision making such as approve or reject a proposal. Legitimacy relates to provide legitimation, recommendation or witness that can be used as the basis for a decision. Such as a recommendation from the police (Police Clearance) that someone does not involved with any crime. Urgency relates to the need of products that can be goods or services, such as the national geography agency of a country, it has the urgency on the availability of remote sensing data. It does not matter on how those data can be acquired. The most important is the availability of the data that comply with the defined criteria.

**Decision makers** can represent those who possess power, since only those who hold power can impose a decision made into implementation. **Academicians** can represent those who possess legitimacy of having the necessary knowledge. Professionals can represent those who possess urgency, since the investigated situation is concerned with their jobs (professions). The approval of the project means their jobs are secured. Those who professionally involved in an investigated situation can be classified into two classes, those who are directly involved (**executor**) and those who are indirectly involved (**involved witnesses**). Who professionally have direct involvement with the project are the executors, such as researchers on micro satellite. Those who professionally have indirect involvement with the project can witness the project, such as those who are responsible with administration aspect of Sipesmik project. Therefore they can be identified as involved witnesses. Those who, at the time of selection, are not identified as stakeholders (in decision making positions, having academic interest in the investigated situation, executors and involved witnesses) can represent the non stakeholders. They can be identified as the **not involved witnesses**, since they witness the project but they are not involved. Those who belong to this category will participate, if they see possibilities of getting benefits or harmed by it.

The above reflection leads to the assumption that the interviewees (samples) should consist of those who at the time of selection are:

- a) decision makers in the investigated situation
- b) having academic interest in the investigated situation
- c) executors of the investigated situation
- d) involved witnesses of the investigated situation, and
- e) not involved witnesses of the investigated situation

However, all of those who are selected to be respondents should represent all types of stakeholder and non stakeholders.

2) A new step of 'engagement process to systems thinking' should be inserted

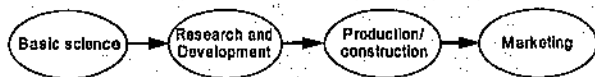
According to Ledington and Ledington (2001) an engagement process to systems thinking is thought necessary before an interpretive systemic research can be executed. Action research needs participation of both persons involved and not

involved in the situation, so that the more holistic view of the situation can be gathered. The MMA comes from a western developed country. To introduce it into an eastern developing country needs special techniques that accommodate various levels of knowledge, educational and professional background and other local conditions.

In certain cases, the use of traditional parable, familiar terms or phrases may have greatest possible acceptance, such as 'action research' be introduced as '*riset gotong royong*' (gotong royong research, see section 2.4). To illustrate the difference between the holistic views and partial views a traditional parable of the elephant and the blind men can be used. One blind man can only provide a partial view of the elephant, based on his result of caressing it. The more blind men involved in caressing it, the more holistic views of the elephant can be gathered.

Another illustration can also be used to show the difference between partial views and holistic views such as the linear model of innovation process and the interactive model of innovation process, where the latter is the more holistic. Figure 3.4 shows two types of linear models. Figure 3.4a shows that innovation process starts from a finding in basic science that stimulates research and development to result basic engineering, based on which a product can be produced or constructed and marketed.

a. Science push model



b. Demand pull model

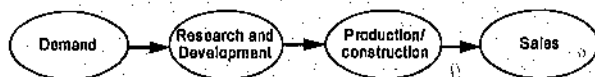


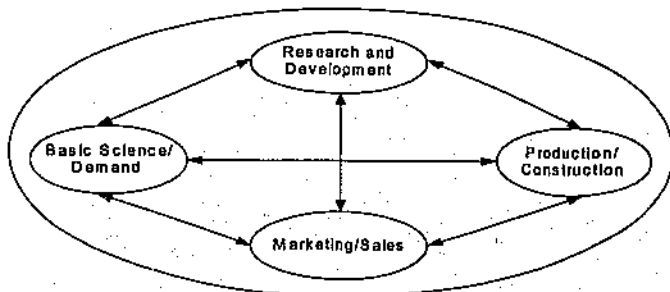
Figure 3.4 Linear model of innovation process

(Source: Manley, 2001, p.7)

Figure 3.4b presents the similar flow with a slight difference, it starts from the presence of demand that stimulates research and development to result basic engineering based on which a product can be produced or constructed and sold. However, in the real world, the innovation process is not that simple, to result a basic engineering may need intensive communications between those who are in the basic science camp and those who are in the research and development camp. Similar situations may occur between camps. The model showing that sort of interactive relationships between camps is the interactive model of innovation process, presented by figure 3.5.

Figure 3.5 is a combination between figure 3.4a and 3.4b that shows the whole (figure 3.5) more than the parts (figure 3.4a and 3.4b). Figure 3.4 shows how the finding in basic science can stimulate further process to result a new product that can be marketed. To market it means to create market for this product, since the demand is not yet available. Figure 3.4b stresses the presence of demand of a certain products. This demand stimulates research and development to result a basic engineering of a demanded product. Based on this basic engineering, that product is produced or constructed, and sold to the demander. Figure 3.5 shows that the innovation process can start from everywhere in the indicated camps, the basic science, the presence of demand, the research and development, the production/ construction, or the marketing/sales. The process is cyclical that can be seen as a never ending process. This process occurs in an environment that affects the whole process.

Views of an interviewee may be partial view, however if a number of partial views collected and combined, they will result the whole appearance of the observed situation. Better understanding of a situation will be resulted from participation of all interviewees.



**Figure 3.5 Interactive Model of Innovation Process**

(Source: Manley, 2001, p.7)

The above illustrations are supposed to be able to elevate the interviewees' understanding on how important their participations are, which stimulate their enthusiasm to participate in the research.

- 3) 'Model validation' and 'model improvement' steps should be scheduled after the modelling process is completed.

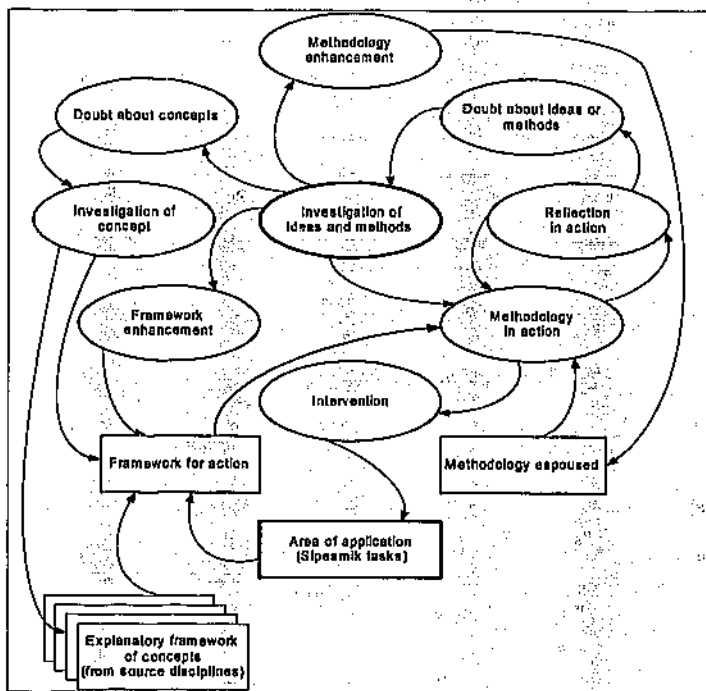
As an action research the MMA cannot just end with modelling. The interviewees should be introduced to the models. They have to get the opportunity of evaluating them, to verify and validate them also suggest further improvement. In this way, what Tepe and Haslett (2002) identified as 'reflection' that is the core of the recursive characteristic of an action research can take place. Also as Kemmis and Taggart (2003) suggested, action research has to be reflective and dialectical so that the effect of its operation creates an increase of individual knowledge, social practice, social structure and social media can work in cyclical manner (see figure 2.3).

The ARF (James and Smith, 2002) is in line with the suggestions of Tepe and Haslett, (2002); and Kemmis and Taggart, (2003). It is concerned with framework and methodology enhancements and reflection in action that need participants' involvement. Figure 3.6 outlines the ARF that emphasizes how knowledge

generation could occur within action research. An action research project is defined in terms of its relationship to

- the relevant field of application,
- the project related roles played by various actors, and
- one or more project stages.

Each project stage is defined in term of a framework for action and an espoused methodology. James and Smith (2002) claim that in some cases reflection upon observation and interpretation of phenomena in a certain application, or on the results of intervention, could lead to enhancement to the framework for action or the methodology.



**Figure 3.6 Action Research Frameworks**  
(Adapted from James and Smith, 2002, p. 272)

The above reflection leads to the conclusion that action research participants should be given the opportunity to participate in model validation and improvement. Within which process of better understanding, reflections and improvements could occur that could benefit both the participants and the research.

### 3.4 Soft System Methodology (SSM)

As described earlier in section 2.0, SSM was created by Checkland (1972, 1981) and his colleagues from Lancaster University in the United Kingdom, who were fascinated by the fact that hard system methodologies have so many limitations when dealing with 'messy' or 'ill-structured' social problems. In the social sciences, a repeated experiment is difficult to achieve if not impossible, since all elements are dynamic, they vary with time. Checkland and Scholes (1990a) describe this situation as 'heavily meaning bearing'<sup>3</sup>, since social science depends on experiences of the person involved. For this type of problematic situation, Checkland (1981) developed a methodology that has the capability to map that situation and develop solutions.

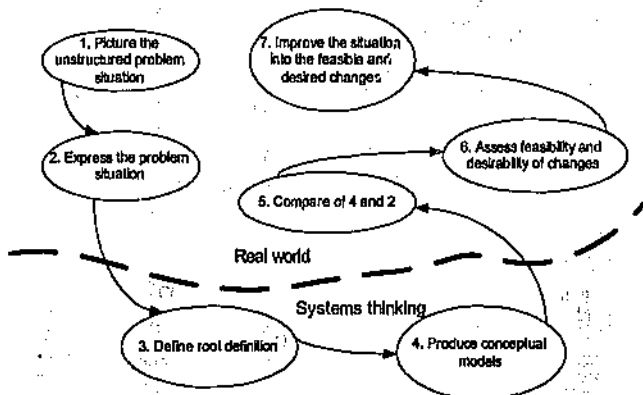


Figure 3.7: The SSM stages

(Source: Flood and Jackson, 1991, p.173)

<sup>3</sup> It means that social science is closely related to experiences and or knowledge of the persons involved. It can not be verified through recurrence of the process of finding it out.



This methodology develops into two styles that can be viewed as frameworks for structuring an enquiry into a situation. The first mode is commonly identified as the mechanistic interpretation of SSM. It consists of seven activities that can be grouped in four stages. Two stages are in the 'real world' portion, and the others are in the 'ideal world' or 'system world' portion. Illustration concerning these stages could be seen in figure 3.7. The second version includes two parallel streams of enquiry into the cultural and the logic-based elements of a problematic situation (Checkland and Scholes, 1990).

### 3.4.1 First version of SSM

Stages of the first mode can be described as follows (see figure 3.7):

**Stage 1** is the **Rich Picture** stage that belongs to the real world portion. This stage consists of two activities, the **first** identify the existence of the unstructured problem, and the **second** describes the perceived real world by compiling views of the participants. In this stage, the problem situation is summarized in a 'rich picture' which describes participants' issues and views regarding internal and external factors. The internal factors include system's structure and process and edges. The external factors include forces that influence the system.

**Stage 2** is the **Root Definition** stage that is in the ideal world portion. In this stage a root definition is created based on the participants' ideal system. It should define precisely the following items:

- a. The **clients** who consume the systems' products
- b. The **actors** who execute the transformation process.
- c. The **transformations** are the process that changes input into out put.
- d. The **weltanschauung** (worldview) is the basis for making the system valuable in the eyes of participants.
- e. The **owners** are those who have the power to close down the system.
- f. The **environment** is everything external to the system and that is considered of having strategic influence to the system

The above items are often called by the mnemonic CATWOE to help memorize the factors should be considered include in a root definition of a system. However, to be consistent with the dynamic stakeholder theory for the selection of respondents, the term 'actors' of a system equals to 'stakeholders'. They include owners, executors and clients. While in the SSM, actors are those who do the activities, owners are those who can stop the activities and clients or customers are the victims or beneficiaries of the purposeful activities (Flood and Jackson, 1991, p.175).

**Stage 3 is Conceptual Modelling.** This stage develops conceptual models based on root definition. These models are designed to demonstrate the necessary actions to function as the ideal system described in the root definition. This stage is still in the 'ideal world' portion therefore everything justified must be ideal, based on the interviewees perceived ideal systems. The models developed must only include tasks directly or inferentially requested by the root definition (s), and for that reason each task should be expressed using verbs used or defined within the root definition.

**Stage 4** backs to 'real world'; this can be seen as the solution formulation stage. This stage consists of three activities, consecutively activity 5, 6 and 7: to compare ideal system (result of activity 4) with the real world (result of activity 2), to identify feasible & desirable changes and at last, action to improve situation. This stage has the role to examine the feasibility of the identified changes and their desirability based on political, cultural and social considerations. When everything is reasonably checked then solution is formulated.

#### 3.4.2 The second version of SSM

It can be formulated as two parallel streams of enquiry into the cultural and the logic-based element of a problematic situation (Checkland and Scholes, 1990, p.281). The differences between them are as follows:

- The first stream, mentally starting from the SSM and using it to structure what is done.
- The second stream, mentally starting from what is to be done and mapping or making sense of it through SSM.

The cultural analysis is an enquiry into the social and political realities of the organizational setting. It takes place in order to modify the proposal of ideal types, which considers of what is actually done. It consists of three separate studies (Barden and Darke, 2002, p.90):

- **Analysis 1:** is an analysis of the intervention that affects the fact of enquiring into the problematic situation has on that situation.
- **Analysis 2:** is an analysis of the social system in term of interacting roles, norms and values.
- **Analysis 3:** is an analysis of the political system within the situation

The logic based stream of enquiry identifies tasks and issues which are relevant in the situation and which lead to proposals of ideal types of systems which might be relevant in an improvement.

Based on those two streams of enquiries a rich picture and a root definition are developed where the CATWOE and the five Es (efficiency, efficacy, effectiveness, ethicality and elegance) are used as guidance. Within this process comparative, feasible and desirable changes analysis are used as tools for tasks selection. Based on the root definition, the conceptual models are developed to lead the way for actions. Implementation of these models will give further input for new iteration. This complete the cyclic activity based action research of the SSM.

Regarding the viability criteria of a system model Checkland and Scholes (1990a) use three factors i.e. efficacy, efficiency and effectiveness. They describe each of them as follows:

- a. **Efficacy** shows the function of the means, whether they work well or not.
- b. **Efficiency** represents the amount of output divided by the amount of resources used in a period of time.
- c. **Effectiveness** is the system performance in achieving its aim in the long term.

Checkland et al (1990) add the above criteria with:

- d. **Ethicality** that concerns with the transformation morally correct or not.
- e. **Elegancy** that concerns with the system aesthetically satisfying or not.

### 3.5 The Critical System Heuristic (CSH)

The CSH was developed by Ulrich (1987, 1993) and emphasises the importance of identifying the normative content of a system, so that the system investigator may investigate any overwhelming and unfair circumstances of the situation observed. To help identify the scope of the system observed, which is influential to the analysis, Ulrich (1987) developed a checklist of boundary questions which provides guidance for observation of an investigated situation. This boundary checklist contains four categories that include the basis of system design for: **values, power, knowledge and legitimization.**

From these categories Ulrich (1987) developed 24 questions to uncover the critical elements of the existing and desired systems. So that based on the gap between the existing and the desired, system investigator could identify tasks necessary to change or modify the system observed. For this purpose these questions should show up the sources of control, motivation, expertise and legitimization of the existing and the desired systems. These questions also have the role as a tool to examine issues which are at the root of the problem and give perspectives from various actors in the system. Therefore each question is designed to investigate what the existing situation is and also what it ought to be.

Ulrich's 24 questions can be combined into 12 questions (Hutchinson, 1997, p.27) as follows:

- 1) Who is / ought to be the client of the system design?
- 2) What is / ought to be purpose of the system design?
- 3) What is /ought to be the system's in-built measure of success?
- 4) Who is /ought to be the decision maker?
- 5) What components of the system and what conditions of successful planning are / ought to be controlled by the decision maker?
- 6) What is / ought to be considered part of the system's environment (that is not under the control of the decision maker)?
- 7) What is / ought to be the planner of the system?
- 8) Who is / ought to be the expert in the design of the system?
- 9) Who is / should be the guarantor of the system?

- 10) Who belongs to the witness of the system, that is who is / ought to be representing those do not involved in the system design but affected by it?
- 11) Are those affected by the system allowed to emancipate themselves from the experts (that is, can be they take their fate into their own hands)?
- 12) What worldview underlies the system? Is this worldview shared by those involved and those affected?

Flood and Jackson (1991) criticize the CSH as utopian, since it requires the system designer should also take into consideration the views of those who are affected but not involved with the system. This research accepts the view that the boundary of a system is dynamic, one day one might be involved but the next day may be not involved anymore with the system, also in reverse. Therefore to complete the wholeness characteristic of the research it should consider the views of those who are not actually involved but affected.

In addition to the above consideration, the view of those who are affected by the system is fundamentally important to be taken into consideration. This is an actualization of Pancasila principles especially those of 'social justice' and 'just and civilized humanity' principles (see section 1.3), in the practical world. These principles imply that justice should be seen from both individual and social perspectives. One's action will not impact only to oneself but also to others. Therefore, to practice social responsibility one should consider one's action's impact on others before taking action.

### **3.6 Reflection on the use of a combination of SSM and CSH for a large project**

As described in section 2.1 that the multimethodological approach (MMA) benefits from using CSH for data collection and SSM for data processing and interpretation. From CSH, the MMA adopts the list of questions for data collection. These questions imply that they are asking for two types of views from the respondents:

- The answer to our 'what is' question will be used to describe the respondents' perceived present situation. This is relevant with the first inquiry stream of second version of SSM, based on which can be structure what is done. (see section 3.2)

- The answer to our 'what ought to be' question will be used to describe the respondents' perceived ideal situation. This is relevant to the second inquiry stream of SSM, based on which can be done the analysis of what should be done and mapping or making sense of that ideal, for improvement of the actual situation.

In addition to the mechanistic interpretation of the SSM in the first mode, which is considered inappropriate for social science (Checkland and Scholes, 1990), the above reflection indicates that the second mode of SSM is more relevant to be combined with the CSH. This is in line with the view of Checkland and Haynes (1994) that SSM was designed to be a framework, not just as prescriptive process, for thinking about and making sense of the world, as well as improving situations perceived as being problematic.

Further support can be raised from the analysis whether the use of the CSH questions can fulfil the need of information for cultural and political analysis in the SSM. Since in this combination the main role of SSM is data processing and interpretation, therefore the most crucial elements from the SSM Capability Maturity Framework<sup>4</sup> (Barnden, Smith and Wilson, 1995, p.11-14) that should be fitted are the technique elements. These elements are:

- **Recognize the real world.** The 'what is' questions can be used to collect data for recognizing of what actually happen. This is the real world.
- **Distinguish the system thinking world.** The 'what ought to be' questions will help to collect data about the ideal world that equals to the system thinking world.
- **Characterize the problem situation.** Table 3.4 shows that the use of CSH questions can help identify the characteristics of the problem situation, that include 'what is' the actual situation, 'what ought to be' the expected situation, and how to change that situation through transformation actions.
- **Analysis:**
  - **Analysis 1:** is the intervention: Table 3.4 shows that information with regard to transformations (improvements and emancipations) can be

<sup>4</sup>The Capability Maturity Framework of SSM consists of philosophy, constitutive rules, process and techniques.

acquired using the CSH questions. Since the purpose of intervention is to transform the actual to ideal situation, therefore information to support this analysis can be acquired using the questions.

**Table 3.3 Fitting Analysis of CSH list of questions with the information requested for the SSM's Cultural and Political analysis**

Information requested from the question.	Cultural analysis (First stream)	Political analysis (Second stream)	Techniques/ transformation
1. Clients	Clients	Clients	Comparison
2. Purposes	Worldviews	Worldviews	Improvement
3. Success criteria of the system	Worldviews	Worldviews	Improvement
4. Decision makers	Owners	Owners	Comparison
5. a. S. components	Worldviews	Worldviews	Comparison
5. b. Success criteria of a plan	Worldviews	Worldviews	Improvement
5.c.Contr.conditions	Worldviews	Worldviews	Comparison
6. S. environments	Environment	Environment	Comparison
7. System's planners	Actors	Actors	Comparison
8. System's experts	Actors	Actors	Comparison
9. System's guarantor	Owners	Owners	Comparison
10. Not involved witnesses but affected and their representations	Clients	Clients	Emancipation
11. Emancipatory practice	Worldviews	Worldviews	Emancipation
12. Underlying world-view and the shares of the involved and the affected parties.	Worldviews	Worldviews	Emancipation

- o **Analysis 2:** is concerned with interacting roles, norm and values. Those who have roles are owners, actors and clients. Therefore when the norm and values (that can be included in worldviews), underlying

the interaction between them gathered using the CSH questions, then these criteria are fitted. Table 3.4 shows that worldviews underlying the interaction within the system is collected using the questions.

- o **Analysis 3:** is concerned with what is possible to be achieved. The CSH questions are designed to collect 'what is' and 'what ought to be' the situation. Among those 'ought to be' situations can be analysed which of them are achievable.
  
- **Rich picture (Characteristically Rich Picture Diagrams), Root Definition and the CATWOE.** Table 3.3 shows that the use of CSH questions may complete the CATWOE for both Rich Picture and Root Definition. However with regard to the graphic presentations of Rich Picture and Root Definition of a large project, they face a dilemmatic situation between completeness and clarity. To have the complete detail, will loose the clarity of the general structure. In contrast, to have the clarity, it will loose some essential detail. The practice of presenting rich picture and root definition in an essay and tables such as done in the MMA appears to be thoughtful to overcome such a dilemma.
  
- **The five Es (efficiency, efficacy, effectiveness, ethicality and elegance).** It is arguable that the use of CSH questions can secure the fulfilment of the necessary information regarding these elements of viability of a model. Therefore it is advisable to complete the CSH questions with other questions that are designed to gather information regarding to these viability elements of a model (the five Es).
  
- **Conceptual modelling, desirable and feasible change, and actions.** It is ideal that all participants join in the development of the conceptual models, analysis and selection of tasks, and action conditions. However the CSH question seems to be not designed to cover such idealism. However the interview can be transferred into a 'talkative knowledge gathering' (Sundberg, 1999) where interviewee can freely express his or her views. And the interviewer may use the list of questions as pointers, so that the whole information targeted can be collected. In this way, other necessary details that



should be collected could be included in the list including, conceptual modelling, desirable and feasible change and preferable actions conditions.

- **Comparison.** Table 3.3 shows that the use of CSH questions can accomplish the need to make comparison between 'what is' and 'what ought to be' the situation.

### 3.7 Model Validation

Forrester and Senge (1980) say that before a model can be used for policy analysis or any other use, the modeller must have sufficient confidence regarding its soundness and usefulness. The common process by which such a confidence is acquired is called validation. (Maani and Cavana, 2000). In the case of system dynamic model, Coyle (1996, p 362) outlines three types of test. These are:

- **Verification test** that verifies whether the structure and parameters of real system, have been corrected transformed in the model.
- **Validation test** that validates whether the model generates the same behaviour that would be expected from the real system.
- **Legitimate test** that determines whether the model comply with the laws of system structure or any generally accepted rules.

The above reflection leads to a conclusion that the essential objective of models validation is to theoretically and judgmentally verify the models. Theoretical verification is done by the researcher. It consists of two types: theoretical verification:

- **Legitimation evaluation** that examines the model's compliance with the laws of system structure or any generally accepted rules, and
- **Tasks desirability and feasibility** of the models.

The laws of system structure are generally accepted rules such as those derived from Churchman's (1971) anatomy of system teleology that consists of nine conditions (see section 4.6). The **tasks desirability evaluation** was designed to evaluate the desirability of the identified tasks based on researcher's judgments and assumptions. The **tasks feasibility evaluation** evaluates the feasibility of the identified tasks based on researcher's judgments and assumptions.

After the researcher has built the sufficient confidence that the models are theoretically valid, the interviewees are invited to judgmentally verify whether their ideal systems have been correctly transcribed into the models and also that they have viability terms of its effectiveness, efficiency, efficacy, ethicality and elegancy. Also, they can be invited to judgmentally validate the models from some special or local intentions such as:

- The system performance of the models in term of its equity<sup>5</sup>.
- The ability of transforming the high level goals into comprehensive and acceptable actions.
- The ability of transforming the high values and goals held within Pancasila into realistic and acceptable actions, in term of its:
  - a. Correspondence that is the agreement of the basic idea
  - b. Consistence that is the role agreement of each part of the model with the basic idea
  - c. Coherence that is the role agreement of the whole structure and parts of the models with the basic idea.

### 3.8 Summary

Strategic management used by Depanri for establishing the long term plans for national space development in Indonesia appeared to be inappropriate in the context actual national development. The concept inferentially requests that public should become both the object and the subject of the development. In actuality, the strategic management used, and its practices do not indicate any public inclusion in the decision making process. The situation in Indonesia is relatively unique in that different parts of the society represent all three of Toffler's (1980) categorical waves (see section 3.1).

The systems approach represented by the MMA after refurbishment appears theoretically to be relevant for Sipesmik project, since:

- Sipesmik was designed to cover all the three Toffler's categorical waves (agricultural, industrial and virtual transformations)

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<sup>5</sup> *Equity* was derived from Pancasila. This is inferentially derived from the first principle, implying that the world is God's creation. All creations are equitably treated by God, and the world is effective and efficient. This reflection helps conclude that to be effective and efficient a model should implement equity principle.

- A combination of systems approach and action research theoretically can help integrate the whole categories, where each one can do one's preference but one's result accomplishes other requirements.

The refurbishment of MMA focuses on the use of a combination of SSM and CSH since among methodologies used in the MMA, only them that are in compliance with the criteria that public should become both subject and object of the development. Due to the mechanistic interpretation of the first version of SSM, which is considered inappropriate for social science, and the SSMs fitted framework with the CSH, the second version of SSM is found suitable to be combined with the CSH. However, in order to complete the necessary information for the implementation of SSM, some questions need to be included in CSH's list of questions. Also the practice of building the Rich Picture and Root Definitions in the form of text, tables and graphic presentation, is considered more suitable for large project investigation/ intervention rather than just graphics displays.

In order to vitalize the self improvement mechanism, a model validation step is thought necessary to be inserted into the MMA's intervention steps. Also, an engagement step needs to be interleaved at the interview step. This insertion was decided upon due to the acknowledgement to all respondents especially those who are not yet familiar with systems approach and action research. In addition to the above refurbishment, a dynamic theory of stakeholder is considered appropriate as the foundation of selecting interviewees for a large project intervention.

Also, with regards to acquiring answers to the research questions (see section 1.3) there is no need to implement all of the steps of the MMA. It was though sufficient to conclude with models' validation. This was thought to be the conclusion of this research, as any further progress actually involves the implementation of the models created, which is beyond the brief of the researcher concerned. **The following analysis and models in Chapters 5 and 6 follow the similar pattern and format as that used in Hutchinson (1997).<sup>6</sup>**

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<sup>6</sup> Many of the models derived in the two separate large projects seemed to have commonality. This occurred despite the differences in objectives (water management versus satellite development). Although, both involved a large number of stakeholders and the general environment, it is a topic for further research but using Riordan's philosophical classification seems to produce models of a similar structure.

## Chapter 4

### THE RESEARCH METHODOLOGY

#### 4.0 General overview

As described in Chapter 3 the Sipesmik can be categorized as a large project, and the best approach to handle it is the MMA. Within this approach, the methodology used should be a combination of two; CSH is used for data collection and SSM for data processing and interpretation. Also, this research accepts the dynamic theory of stakeholders.

Section 4.1 introduces the investigation's steps that were developed considering the refurbishment of the MMA. Section 4.2 discusses the interview questions and their rationales. The interview process will be illustrated in section 4.3 and that becomes the forerunner of the discussion on the building of the Rich Picture in section 4.4 and the Root Definition and Tasks Models in section 4.5. Section 4.6 presents the model's verification and validation. The model validation questions and their rationale are covered in section 4.7. Section 4.8 introduces the data collection and processing of the models' validation. Section 4.9 illustrates the limitations of this research ends this chapter.

#### 4.1 The Investigation Stage

To ensure that the research questions (see section 1.3) are appropriately addressed, the investigation necessarily needs participation of stakeholders of the sample project. The toolkit chosen to define solutions of a complex, pluralist and coercive situations is a combination of systems thinking and action research as is represented by the MMA (see section 3.2). As an action research the use of this approach necessarily needs stakeholders' participation, and also whether the generated solutions are acceptable to them.

Pancasila is a state philosophy within which an ideal situation is expressed. Some Indonesians (Moedjanto, 2003) claim that this idealism has a long history and it embodies the worldview and philosophy of Indonesians. Assuming that it is true, to

transform it into realistic and acceptable actions need participation of Indonesians, who keep in mind their ideal situation. This provides further support to practice an action research.

In view of the first research question, based on MMA, the role of stakeholders in generating solutions is to provide information about 'what is' and 'what ought to be', which data consecutively become inputs for defining Conceptual Models (Rich Picture, Root Definition, and Tasks Models). These are the generated solutions. Considering the second research question, stakeholders have their role to judge as to whether the generated solutions are acceptable to them. Bearing in mind the third research question, the role of stakeholders is also to judge whether a systemic approach can help them to transform an ideal situation that they keep in mind into realistic and acceptable actions.

The above reflection leads to confirm the desirability of using the refurbished MMA. Since this investigation is concerned only with the interpretive part of the approach, only the soft parts among the four combined methodologies in this approach were chosen that is, CSH and SSM. CSH was chosen due its powerful questions that provide the possibility to ascertain what people think about the **present situation** ('what is') and what they think about the **ideal situation** ('what ought to be'). The data of 'what is' can be input for the Rich Picture for the present situation, and the data of 'what ought to be' that represents the ideal situation can be input for the Root Definition, as requested by the SSM, and based on which the task models can be developed.

Up to this stage the selected stakeholders have gained experience through participating in the solutions' generation, which also means involvement in answering of the first research question. To obtain answers of the second and third research questions the researcher needed to proceed to a further step that can be identified as the **judgmental step, which is absent from the MMA**. This judgmental step can be divided into two levels. The first level is for acquiring the answer of the second research question and the second level is for obtaining the answer of the third research question.

Figure 4.1 presents the investigation steps of the research, which consist of five basic steps, 1) Select approach to research questions , 2) generate solutions, 3) Judge solutions, 4) revisit research questions, and 5) Identify future actions.

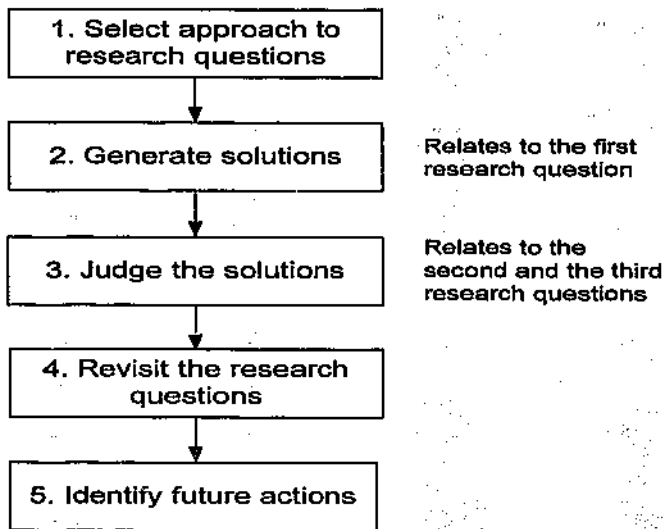


Figure 4.1 Investigation steps

These steps were thought sufficient for answering the research questions. (As some interviewees wished for more concrete answers to the problem when confronted with the conceptual models, the possible implementation strategies and organisational structures were also modelled using VSM. (Please see the appendices for the result). The next section will describe on how solutions were generated.

#### 4.2 The Interview Questions

As discussed in section 4.1 that this research used the CSH for data collection. This method uses twenty four questions to collect data. The twelve critically heuristic boundary questions are in the 'is' mode, and the others are in the 'ought to be' mode

(Flood and Jackson, 1991, p. 206). This research assumed that the simpler the better and it should result in collecting richer information. Therefore those twenty four questions were rearranged into three groups and they were designed to acquire seven basics information as follows:

- 1) **The respondent's philosophical stance.** This information was needed to investigate whether all philosophical stances available were represented to grasp the holistic character of the collected views. However, it was considered extremely difficult as the basis of selecting interviewee, since an investigator only recognizes interview's philosophical stance after the interview is done, however it was helpful for data evaluation especially the consistency of answering questions.
- 2) **The respondent's perceived boundaries of the Sipesmik.** The perceived boundary is 'the gap' between parts that include and exclude of the Sipesmik. With regard to SSM these questions could help obtains the necessary information to produce 'rich picture' of the problem situation and 'root definition' of the desired system.
- 3) **Participants' perception on the occurrence of conflicts or power strives.** As the consequence of the use of the MMA, (basically LSA), the emancipatory focus of critical realism would suggest that the presence of a coercive situation would need to be addressed first (Dobson, 2001). For a critical realist, the presence of a coercive situation may indicate the presence of a dominating inequitable structure that needs to be addressed.
- 4) **Perceptions to build rich pictures of the investigated situation.** This represents of what the respondents think of the 'what is' in the situation. It might be possible that they do not know the 'what is' of the situation, since the selected samples include those who were not involved in the situation.
- 5) **Perceptions to build root definitions for the required system.** These represent what the respondents thought of 'what ought to be' in the situation. Although, they did not know about the 'what is' but everyone has one own ideal situation. Even for those who are involved in the situation can therefore generate ideas.

- 6) **Perceptions of the required organizational structure.** These were needed to develop organizational models, as a supplement the task based conceptual models.
- 7) **Perceptions of the objectives of the desired system and tasks required to achieve them.** These were needed to develop the transformation aspects of the root definition.

The above seven basic information types were designed to be embedded in three groups of questions. The first is concerned with the philosophical stance of interviewee, the second with the management and policy making system and the third about the measures of performance of the desired Sipesmik. Although several questions were specific, the interviewees were also asked to freely express their views, since the nature of the questions was designed be both open and closed. The purpose of was not overtly stated unless requested by the interviewee. The following are the list of questions and their rationales.

#### **Question 1**

What is your underlying philosophical stance for investigating the Sipesmik, for example?

- a. Cost benefit analysis is capable to show the economic value of an action program, therefore each action program of Sipesmik shall accomplish an economically acceptable cost benefit ratio.
- b. Although the Sipesmik is a research and development activity that should be managed as a non profit entity, but it should also be seen as a way of developing national prosperity and security.
- c. Cooperative way of managing the Sipesmik could guarantee the practice of open management and the use of micro satellite system that is limited for peaceful purposes.
- d. Why develop our own satellite, global space market provide choices so that we can choose based on our own criteria that include especially preserving our nature through minimum release of manmade debris in space.



## Rationale of question 1

These questions were designed to obtain information about the philosophical stance of the respondents. It would become an opening discourse between interviewer and interviewee, so that the perceived boundaries and factors influencing of Sipesmik could be obtained.

Options a) to d) represent a continuum from catastrophe-technocentric, corporative technocentric, cooperative-naturopocentric and arthemis-naturopocentric (see below). These questions are designed to show the characters of Sipesmik problem situation which are complex, pluralist and coercive. The complex pluralist is shown by the presence of all philosophical-stance of interviewees, and the coercive character is shown by the present of arthemis-naturopocentric and the catastrophe-technocentric.

The basic thoughts on the above philosophical assumptions are from O'Riordan's (1981) work. This author took two extreme philosophical stances that centres on technological and that natural orientation. Several scientists have proposed a similar method of contrast. Arne Naess's (1973) makes a distinction between shallow ecology and deep ecology. William Catton and Riley Dunlap (1978) uncovered the distinction between the dominant 'human exemptionalism paradigm' of mainstream sociology and the 'new ecological paradigm' of the 'post exuberant age'. Alan Drengson (1980) distinguished the 'technocratic' and 'person-planetary' paradigm. Timothy O'Riordan (1981) uses 'technocentrism' and 'ecocentrism' for environmental problems. Environmental historian, Donald Worster (1983) identifies the 'imperialist' and the 'arcadian', in tradition of ecological thought. Murray Bookchin (1984) contrasts 'environmentalism' and 'social ecology'. Although there are differences, they all contrast a human-centered orientation with an ecology-centered orientation (Eckersley, 1992).

Basically, this research took the position that the technological centered (technocentric) and the natural centered (naturopocentric) orientation were the extremes of a continuum. In the technocentric camp two branches of thought are identified: they are the catastrophe technocentric and the corporative technocentric, whilst in the

naturocentric camp there are the cooperative naturocentric and the arthemis-naturocentric. Technocentrists believe in the preservation of the status quo in the existing structure of political power, but wish for more receptivity and responsibility in political, regulatory, planning and educational institutions. At the opposite end of the spectrum, naturocentrists wish for the redistribution of power towards a decentralized, federated economy with more emphasis on informal economic and social transactions and the pursuit of participatory justice.

#### Question 2

- a. Who is/ought to be:
  - i) The beneficiaries of the Sipesmik process?
  - ii) The decision makers in the Sipesmik process?
  - iii) The planners in the Sipesmik process?
  - iv) The experts used in the Sipesmik process?
  - v) The representatives of those affected by Sipesmik?
- b. What conditions are/are not controlled by the decision maker?
- c. What are/ought to be the constraints on the decision maker?
- d. Who has the power to ensure success of Sipesmik?
- e. Are those affected by Sipesmik allowed to take their fate into their own hands despite the experts? Should they be allowed to?

#### Rationale of question 2

These questions were designed as a consequence of the implementation of MMA in the assessment of Sipesmik. They provide opportunities for interviewees to express their perceptions on the situation (both present and desired). They provided information needed to create root definitions as requested in the SSM as well as exposing power differentials. This stakeholder analysis has primary importance in showing the interaction or transformation process (Dobson, 2001) that is perceived to happen in the Sipesmik.

#### Question 2a

From the CSH point of view, this question allows the interviewee to express their views regarding the actual and the desired main actor of Sipesmik, and to

show any differences between the actual and the desired systems. With regards to SSM, this question helps investigators to find the required human elements of the CATWOE: clients (beneficiaries), actors (planners, experts, representatives), and owners (decision makers) to produce a root definition of the desired systems.

#### **Question 2b**

This question helps investigator to collect respondents' perception regarding the scope of power of the owners of the system. It can also help expose the physical/ social/ economic phenomena that are present in Sipesmik, and that affect the system, but cannot be controlled by the decision makers.

#### **Question 2c**

This question helps the investigator to data on the desired scope of the power of the system's owners with regarding to the actual situation.

#### **Question 2 d**

This question provides the investigator to acquire the respondent's perception on who/what should attempt to control the Sipesmik process to ensure it can function well.

#### **Question 2e**

This question helps to identify whether the implementers of Sipesmik (for example Lapan, BPPT, I Ae etc), are considered appropriate to have real decision making powers or whether they should rely on someone else. This is to identify the respondents' perception on the real decision-making should lie in the Sipesmik process.

#### **Question 3**

**Based on your (life) experience, would you mind telling me what criteria do you use to measure efficiency, effectiveness, efficacy (ease of use and implementation), equity, ethicality and elegance of a Sipesmik plan?**

### **Rationale of question 3**

Multi-functions characterize this question. The first function is to collect information on the desired system especially with regards to measurement of success (Checkland and Scholes, 1990). The second is to recognize the structure and the process elements that should be included in the conceptual models. The third is to allow respondents give more specific indications regarding the scope of Sipesmik and its priorities. The fourth is to discover the respondents' perceived real objective of Sipesmik. The rationale of this question is that to establish the measures of efficiency, effectiveness, efficacy, equity, ethicality and elegance of Sipesmik, the interviewee must first define the outputs, hence the 'purpose' of Sipesmik from their perspectives.

These measures were designed to get qualitative measurements of the viability of the generated models. Three of them suggested by Checkland and Scholes (1990a) i.e. efficacy, efficiency and effectiveness, two other criteria also suggested by Checkland et al (1990b) i.e. ethicality and elegance, and the other one is equity that was derived from Pancasila (see section 3.6).

### **4.3 The Interview Process**

As discussed in section 3.3 the interviewees should consist of those who at the time of selection are:

- a) decision makers in the investigated situation
- b) having academic interest in the investigated situation
- c) executors of the investigated situation
- d) involved witnesses of the investigated situation, and
- e) not involved witnesses of the investigated situation

Also those who are selected to be respondents should represent all types of stakeholder and the non stakeholders. List of those who were selected to be the interviewees of this research are presented in table 4.1 and their stakeholder's types are illustrated in table 4.2.

**Table 4.1 List of the Selected Interviewees**

<b>(1) Managerial and policy making interest</b>	
S 1-5	Members/Officers of DEPANRI (Aeronautics and Space Council of Republic of Indonesia)
S 6-7	Members of DPR (Peoples Representatives Council): Commission: Science & Technology
S 8	Member of National Research Council (aerospace division)
S 9	Officer of National Planning Agency: Science & Technology Bureau
S 10	Officer of Ministry for Research and Technology
<b>(2) Academic interest: (20%)</b>	
S11	Philosophers
S 12	System scientist
S 13	Space policy scientist
S 14	Economists
S 15	Social & political scientist
S 16	Combustion engineer
S 17	Space lawyer
S 18	Environment scientist
S 19	Remote sensing scientists
S 20	Chemists
<b>(3) Executors (20 %)</b>	
S 21	National Program Managers
S 22	Project Manager
S 23	System Engineer
S 24	Satellite Structure
S 25	Thermal
S 26	Mission Control Ground Segment
S 27	Attitude Determination Control System
S 28	Payload Mission 1
S 29	Communication system

S30	Payload Mission 2
<b>(4) Involved witnesses (20 %)</b>	
S 31	Officer of Planning Coordination Bureau
S 32	Government investment analyst
S 33	Officer of Frequency Regulation Directorate
S 34	Officer of Department of Foreign Affairs
S 35	Space vehicle researcher
S 36	Member of ASSI (Indonesia Association of Satellite System)
S 37	Officer of a satellite operator corporation (technique)
S 38	User of remote sensing technology
S 39	Officer of a sea surveillance and communication office
S 40	Officer of a satellite operator corporation (planning)
<b>(5) Not Involved witnesses (20 %)</b>	
S 41	Officer of the National Council for Defence and Security
S 42	Member of AITEI (Indonesia Association on Telecommunication and Electronic Industry)
S 43	Officer of space flight test and operation
S 44	Officer of a spaceport developer corporation
S 45	Officer of a local government
S 46	Officer of a local government
S 47	Public with socio economic development interest/ farmer
S 48	Public with socio economic development interest/fisherman
S 49	Member of KADIN (Chamber of Commerce and Industry)
S 50	Officer with environment preservation /gender empowerment interest

**Table 4.2 Stakeholder Types in the Selected Interviewees<sup>1</sup>**  
**(Based on assumptions made by the author)**

**Note: RS = Remote Sensing**

Respondent Number	Attributes			Type of Stakeholder
	Power	Legitimacy	Urgency	
01	Depanri	None	Monitoring	Dangerous
02	Depanri	Space science and technology	Innovation	Definitive
03	Depanri	Foreign affairs	None	Dominant
04	Depanri	Telecommunication	Innovation	Definitive
05	Depanri	None	Monitoring	Dangerous
06	DPR	Legislation	None	Dominant
07	DPR	Legislation	None	Dominant
08	DRN	None	None	Dormant
09	BAPPENAS	Planning administration	None	Dominant
10	BPPT	Research facility	None	Dominant
11	None	Philosophy	None	Discretionary
12	None	System science	None	Discretionary
13	None	Space policy	None	Discretionary
14	None	Economics	None	Discretionary
15	None	Social politics	None	Discretionary
16	None	Combustion engineering	None	Discretionary
17	None	Law	None	Discretionary
18	None	Climate change	RS data	Dependent
19	None	Remote sensing	RS data	Dependent
20	None	Telecommunication	Innovation	Dependent
21	Program manager	Physics	Innovation	Definitive
22	Project manager	Electronics	Innovation	Definitive
23	None	System engineer	Innovation	Dependent
24	None	System structure	Innovation	Dependent
25	None	System thermal	Innovation	Dependent <sup>1</sup>

<sup>1</sup> This table was established based on stakeholders' type as illustrated in figure 3.4

26	None	Mission control	Innovation	Dependent
27	None	Attitude determination	Innovation	Dependent
28	None	Communication payload	Innovation	Dependent
29	None	Communication system	Innovation	Dependent
30	None	Remote sensing payload	Innovation	Dependent
31	Coordinator	Planning	None	Dominant
32	Analyst	Government investment	None	Dominant
33	Regulator	Radio frequency	None	Dominant
34	None	Foreign relation	None	Discretionary
35	None	Space vehicle	Research partner	Dependent
36	None	Industrialist	Services	Dependent
37	None	Satellite operation	Research partner	Dependent
38	None	Remote sensing	RS Data	Dependent
39	None	Sea surveillance	Law enforcement	Dependent
40	None	Satellite operation	None	Discretionary
41	Power	National systems	None	Dominant
42	None	Chemistry	None	Discretionary
43	None	Space flight testing	Market	Discretionary
44	None	None	Market	Demanding
45	District authority	Public participation	None	Dominant
46	Sub District authority	Public participation	None	Dominant
47	None	None	Innovation	Demanding
48	None	None	Innovation	Demanding
49	None	None	None	None
50	Regulator	Environment	None	Dominant



Proposals for interview were sent to the selected interviewees at least two weeks before the requested date. Aware that the selected interviewees were busy persons, the interview schedules were kept flexible. Communication through email and telephone were provided whenever the interviewee needed to reschedule or cancel the agreed time. Considering of the possibilities of cancellation of the targeted subject, a list was prepared of alternates for each category of interviewee. This was managed in order to keep the number of interviewees to 50. The interviews were conducted in *Bahasa Indonesia*, (Indonesian language) including the proposal for interview, but the English version of the proposal and the interview summaries are provided in Appendix 1. Almost all of the selected interviewees found one meeting sufficient usually about two hours in length, but some needed two, since they wanted to discuss things that had taken their interest and were not covered in the targeted time frame. Almost all interviewees asked why they were chosen, and some asked what 'systems thinking' was about. These were unavoidable questions that emphasised the importance of preparing well for the engagement process.

#### **4.4 Building up a Rich Picture**

This research uses essay and tables to display the Rich Picture of the investigated situation. The tables are identified as the Rich Picture Tables (RPT). 16 tables are used to display the Rich Picture of Sipesmik. Examples of RPT can be seen in Chapter 5 that displays the Rich Picture of Sipesmik such as Table 5.1 entitled 'Themes, issues and worldviews on Sustainability' and Table 5.2 entitled 'Tasks should be included in creating the necessary conducive state for space science and technology development in Indonesia'. The list of RPT can be seen in the second column of Table 4.3. This table illustrates how the data gathered using the Interview Questions can be used to construct the Rich Picture and Root Definition of the investigated situation.

From the first Interview Question can be acquired information displayed in the Rich Picture Table (RPT) numbers 1 to 8 that display all elements of CATWOE that can be summarised as the 'preliminary' Root Definition (see section 5.7). The answers of the second Interview Question displayed in the RPT numbers 9 to 16 hold information of the element of CATWOE. Data collected by the used of the third Interview

Question displayed in the RPT number 16 that contains information on the perceived control mechanism and measurement of success needed for Sipesmik complete the Rich Picture of Sipesmik. A part to data collected by the use of the Interview Questions, the Rich Picture also benefit all respondents' comments during the interview and engagement process.

**Table 4.3**  
**How the information gathered using the Interview Questions could help construct a Rich Picture and a Root Definition**

<b>The Interview Questions</b>	<b>Rich Picture Tables (RPT)</b>	<b>The Root Definition</b>
1. What is your underlying philosophical stance for investigating the Sipesmik, for example?	1. Sustainability of a system 2. System's tasks 3. Social and educational process 4. Regulatory 5. International cooperation 6. Present failures 7. Specific management details 8. Miscellaneous issues	All elements of CATWOE that the summary can be identified as the preliminary Root Definition (see section 5.7)
2. Who is/ought to be	9. Interviewees' perceived clients of Sipesmik	Clients
a. i) The beneficiaries of the Sipesmik process		
ii) The decision makers in the Sipesmik process?	12. The desired owners of Sipesmik	Owners
iii) The planners in the Sipesmik process?	10. Interviewees' perceived executor (actors) of Sipesmik	Actors (Executors)
iv) The experts used in the Sipesmik process?	10. Interviewees' perceived executor (actors) of Sipesmik	Actors (Executors)
v) The representatives	12. The desired owners of	Owners

of those affected by Sipesmik?	Sipesmik	
b. What condition are / are not controlled by the decision maker?	16. The perceived control mechanism and measurement of success needed for Sipesmik	Environment (System's boundary)
c. What are/ought to be the constraints on the decision maker?	13. The perceived fix constraints of Sipesmik 14. The perceived constraints on the owners of Sipesmik	Environment (System' boundary )
d. Who has the power to ensure success of Sipesmik?	12. The desired owners of Sipesmik	Owners
e. Are those affected by Sipesmik allowed to take their fate into their own hands despite the experts? Should they be allowed to?	15. The perceived problems of power and conflict within Sipesmik	Worldviews (Ethics)
3. Based on your (life) experience, would you mind telling me what criteria do you use to measure efficiency, effectiveness, efficacy (ease of use and implementation), equity, ethicality and elegance of a Sipesmik plan?	16. The perceived control mechanism and measurement of success needed for Sipesmik	Transformations Worldviews

#### 4.5 Building up Root Definitions and Task Models

To build a model of a system, one should know what kind of system one would like to define. This reflection is a reminder of what Churchman (1971) wrote in *The Design of Inquiring Systems*. In brief, this can be summarized that a system should have 9 necessary conditions:

- 1) A system is teleological. This character was derived from Aristotelian imagery stating that every element of nature at any moment of time is conceived as having a number of choices at its disposal, and it selects its choices so as to pursue the goals appropriate to it.
- 2) A system has teleological components that work together in an interactive way to achieve their own goals and the goals of the whole system
- 3) A system has clients whose interests are served
- 4) A system has measure of performance
- 5) A system has a boundary that limit the system to its environment
- 6) A system has decision makers that have the necessary power to change in the measure of performance
- 7) A system has designers whose design may influence the decision makers leading to change in the measure of performance of the system, and who aim to maximize the system's value to the clients
- 8) A system has a built in guarantee that the purpose of the system defined by the measure of performance of the system can be achieved and secured,
- 9) A system has a stability mechanism that controls the whole system especially in:
  - a. decision making process
  - b. performance standards measurement and their improvements
  - c. communication channels both internal and external
  - d. information flows especially in support to the input output management
  - e. allocation of responsibility so that everyone knows what kind of participation should be performed

According to Churchman (1981) if a model is compliant with the anatomy of system teleology then this model is a model of a system with high viability (effective and

efficient). The author accepts this formula as these criteria are in line with those of Walker (1994) who describes that model with high viability should comply with both general and specific criteria. The general criteria are resilient and resistant. Resilient means having the capacity to restore the system when stress destabilizes it. Resistant means having the ability to maintain the system's functions whilst under stress. The special criteria relates to specific method or specific condition. With regards to conceptual models within SSM, Wood-Harper et al, (1985) identify some criteria that should be accomplished:

- mission that gives the general statement of objective and how will it be achieved,
- measure of performance,
- decision making process,
- subsystems,
- a certain degree of connectivity or interaction between the components,
- boundaries that limit the system /subsystems, and
- The guarantee of continuity and long term stability.

Based on the complete picture of the problem situation, as discussed in section 4.4, the author identified the character (or definition) of the ideal system covering the problem situation as a whole. Using specific tabulations as described in section 4.4, the resulted rich picture was also designed to map the characteristic of the ideal system, based on which a verbal statement of a root definition was formulated. This verbal statement became the basis for constructing a root definition model that displays the CATWOE in a figure. This graphic display provides general view of the ideal system, which focus on displaying the teleological components and their relationships. Due to less flexibility of graphic presentation than verbal statement, a number of other graphic presentations are needed to display the whole characters that are indicated by the rich picture. Those graphic presentations can be classified into two models. The first type is a model that displays a general feature of the system that presents the strongest character of relationship feature of all elements of the system. This was especially designed to comply with the 9<sup>th</sup> condition of the anatomy of system teleology. The second types are tasks models, which are also identified as conceptual models that include overall task model and subsystem models. These were

designed to comply with the 2<sup>nd</sup> condition of the anatomy of system teleology. One subsystem model presents one desired task. The strongest character presented by the 'overall task model' is the relationship between the desired tasks. Each of the subsystems was designed as a teleological component therefore each of them should also comply with the anatomy of system teleology.

These conceptual models provide the desired primary tasks of Sipesmik, from which the required system actions can be identified. They also provide tools to verify the present process within the Sipesmik, which parts are missing and or which parts should be omitted. Based on the identified actions plans and other necessary information collected both from interview and secondary resources, basically the VSD could be used to develop an organizational model, from which organizational framework at various levels within Sipesmik can be built. Also, the tasks in conceptual models can be used as the basis for what is required, thus SD models can be build to show how these tasks could be executed. Both the conceptual models and the VSM are systematic reflections of the desired result of this assessment brought into being from the interviewees' points of views. The VSM for Sipesmik is presented in the appendix 4, since in this research it is complementary in character to fulfil the need of interviewees, who are concerned with implementation steps to further use the conceptual models for operational actions.

#### **4.6 Model verification and validation**

The models that were verified and validated consisted of Root Definition and Task Models (Conceptual Models). However a Viable System Model (VSM) and a System Dynamics Model (SDM) were also prepared as supportive models. According to Forrester and Senge (1980), before a model can be used to develop policy or any other usages, there is a need to have sufficient confidence with regard to its 'soundness' and 'usefulness', which can be fulfilled through model validation. Coyle (1983) identifies three types of test that should be used to validate a system dynamics model. These are verification, validation and legitimation tests. **Verification tests** are concerned with the verification of **structure and parameters** of the real system whether they are correctly transformed into the model. **Validation tests** are concerned with the **similarity behaviour** between the model and the real system. **Legitimation tests** are

concerned with the accomplishment of the model with regards to the laws of system structure or any other adopted system rules.

As discussed in section 4.2 that verification and validation of models need interviewees' participation, which means that before they participate in verifying and validating the models, the researcher should verify and validate them first. Therefore two steps of verifying and validating the models should be carried out, the first was completed by the researcher and the second was done by the interviewees.

#### **The researcher**

As discussed in section 3.5, the essential objective of a model validation is to theoretically and judgmentally verify the model. Theoretical verification is done by the researcher. It consists of four types of theoretical verification:

- Teleological evaluation
- Tasks feasibility evaluation
- Tasks desirability evaluation
- Compatibility evaluation

The teleological evaluation is concerned with the compliance of a model to the anatomy of system teleology. A model that complies with all conditions of system teleology is a viable (effective and efficient) model for that system teleology. This evaluation can be done using a table of three columns. They should consecutively mention: the condition of system teleology, the model's level of compliance to the condition (can be high, medium or low), and the supporting arguments. Example of this evaluation can be seen in table 7.1 that present the teleological characteristics of Sipesmik.

Tasks feasibility evaluation is to determine feasibility level of the tasks of a model. This research used three levels of judgment for feasibility evaluation of a task.

1. A task is determined as high feasibility when the resources and environment are favourable to execute the task. The resource factors include software, hardware, and man-ware. The environment factors include physical, legal, political, socio cultural, economical and technological.

2. A task is determined as medium feasibility when the resources and environment is less favourable to execute the task
3. A task is determined as low feasibility when the resources and environment are unfavourable to execute the task.

Resources are determined as 'favourable' when possible for them to be acquired and used. They are judged as 'less favourable' when it is possible that they be acquired and used but there are other criteria that should be fulfilled, which means certain interests must be sacrificed. The resources are judged as 'unfavourable' when it is possible that they are acquired and used but there is a need to sacrifice a certain strategic interest. The environment is judged as 'favourable' when it allows the task to occur as expected. The desirability evaluation of a task is an evaluation of the actors' desire to execute the task. The most desirable task fulfils the interests of the actor.

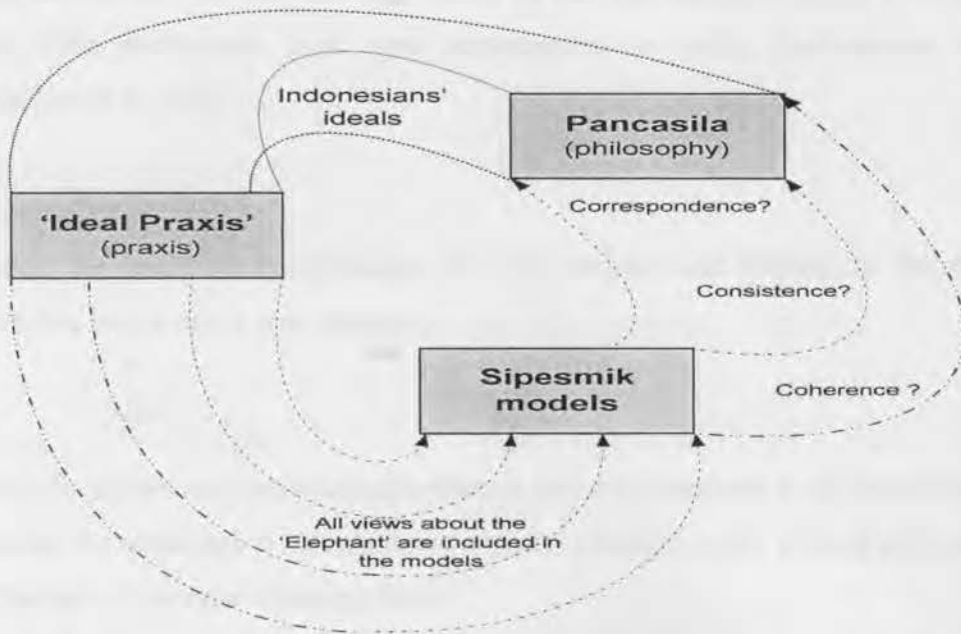
The compatibility evaluation of a model is an evaluation on its compatibility to Pancasila. To facilitate in understanding this, figure 4.2 illustrates three parties who were assumed of having special relationships in this research: the 'Ideal praxis', 'Pancasila' and 'Sipemik models'. The Ideal praxis represents the Indonesians' ideal at praxis level for micro satellite development. Sipemik models were the transformation result of that Ideal praxis into graphic models.

With regards to Pancasila, the Ideal praxis was assumed as the praxis representation of Pancasila for micro satellite development. With regard to the Ideal praxis, Sipemik models are its transformation into graphic models. Only the respondents know the Ideal praxis since it is their ideal. Sipemik models equal to the Ideal praxis when they are approved by the respondents that all of their views are included in the models.

The compatibility assessment of Sipemik models to Pancasila is done based on the belief that all views of the respondents are included in the models. This belief is based on the facts that all respondents' views are included in the data processing that methodologically they are incorporated in the models. Since all respondents' views are included in the models therefore they are equal to the Ideal praxis thus they are representations of Pancasila at praxis level for micro satellite development. To verify



or measure their appropriateness in representing Pancasila, this research has developed tools derived from truth theories: correspondence, consistent and coherence (see Appendix 3).



**Figure 4.2 Relationships between the ‘Elephant’, Pancasila and Sipesmik Models**

In this case Pancasila turns out to be the reality and the Sipesmik models to be representations. Since reality is infinite and the representation is finite therefore a number of representations may represent the reality. Thus there can be a great number of representations that can represent Pancasila, where each representation should have at least one ‘elements’ of Pancasila that becomes its corresponding part. This reflection teaches that a model is in correspondence with Pancasila if it has at least one corresponding part within Pancasila such as one principle or element of Pancasila. One principle or element of Pancasila can be in correspondence with a model if its basic idea is in agreement with the basic idea of the model.

A model is consistent with Pancasila if it has a logical relationship with Pancasila. A logical relationship can be based on mechanical or mutual causality. Pancasila accepts both of them, since within Pancasila both of them are acceptable.

Examples are:

**Mechanical causality:**

The Independence War against the Dutch was a true decision, therefore helping the Dutch to survive in that war (the appositive of the war against Dutch) is a false decision. This mechanical logic was implemented to judge Indonesians who supported Dutch as guilty.

**Mutual causality:**

War against the Dutch for independence is a true decision and helping the Dutch to survive in that war is also a true decision.

A model is in coherence with Pancasila when it correctly responds to all requirement of Pancasila. It means that to be coherence a model should comply with all principles within Pancasila. Example: Farming Model

Table 4.4 shows an example of a Farming Model that is supposed to be in coherence with Pancasila principles. This example illustrates how coherence situation of a model with Pancasila may be achieved. Pancasila principles mentioned in this table are the short form. The complete form can be seen in section 1.1. The first principle inferentially requires that in the farming business, land farm should be treated as God's creation. This can be transformed in farming practice as to preserve the land fertility. Uncontrolled use of farm may degrade land fertility. This practice should be avoided. Using table 4.4 one can analogically describe the coherence situation of the farming model with other Pancasila principles.

**Table 4.4****Example of a Farming Model that is supposed to be coherence with Pancasila**

<b>Pancasila Principles</b>	<b>Inference</b>	<b>Farming practice</b>
The belief in God	Treating land farm as God's creation	Preserve land fertility
Humanity	Treating farm workers in an appropriate manner	Respect standard load of work for farm worker
Unity of Indonesia	Farming products should fulfil the need of domestic demands.	Respect national plan of regional specific farming products.
Democracy	Everyone has the right to express views regarding farming business	Respect one opinion but implement what is agreed upon by the member of farming community
Social justice	Farming as a social process that the interaction should result in a continuous improvement.	Gotong royong (collective farming)

**The interviewees**

As discussed in section 3.5 that the essential objective of models validation is theoretically verify and judgmentally validate the models. The interviewees were asked judgmentally validate the models. This includes:

- The acceptance and participation of the respondents
- The inclusion of their views in the models
- The transformation the high level goals into realistic and acceptable actions
- The viability of the models
- The compatibility of the models

To validate the interviewees' acceptance and participation in the Sipesmik, they were asked to choose:

- Their roles in the Sipesmik as owner, executors and or clients, and
- Their Sipesmik tasks preference

To validate the inclusion of the interviewees' views in the models, they were asked to judge whether all of their views were included. As described earlier, their judgments were used to determine as to whether the Sipesmik Models were equal to the representations of Pancasila at praxis level for micro satellite development. The respondents were asked to judge on how well the high level goals were transformed into realistic and acceptable action. Respondents' judgments on their Sipesmik acceptance and participation also provide indication whether Sipesmik tasks are realistic and acceptable to them.

To judge the viability of the models, the respondents were asked to judge:

- The effectiveness,
- The efficiency
- The efficacy,
- The ethicality,
- The equity and
- The elegancey

of Sipesmik models, based on their live experiences. To judge the compatibility of the models with Pancasila, the respondents were asked to judge them in term of their correspondence, consistence and coherence. The following elaborates the Sipesmik models validation questions and their rationale.

#### **4.7 Sipesmik models validation questions and their rationale**

This section presents the Sipesmik models' validation questions and their rational. There are 7 questions, the first and second questions introduce the models as a whole. The third and the fourth questions were designed as tools of verification and validation tests consecutively. The fifth and the sixth questions were designed as tests of legitimation. The last question was designed to provide interviewees the opportunity to express their views regarding experiences they gained by participating in the use of systemic approach in Indonesia, and other comments especially with regards to Sipesmik models.

### Sipesmik Models Validation Questions

After having examined the Sipesmik conceptual models could you like please answer the following questions? This is needed to validate the models that have been created.

(1) In **Model 1**, where do you might position yourselves in the Sipesmik?

owner  executor,  or client.

You may choose more than one.

(2) In **Model 3**, what kind of tasks might your participation focus on?

- a. Science & technology innovation development .....
- b. Create/ maintain sustainable foods .....
- c. Manage natural environment .....
- d. Increase and maintain economic productivity .....
- e. Change socio cultural practice .....
- f. Regulate the Sipesmik .....
- g. Change institutional practice .....
- h. Increase / maintain local government participation ...

You may choose more than one.

(3) Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

(4) Would you mind qualitatively measure the capability of Sipesmik conceptual models) in transforming '*the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement*' into comprehensive actions:

High  Medium  Low

(5) How well do you think Sipesmik conceptual models transform the high values and goals held by **Pancasila** into comprehensive actions, in terms of their?

a. Correspondence

High  Medium  Low

b. Consistence

High  Medium  Low

c. Coherence

High  Medium  Low

Note: Correspondence relates to the agreement or similarity of basic idea.  
Consistence relates to 'harmony', 'logic relations' or 'agreement' of each of the elements of the models.  
Coherence relates to the wholeness consistency of the models.

(6) How do you regard the Sipcsmik conceptual models in terms of their:

- |                  |      |                          |        |                          |     |                          |
|------------------|------|--------------------------|--------|--------------------------|-----|--------------------------|
| a. Effectiveness | High | <input type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| b. Efficiency    | High | <input type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| c. Efficacy      | High | <input type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| d. Equity        | High | <input type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| e. Ethicality    | High | <input type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| f. Elegancy      | High | <input type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |

Note: Effectiveness relates to objective achievement,  
Efficiency relates to the use of resources in achieving their objectives,  
Efficacy relates to easiness use,  
Equity relates to equal treatment to parts or parties involved and effected,  
Ethicality relates to degree of morality in the models,  
Elegancy relates to aesthetics or public effect of the models.

- (7) Could you please give any further general comments on the on the Sipcsmik Conceptual Models?

c. Rationale of the models verification and validation questions

The models validation was designed to get supportive data for answering of the research questions that are described in section 1.3. Those research questions are:

- 1) Can a western systemic approach be successfully used to define solutions of complex pluralist and coercive problems in a developing eastern world country such as Indonesia?
- 2) Will the solutions generated in this context be acceptable to Indonesian stakeholders?

- 3) Can these systemic methods be used to transform the high values and goals held within the state philosophy of Indonesia 'Pancasila' into realistic and acceptable actions?

The generated solutions are Sipesmik conceptual models, which represent a partial answer of the first research question. The complete answer should include the indicators showing that the Sipesmik conceptual models are theoretically and judgmentally viable. The accomplishment of Sipesmik models with sound system theory provides theoretical indicators of their viability. The judgment whether they are 'viable', should be given by the respondents since they are the 'experts' who 'caress the elephant'.

The answer of the second research question needs two types of supportive indicators. The first is related to what high ranking management is concerned with, which represents the top down approach indicators. The second is related to the inclusion of all views of the representative of the stakeholders, which represents the bottom up approach indicators.

The answer to the third research question needs two types of supportive indicators. The first is a rational indicator and the second is a judgmental indicator. The supportive indicators that relate to the validation question is the judgmental indicator, which needs participation of the respondents to judge on how well the conceptual models transform the high values and goals held by Pancasila into comprehensive (realistic and acceptable) actions.

The deliberation above provides rational foundation of all validation questions, regarding the rational of each validation questions related to the research questions are presented as the following:

**a. Question 1**

This question was designed to investigate whether all types of stakeholders of Sipesmik are well represented by the 'interviewees' (respondents). The collected data becomes supportive data of all answers of the research questions. Based on the root

definition (see section 5.9), there were possibilities for a person to choose more than one role in the Sipesmik. Therefore in the research question there is a note allowing this.

**b. Question 2**

This question was designed to investigate whether the tasks are realistic and acceptable to the respondents. The collected data becomes supportive data for all answer of the research questions especially the third research question. The assumption was that by selecting to participate in a task, a respondent accepts that the selected task is realistic and acceptable for her or him. Therefore there were possibilities for each respondent to choose more than one task.

**c. Question 3.**

This question was designed to investigate whether all views of the respondents are included in the models. The collected data became supportive data for all answers for the research questions especially the second and third questions. The assumption was that respondent was the 'only person' who knew the 'elephant' (Sipesmik), since only she or he had the opportunity to 'caress' it. Thus respondent is 'the expert' whatever respondent said about the 'elephant' was true (see section 3.3). Therefore all views of the respondents should be included in the models.

**d. Question 4.**

This question was designed to investigate the judgmental indicators on how well the high level goals of Sipesmik be transformed into realistic and acceptable actions. The collected result becomes supportive data for all answer of the research questions especially the second research question.

The high level goals of Sipesmik are the views stated by respondents having the interest in managerial and policy making in the Sipesmik. They belong to owners group in the Sipesmik conceptual models. Seen from *trias politica* they belong to legislative group and executive group. They hold decisive power in the governmental



system of Indonesia, therefore the better the conceptual models transforming their views is the higher possibilities of the models be approved and adopted for implementation by the government.

**e. Question 5**

This question was designed to investigate the judgmental indicators on how well the systemic approach, through Sipesmik conceptual models, can transform the high values and goals held by Pancasila into realistic and acceptable actions. The collected results become supportive data for all answers of the research questions especially the third research question.

Pancasila is the state *weltanschauung* of Indonesia (Soekarno, 1945). It is the 'social contract' of the establishment of Indonesian state, and it can be compared to the 'Magna Carta' of England and the 'Bill of Rights' of the United States of America (Onghokham, 2001). Pancasila is the state philosophy of Indonesia so that we can see that it is at the level of philosophy, while the models are at the level of praxis. They can also be treated them as follows: Pancasila represents the 'ideal world at philosophical level' and the models represent the 'ideal world at praxis level'. Based on method of validation model of human idealism (see appendix 3), there is a need to evaluate whether the latter is correspondent, consistent and coherent with the previous.

**f. Question 6**

This question was designed to investigate the judgmental indicators on how viable the Sipesmik conceptual models are. As discussed in Section 4.4, the viability of a model should be measured based on its effectiveness, efficiency, efficacy, ethicality, equity and elegance. All of these criteria have been questioned to the respondents on how to measure them based on their life experiences. This became an opportunity to use them in practice. The collected result becomes supportive data for all answers of the research questions (especially the first and the second research questions).

#### **g. Rationale of Question 7**

This question was planned to collect opinions or comments with regard to the use of systemic approach especially in handling the Sipesmik problems. The collected data were designed to becoming the basic (supportive) data for all answers of the research questions. The assumption was that experiences gathered by respondents by participating in this research would be beneficial for this and future research projects.

#### **4.8 Models' validation, data collection, and processing**

Validation interviews with the 50 respondents who had previously participated in the research were organized. The respondents were allowed one week after confirmation of receipt to investigate the models. Additionally, the respondents were told that they could reschedule, if they found it necessary. This was designed to provide an agreeable and friendly environment for them. Each of the validation interviews started with an introduction by the investigator of the consent form (see Appendix 1), if the respondent agreed with then the interview validation continued, if the respondent did not agree, then the interview was cancelled. Fortunately, that all respondents consented.

As described earlier that during the engagement process all respondents were introduced to system concepts using the Interactive Models of Innovation Process (Manley, 2001), and at the validation process each respondent was asked to sign a consent form whether they accepted the ethical norm used in this research. This included the use of Pancasila as the common denominator to evaluate the suggested solutions of Sipesmik problems. These respondents' participation indicates their readiness be included in the research.

The bar graphs presenting the data collected by the use of question 1 were designed to show the number of 'owners', 'executors' and 'clients' of Sipesmik that had participated in the research. Based on the list of interviewees the range should be  $\geq 0$  and  $\leq 50$ . A result  $>50$  meant something needed to be clarified. These numbers indicate the respondents' preferences and willingness to participate in the Sipesmik as a client, executor or owner. According to Kornai (1998) preferences are closely

depended upon the system, since they are included in the product of the system. The change of system will cause changes in preferences. A larger number of preferences indicates a number of respondents who find out the system (project) is beneficial to them. A large number of owner preferences indicates that there is a large number of respondents who find it necessary to self secure their interests with regard to the system. A large number of executor preferences indicates the number of respondents who find the system tasks that are appropriate to them.

The bar graph presenting the data collected by the use of question 2 were designed to show the number of participants of each identified tasks. The assumption used was that if a respondent chooses to participate in executing a task, it indicates that the task was found realistic and acceptable. Acceptability is also shown by respondents who indicate whether they are owners, executors or clients in the project.

The diagram presenting the data collected by the use of question 3 was designed to show the grade of inclusion of the respondent's views of the models. The models were designed to include all views of the respondents. The larger the numbers of respondents who vote 'high' shows a higher confidence held in the models, since they represent better the views (worldviews) of the respondents. In evaluating this data, an assumption was made: if a respondent voted 'medium' and did not say which viewpoint (s) should be included, this implied that this respondent voted 'high'. Beside, this research accepts the dynamic stakeholders theory that describes stakeholders' status changes with time, which may cause the changing of viewpoints, therefore the bigger the number of respondents who vote 'low' or 'medium' may also be caused by this kind of change. Therefore it was thought to be necessary to take a note on the occurrence of such changes.

The diagram presenting the data collected by the use of question 4 was designed to show the respondents' judgments on how well the Sipesmuk conceptual models transform the high level goals of the Sipesmuk into realistic and acceptable actions. The assumption was that the bigger number of respondents votes that were 'high' should that a higher confidence was held in the models to be approved and adopted for implementation by the government of Indonesia. This was also designed to get an indication of whether the top down approach was better presented by the

models. The most important was that these data were designed to help answer the third research question, whether the generated solutions have included realistic and acceptable actions.

The diagram presenting the data collected by the use of question 5 was designed to show the respondents' judgments on how well the models transform the high values and goals held by Pancasila into comprehensive actions (realistic and acceptable actions), in terms of their correspondence, consistency and coherency (see section 3.6). The assumption used was the bigger number of respondents voting 'high' on each of these denominations, the higher compatibility of system approach with Pancasila. Chapter 2 identified the theoretical phenomena that are needed to know the potential compatibility of the system approach with Pancasila. It was assumed that combination of the theoretical and the judgmental indicators could provide clear indications on how well the compatibility of the system approach is with Pancasila.

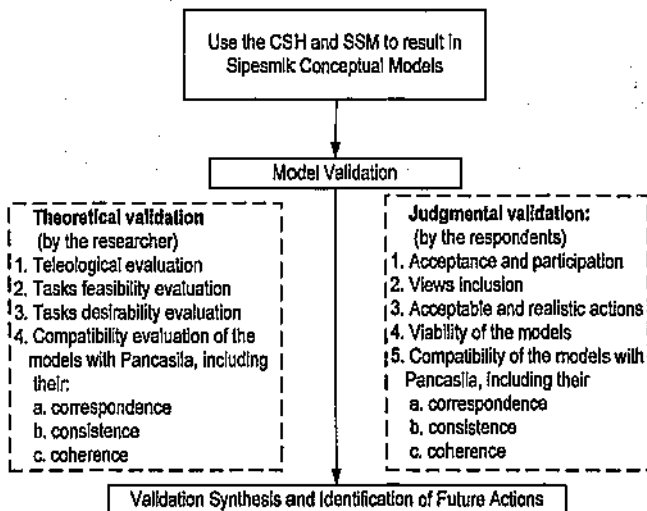
The diagram presenting the data collected by the use of question 6 was designed to show the respondents' judgments on how viable the models are. The bigger number of respondents votes 'high' on each of the denominations, the higher confidence held by the models to be approved and adopted for implementation both by donor (develop) countries and recipient (developing) countries (see section 3.6). Since, their interests are better accommodated by the models.

The data collected by the use of question 7 were considered to be input for investigation of the use of systemic approach in Indonesia as a whole especially with regard to its usage in handling Sipesmik problems.

#### 4.9 Limitations of the Research Methodology

Due to the inclusion of both technical and social aspects, this research treated Sipesmik as a socio-technical management problem. A different worldview would result in different solution such as treating it as a purely technical or social management problem. The dilemma is that treating it as a pure technical management problem, fails to take into account the social dimension; similarly treating Sipesmik purely a social management problem fails to consider its technical perspective.

The Sipesmik is a social system that is infinite so all details of it can not be included in the models created, since they (the models) are finite; therefore resistance elements within the system could persist at any moment due to the failure of the system to meet the aims of these elements.



**Figure 4.3 Summary of the Research Methodology**

The brief summary of the research methodology that is presented in figure 4.3, clearly shows that this research combines the SSM and CSH, therefore it can be seen as a

combination of interpretive and radical humanism that sees either individual or social reality as the self-conscious creation of human actors (see table 3.2). This can be criticised as being too optimistic. Moreover, subjectivity domination in this combination may cause dishonesty that persists when an objective reality involves hidden interest that tends to manipulate or omit opinions that are not in line with the objective reality. This causes certain opinions invalid.

The collection of data by interview, from people who have no immediate or close involvement (see table 3.3 'not involved witnesses' were included) with the system either economically or organizationally, might distort their answers.

As consequence of the use of MMA, the list of questions used in this research was based on that of CSH and the data processing and interpretation were inspired mostly by the SSM. This might cause some methodological disagreements. The metaphors used to picture up the investigated situation, are socio-cultural for SSM and socio-political for CSH (Flood, 1995). The culture metaphor characterised by full of argumentations from the problematic situation' participants, which aim is to enhance their understanding and participations. The political metaphor is concerned with setting the sights on issues of interests, conflict and power. This is to uncover whose concerns are being carried out and to prevent supremacy of a particular group or individual. Since the aim of investigating of the power dimension was to provide a means of enriching the rich picture and to provide the system definition with the necessary foundation however, it can not be categorised as providing radical solutions that are essential in critical system thinking.

Mingers and Brocklesby (1995) indicate that there are a number of thinkers who are not persuaded of that kind of complementarism. The argument is that each methodology has its own paradigms. Thus, a complimentary use of methodologies may make them invalid. In this research, it was assumed that different paradigms can be used to increase our understanding of the problem space. This assumption was taken as the consequence of the use of LSA that is underpinned by among other the philosophy of critical system thinking of Churchman (Flood, 1999) that accepts the view that different theoretical spot and methodologies can be used in complimentary to deal with complexities of management and to achieve maximum development of the ability of all persons, however it should be aware of social and institutional pressures.

Interviewees can be seen as the representative of Sipesmik stakeholders. However, in reality stakeholders change over time and their stakes change depending on the strategic issue under consideration. According to Mitchell *et al* (1997), it may consist of one or more of three relationship-attributes: power, legitimacy and urgency (see chapter 3). This makes the choice of the interviewee has a profound affect on the data gathered, and its interpretation. The data gathered during interview were designed as a mapping result at the time of interview. Also, the data gathered during model validation were snapshots of the situation at the time of model validation. This research used the same interviewees (respondents), but their stakeholders' status sometimes changed, also their views regarding Sipesmik might have changed accordingly. The occurrence of these changes may represent the dynamic characteristic of the investigated situation.

This qualitative exercise only models the perceptions of those chosen (interviewees). When the basis of choosing the sample is dissimilar such as gender, ethnic group, age, political belief, or geographical factors, might result different interviewees that could cause the generation of other models. The person selected for these interviewees were expected to have the capability to communicate with interviewer. So they can express their views or expectations. This was designed to get fresh inputs that may not retain the structure, process and boundaries of the existing system. Therefore, this research may have radical characteristic as required critical system thinking. To avoid the possible knowledge imposition an engagement process to systemic thinking was carried out in the introduction phase of each interview. To better understand arguments expressed by respondents, the investigator completes him self with the necessary socio cultural information concerning the investigated situation.

This research equally treats each of the collected viewpoints, which result that the analysis of the data could be judged as being not democratic. The marginal views were regarded as valid as the mainstream. Without any concession, all viewpoints are integrated into the models, otherwise the mainstream would always dictate solutions, and the existing configuration would be maintained. This position was erected as the consequence of the use of the Indonesian traditional parable 'elephant' and 'the blind men' (see section 3.3). Every viewpoint given by the 'blind men' represents something about the 'elephant'. To get the whole figure of the 'elephant' every viewpoint given by the 'blind men' should be incorporated in the models of the

'elephant'. Thus, this kind of equal treatment to all viewpoints was designed to obtain a systemic solution where all viewpoints are incorporated into the models.

This research practices the 'one-to-one interview' in data collection. This is to guarantee of privacy and avoiding power plays that might occur in group interviews. It is certain that the lack of group dynamic eliminates the possibility to generate ideas that would be born by interaction. However, it did not allow the occurrence of learning process between participants. Additionally, as indicated by Kartowisastro and Kijima (1974) that 'one to one interview' in a highly hierarchical organization provides opportunity to prevent coercion and the result could be input to the managers who could hold the learning task.

At this step of action research, the latter fact was not considered of significant importance, as its primary purpose was to provide models for further elaboration and development that the learning task will obviously occur within the recursion of the research. Also, the nature and logistics of this research precluded this aspect. Therefore, the integration of learning processes into the organizational and conceptual models was definitely considered (see 'recursion' in chapter 6).



## Chapter 5

### DEFINING THE SIPESMIK

#### 5.0 General overview

This chapter presents the results and analysis of the data collected using the research methodology introduced in Chapter 4. This analysis was directed toward assessing the Sipesmik's CATWOE, its constraints, problems of power and conflict, and the desired control mechanisms. The analysis is based on respondents' views, perceptions and concerns expressed during interview and it was designed to display the result in the form of text and tables that are comparable with a rich picture as methodologically requested by the use of SSM.

This chapter consists of nine sections that follow this general overview section. Section 5.1 presents a summary of the respondents' view, perception and concerns, all of which should be considered when constructing the Sipesmik model. The data used for this section were derived from responses to interview Question 1 and related comments.

Sections 5.2 to 5.7 present the summary of respondents' answers to Question 2 of the interview questions and related comments. These sections consecutively present the respondents perceived clients, actors (executors), transformations, owners (decision makers), environments (constraints) and problems regarding power and conflict in the Sipesmik project.

Section 5.8 presents the respondents' perceived control mechanisms required. This is derived from the summary of the respondents' answers to Question 3 and related comments. According to their context the data collected during the engagement process (see sections 3.3) are set out in sections 5.1 to 5.8.

Section 5.9 presents the root definition of Sipesmik formulated using the CATWOE analysis of the summaries presented in sections 5.1 up to 5.8. This root definition encapsulates the various views and comments of the respondents, so that all the respondents' perceptions towards Sipesmik are gathered, and completely transformed into a rich picture.

## **5.1 Themes, issues and worldviews**

This section deliberates on the respondents' answers to the first interview question and its related comments. These answers give an indication of the philosophical foundations of the respondents. The four types of statement attached to the question represent a continuum from catastrophe-technocentric, corporative-technocentric, and cooperative-naturocentric; to arthemis-naturocentric (see section 4.2). The interview results indicate that all philosophical stances are represented in this research. This indicates the holistic characteristic of the collected data.

Based on the answers and comments related to the first interview question, this section elaborates six main categories that are presented by six sub sections. They are: sustainability (section 5.1.1), social and educational process (section 5.1.2), regulation and international cooperation issues, (section 5.1.3), the existing failures of space science and technology development in Indonesia (section 5.1.4); specific management details (5.1.5) and miscellaneous issues (section 5.1.6). Section 5.1.7 is a summary of section 5.1 encapsulated in a CATWOE structure.

### **5.1.1 Sustainability**

Table 5.1 shows the summary of respondents' views, perceptions and concerns about sustainability and the Sipesmik. These views, perceptions and concerns can be

grouped into seven criteria that need to be satisfied to guarantee the high sustainability of Sipesmik models.

The criteria are:

- a) Investment for Sipesmik should mainly generated from the government
- b) Sipesmik should fulfil the need of general population especially fishermen and farmers
- c) Sipesmik shall have the necessary national commitment
- d) Sipesmik should practice open management
- e) Sipesmik shall only develop space science and technology for peaceful purposes
- f) Sipesmik should concern with environmental health
- g) Sipesmik should be economically beneficial

During the engagement process almost all respondents agreed that the sustainability of space science and technology development in Indonesia will depend on the effective creation of the necessary conducive states<sup>1</sup> for space science and technology to grow. The respondents' views on tasks that should be carried out for creating such conducive-states vary, but included the improvement of:

- local government participation,
- economic productivity,
- institutional practice,
- socio-cultural practice,
- regulation practice and
- natural environment (see table 5.2).

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<sup>1</sup> 'Conducive states' are conditions that stimulate an activity or something to better develop or grow comparing to common situation. Example of some indicators of a 'conducive states' for marketing a product: financial aid, after sales service, home delivery, resale guarantee, and public policies that stimulate the use of the product by the public.

**Table 5.1 Themes, Issues and worldviews on Sustainability**

No	Themes, issues and worldviews	Respondents' code number (see Appendix i)
1	Sipesmik should be economically beneficial	203, 402, 407
2	Sipesmik should fulfil the need of general population especially farmers and fishermen	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 201, 202, 205, 206, 207, 208, 209, 210, 301, 302, 303, 305, 308, 310, 401, 403, 404, 405, 406, 408, 409, 410, 501, 503, 505, 506, 507, 508, 509, 510
3	Sipesmik should practice open management	106, 107, 108, 201, 202, 205, 207, 210, 307, 309, 402, 406, 407, 502, 508, 509,
4	Sipesmik shall only develop space science and technology for peaceful purposes	106, 107, 108, 201, 502, 507, 508, 509, 510.
5	Sipesmik should be concerned with environmental health	204, 304, 309, 504,
6	The Sipesmik investment must be mainly generated from the government.	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 201, 202, 205, 206, 207, 208, 209, 210, 301, 302, 303, 305, 306, 307, 308, 310, 401, 403, 404, 405, 406, 408, 409, 410, 501, 503, 505, 506, 507, 508, 509, 510
7	The Sipesmik shall have the necessary national commitment	102, 103, 104, 105, 106, 108, 109, 110, 202, 204, 205, 207, 208, 209, 210, 301, 303, 306, 307, 310, 401, 402, 404, 406, 407, 408, 502, 505, 506, 508, 509, 510

**Table 5.2 Tasks should be included in creating the necessary conducive state for space science and technology development in Indonesia**

No	Themes, issues and worldviews	Respondents' code number (see Appendix 1)
1	Increase and maintain local government participation	102, 104, 105, 106, 107, 108, 109, 201, 207, 301, 303, 402, 406, 407, 408, 409, 504, 505, 508, 509, 510
2	Increase and maintain economic productivity	102, 103, 104, 107, 109, 110, 201, 203, 204, 207, 208, 210, 301, 303, 402, 406, 407, 410, 504, 505, 506, 507, 508, 509
3	Change institutional practice	102, 103, 104, 105, 106, 108, 109, 110, 202, 204, 205, 207, 208, 209, 210, 301, 303, 306, 307, 310, 401, 402, 404, 406, 407, 408, 502, 505, 506, 508, 509, 510
4	Change socio cultural practice	102, 104, 105, 106, 109, 201, 202, 203, 204, 205, 208, 301, 303, 310, 402, 405, 406, 407, 408, 410, 505, 506, 507, 508, 509
5	Increase and maintain the dynamics of regulating the system	101, 103, 104, 105, 107, 108, 109, 207, 301, 303, 402, 403, 406, 407, 408, 409, 504, 505, 509, 510
6	Increase and maintain the dynamic of managing the natural environment	102, 104, 106, 107, 109, 207, 208, 209, 301, 303, 402, 406, 407, 502, 505, 506, 509, 510

### 5.1.2 Social and educational process

Social process is a continuous change in a certain way of a social structure or system (Dharmadhikari, 2003). **Social structure** is a human habit scheme that is relatively stable (ibid), such as traditional fishermen who do what their ancestors did, including their fishing time schedule, fishing ground, even their fishing instruments. The **social**

system is the whole reality of human social life that includes the biological, physical and cultural systems and other aspects such as economical and educational aspects. Those social structures and systems could be changed by interaction with others such as through education and training. An interaction happens when an action is responded by a reaction in such a way that an action causes a reaction and similarly a reaction triggers new actions.

Table 5.3 provides a summary of the respondents' views, perceptions and concerns about Sipesmik as a social and educational process. Some respondents are of the view that space science and technology development is a social process which needs a long period of time to achieve the intended goals. As such, they believe that space science and technology development should be planned as a long time frame project, which should be managed in an appropriate manner such as within cycles where improvement from one to another is carefully planned.

To facilitate the intended social process the Sipesmik actors should become objects of its educational program. Some respondents suggested that education programs for farmers and fishermen should be integrated and developed by cooperative teams that consist of peers containing at a minimum: space remote sensing, fisheries, agriculture, trade and industry, social, education and culture. Those programs should not be limited to knowledge diffusion, but should also function as tools of social change including justice empowerment. Also, some respondents suggested that the Sipesmik education programs for researchers should be transformable into formal education credit, so that from that research can be presented for the award of masters and /or doctoral degrees. In line with the latter suggestion, universities should participate in the Sipesmik especially focusing on education, research and development.

**Table 5.3 Themes, issues and worldviews on social and educational process**

No	Themes, issues and worldviews	Respondents' code number (see Appendix 1)
1	Sipesmik is a social process that needs a long period of time to achieve its goals.	201, 202, 205, 406, 501, 505, 509
2	As a social process Sipesmik should be managed in an appropriate manner comprising cycles where the improvement mechanism from one to another cycle is well established	201, 202, 205, 406, 501, 505, 509
3	Sipesmik is an educational process where the actors are objects of its educational programs to facilitate the intended social process.	201, 202, 205, 206, 210, 406, 501, 505, 509,
4	Due to it's limited in house capabilities, Sipesmik should be open to international cooperation and/or outsourcing	101, 105, 106, 107, 109, 110, 202, 205, 206, 210, 301, 402, 404, 406, 407, 409, 410, 501, 505, 506, 509
5	The Sipesmik education program for researchers should be transformable into formal education credit, so that from their activities the researchers can write up theses for their master or doctor degrees.	201, 202, 203, 206, 209, 402, 406, 509
6	Universities should participate in the Sipesmik especially focusing on education, research and development.	106, 107, 110, 206, 509
7	Education programs for farmers and fishermen should be integrated and developed by cooperative teams consisting of peers in at least: space remote sensing, fisheries, agriculture, trade and industry, social, education and culture.	406, 505, 506, 509

### 5.1.3 Regulation and international cooperation

Table 5.4 summarises the respondents' views regarding regulation of space activities, including the Sipesmik. Some of these views frame Sipesmik as a multi-sector enterprise extending from research and development to sustainable food supply. Consequently, indicators of success embrace science and technology, the socio-cultural, economical, institutional and environmental indicators. For these respondents, Depanri as the national space council should take the initiative to regulate the Sipesmik. One respondent questioned whether law making and regulation for a sustainable food supply was operating effectively anywhere in the world (jurisprudence). However, this question did not deter other respondents, who felt that the absence of jurisprudence provides a challenge to lawyers on how laws can and should be used to achieve such political and social goals. Some respondents reminded the researcher that new laws governing the science and technology has been promulgated recently, therefore Sipesmik should be regulated in accordance with these laws. Also, there are some respondents who could consider that Sipesmik should be regulated according to international laws and regulations such as Space Treaty 1967<sup>2</sup>, Registration Convention 1972<sup>3</sup> and Liability Convention 1975<sup>4</sup>. With regards to enforcement, one respondent held the view that it should start with peer pressure followed by regulation (law enforcement).

Table 5.5 provides a summary of respondents' view regarding international cooperation. Some respondents suggested taking advantage of the existing LAPAN cooperation with foreign partners such as DLR in Germany, ISRO in India, Malaysia Space Agency and Russia. One respondent suggested that outsourcing could help with the resource limitations faced by Sipesmik. . But, in cooperation with foreign partners,

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<sup>2</sup> The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (the "Outer Space Treaty", adopted by the General Assembly in its resolution 2222 (XXII), opened for signature on 27 January 1967, entered into force on 10 October 1967, 98 ratifications and 27 signatures (as of 1 January 2003); (UN-OOSA, 2003)

<sup>3</sup> The Convention on Registration of Objects Launched into Outer Space (the "Registration Convention", adopted by the General Assembly in its resolution 3235 (XXIX), opened for signature on 14 January 1975, entered into force on 15 September 1976, 44 ratifications, 4 signatures, and 2 acceptances of rights and obligations (as of 1 January 2003);(UN-OOSA, 2003)

<sup>4</sup> The Convention on International Liability for Damage Caused by Space Objects (the "Liability Convention", adopted by the General Assembly in its resolution 2777 (XXVI), opened for signature on 29 March 1972, entered into force on 1 September 1972, 82 ratifications, 25 signatures, and 2 acceptances of rights and obligations (as of 1 January 2003); (UN-OOSA, 2003)



Sipesmik might be hindered by some regulations such as MTCR (Missile Technology Control Regimes)<sup>5</sup>. Some respondents commented that adherence to MTCR provides a country with the possibility of getting access to high technology markets, but joint (access) MTCR means such a country would need to be ready to accept international inspection on national technological facilities including those own by the arm forces.

**Table 5.4 Themes issues and worldviews on regulation**

No	Themes, issues and worldviews	Respondents' code number (see Appendix 1)
1	Sipesmik involves cross-sector tasks including research and development, and sustainable food. Indicators for success include science and technology, socio cultural, economical, institutional and physical indicators. Consequently, Depanri, as the national space council, should take the initiative to regulate Sipesmik.	207, 510
2	Sipesmik's high level goals such as enhancing the sustainability of food supply, provide lawyers with a challenge on how laws can and should be used to achieve such political and social goals.	106, 107, 207, 404, 501
3	Is there any jurisprudence on how laws can and should be used to achieve sustainability in the food supply?	207
4	Recently a law governing science and technology has been promulgated; therefore Sipesmik should be regulated in accordance with this law.	106, 107

<sup>5</sup> Missile Technology Control Regimes (MTCR) restricts the exports delivery systems and related technology for those systems capable carrying a 500 kilogram payload at least 300 kilometers, as well as systems intended delivery of weapon of mass destruction (WMD, nuclear, chemical and biological). The MTCR considers missiles, to include ballistic missile, space launch vehicles (SLVs), and sounding rocket. Unmanned air vehicles (UAVs) include cruise missiles, drones, and remotely piloted vehicles (RPVs). MTCR is a voluntary arrangement, among 27 countries consisting of common export policies, applied to common list of controlled items. It was originally concerned only with nuclear capable delivery systems. In January 1993, the Partners extended the guide lines to include delivery systems capable of delivering all WMD. (FAS, 2003)

5	There are international laws and regulations that should be taken into consideration in managing the Sipesmik such as: Space Treaty, 1967; Registration convention, 1972, and Liability Convention 1975.	207, 403, 404, 510
6	Peer pressure first than regulation	406
7	Assess and settle all regulation problems while Sipesmik is in the development phase.	510

**Table 5.5 Themes, issues and worldviews on international cooperation**

No	Themes, issues and worldviews	Respondents' code number (see Appendix 1)
1	Sipesmik should take advantages of the DLR offer of LAPAN in using its space research facilities	302
2	Sipesmik should take advantages of Lapan cooperation with ISRO. ISRO's TT&C station are operated by LAPAN crews in Biak, Irian Jaya, Indonesia.	303
3	Sipesmik should take advantages of LAPAN's cooperation with the Malaysian Space Agency in developing micro satellite	303, 308
4	Sipesmik should take advantage of a Russian offer to cooperate in establishing a business to air-launch satellite services in Indonesia	504
5	Sipesmik should adhere to MTCR which offers the possibility of access to high technology markets.	207, 504
6	Joint access to MTCR means readiness to accept international inspection of all facilities including those belong to arm forces	207, 504,
7	Outsourcing is a method that could help solve resource limitations that might be faced by Sipesmik	406, 410, 509

#### 5.1.4 The present failures of space science and technology development in Indonesia

Table 5.6 provides summary of respondents' views regarding the present failures of space science and technology development in Indonesia. The diversity of such views is illustrated by those who comment on the lack of national blue print up to those of who comment on the pessimism of fishermen and farmers with regard to the government's potential to achieve a sustainable food supply.

**Table 5.6 Present failures of space science and technology development in Indonesia**

No	Themes, issues and worldviews	Respondents' code number (see Appendix 1)
1	There is no national blue print for space science and technology development, therefore decision on projects are frequently based on immediate political convenience	207
2	Due to institutional jealousy, each department /ministry guards its own portfolio, so that no real coordination is actually enforced.	406
3	Qualified space science and technology human resources spread out in a number of institutions both government and private but networking is still very limited among them	406, 407, 210
4	A number of cooperation agreements between institutions were signed, but discontinuance of program often happens in accordance with tour of duty events	207
5	Farmers and fishermen's pessimism on government's will to achieve sustainability of the food supply, can be a future problem for Sipesnik	506, 507
6	As a non adherent country to several international laws and regulations (such as MTCR) Indonesia has difficulty in getting the necessary parts, instruments and materials for space science and technology developments.	301, 302, 303,
7	Indonesian policies in natural resources administration often cause reluctance in foreign partners in doing cooperative research.	408

Some respondents indicated the presence of institutional jealousy as the cause of the absence of real cooperation among departments and ministries. Also, some of them were of the view that discontinuation of cooperation between institutions often relates to 'tour of duty' events in those institutions. Especially when the tour of duty is concerned with the top manager, it always happens that all cooperation agreements are evaluated, some of them might be approved to continue and some might be cut off. Some respondents stated that qualified space science and technology human resources are available in Indonesia. They are spread out in government and private institutions but networking among them was still very limited.

#### **5.1.5 Specific management details**

Table 5.7 provides a summary of respondents' views concerning Sipesmik. Their views vary starting from the need to follow up with action program, the Indonesia National Concept on Space (INCS) that since 1998 has been promulgated by the President as the chairman of Depanri. Another suggestion is that the executors of Sipesmik should include not only members of Depanri, but it should also include others who are responsible for the sea, fisheries, agriculture, environment, trade, industry, social affairs, education, culture and the local government. For this, it seems that there is no objection from other respondents, but it was suggested that government institutions should work in an integrated manner.

Some respondents stated that there was a need to get a national commitment: (government, legislative and public) for Sipesmik so that continuance of the program is guaranteed. Also, some statements emphasize that the creation of the necessary conducive states for space science and technology development is strategically needed for Sipesmik. Additionally, it was suggested that the Sipesmik plan should include a long term plan consisting of cycles describing an improvement mechanism from one cycle to the next.

The creation of a sustainable food supply is closely related with morphological units such as catchment areas. However, one respondent felt that integration of the catchment area management program with Sipesmik was advisable. The same respondent felt that due to Indonesia's vast area and to its maritime circumstances, the

Sipesmik management structure should be a network of two clusters, regionally separated by the Wallace line<sup>6</sup>. The suggested network should have seven nodes spread across the islands of: Sumatra, Kalimantan, Sulawesi, Maluku, Irian Jaya, Nusa Tenggara and Jawa – Bali. The suggestion was also made that due to the importance of local government in achieving food sustainability, an entity organized around administrative boundaries, that the Sipesmik system of management should accommodate both administrative and morphological (physical) boundaries.

There were also suggestions that due to the fact that physical conditions vary, the capability to produce food varies from one region to another. Therefore, an appropriate system for transportation and communication is needed for the creation and maintenance of a sustainable food supply on a national scale. Additionally, it was suggested that an up to date natural resources data base is fundamentally needed, while space remote sensing could help provide real time natural resources data. Therefore, Sipesmik should have an appropriate mechanism that enables the realization of a real time natural resources data base.

**Table 5.7 Themes, issues and worldviews on specific management details**

No	Themes, issues and worldviews	Respondents' code number (see Appendix 1)
1	We have to follow up with an action program on the Indonesian National Concept on Space promulgated by the President as Chairman of Depanri in 1998.	207
2	Creation of the necessary conducive states for space science and technology development is strategically needed for Sipesmik	102, 103, 104, 105, 106, 108, 109, 110, 202, 204, 205, 207, 208, 209, 210, 301, 303, 306, 307, 310, 401, 402, 404, 406, 407,

<sup>6</sup> Wallace Line is an imaginary line postulated by A.R. Wallace, as dividing line between Asian and Australian fauna, which passes between Bali and Lombok islands and between Kalimantan and Sulawesi

		408, 502, 505, 506, 508, 509, 510
3	The executors of Sipesmik should include not only members of Depanri, but also other agencies and individuals who are responsible for sea, fisheries, agriculture, environment, trade, industry, social affairs, education, culture and local governments.	104, 105, 209, 403, 406, 410, 501, 505, 506, 509
4	There is a need for a national commitment to Sipesmik inclusive of government (legislative & executive) and the public to ensure the future of the program.	102, 103, 104, 105, 106, 108, 109, 110, 202, 204, 205, 207, 208, 209, 210, 301, 303, 306, 307, 310, 401, 402, 404, 406, 407, 408, 502, 505, 506, 508, 509, 510
5	Government institutions should not work in isolation	406, 509
6	Long term planning for Sipesmik should be iterative, based on the principle of a self improving system from one iteration to the next.	406, 509
7	Creation of a sustainable food supply is closely related with morphological units such as catchment areas, hence integration of catchment area management programs with Sipesmik is advisable (e.g. in the Bengawan Solo catchment area project)	209
9	Due to its vast area and to its maritime circumstances, the Sipesmik management structure should consist seven nodes that spread out in the main and group of islands: Sumatra, Kalimantan, Sulawesi, Maluku, Irian Jaya, Nusa Tenggara and Jawa - Bali	209
10	The management for the structure of Sipesmik	209

	should be a network with two clusters that are separated by the Wallace line.	
11	Sipesmik works with morphological (physical) boundaries for food sustainability. However, Local Governments are organized around administrative boundaries. Sipesmik should accommodate both administrative and physical boundaries.	209, 505,
12	Because the capability to produce food varies from one region to another due to physical conditions, an appropriate system for transportation and communication is needed for the creation and maintenance of a sustainable national food supply.	104, 209, 403
13	To create and maintain a sustainable national food supply, an up to date natural resources data base is needed. Space remote sensing can provide real time natural resources data, and hence Sipesmik should support a real time natural resources database.	108, 209

#### 5.1.6 Miscellaneous issues

Table 5.8 provides a summary of the miscellaneous issues expressed by the respondents. There is a suggestion for open choices of the characteristic of the satellite system, it should not be specified as micro, small or large satellite. This is in a line with other suggestion that the system name (Sipesmik) should be changed to SPSAI (Sistem Pengembangan Satelit Ala Indonesia = The Indonesia version of Satellite Development System). By this name any satellite can be developed, not strictly to micro satellites, it can be small or large satellites. Additionally, a broader goal is also suggested; it should not be limited to satellites for sustainable food supply but for sustainable development in general. With sustainable food only, another

respondent questioned if this would be enough to secure commitment a project as huge as Sipesmik.

The above suggestions seem to be in accord with a suggestion that Sipesmik should be in correspondence, coherence and consistent with the state philosophy Pancasila. This indicates the view that satellite relates to a large aspects of Indonesians' life. It is therefore understandable for a suggestion that Depanri, as the national space council, should be more active so that people are made able to grasp all possible space benefits.

**Table 5.8 Miscellaneous Issues**

No	Miscellaneous Issues	Respondents' code number (see Appendix 1)
1	Why does the program have to be a micro satellite program, why not just satellite, so that choices remain open?	101
2	Why does the program have to be a micro satellite program for a sustainable food supply, why can't it be a micro satellite program for sustainable development more generally?	510
3	Who will pay for the Sipesmik program?	202
4	Sipesmik should be consistent, coherent and in correspondence with Pancasila.	107, 201, 205, 207
5	Space activity can help in fulfilling many human needs, therefore Depanri as the national space council, should be pro-active in diffusing knowledge of the benefits of the space program.	207,
6	We are proud to have been the third country in the world to have its own satellite for national telecommunications, it will give us even greater pride to design and operate our satellites	501
7	Sipesmik should be changed into SPSAI (Sistem Pengembangan Satellite Ala Indonesia = The Indonesian version of satellite development system). We will be proud when one day another country implements SPSAI.	501



### **5.1.7 Summary of section 5.1**

This section discusses a number of factors that should be included into the model of the desired Sipesmik. They are presented in a Clients, Actors, Transformations Worldviews, Owner and Environment (CATWOE) structure as follows:

#### **Clients:**

General population especially fishermen and farmers, present and future generation, the world as a whole, military, and government

#### **Actors (executors)**

Government agencies, farmers, fishermen, government & private industry, politicians, community group and individuals

#### **Transformation mode:**

Space science and technology development

Long term national sustainable food

Creating and maintaining the necessary conducive states for the development of space science and technology in Indonesia

Increasing/maintaining local government participation

Increasing/maintaining economic productivity

Changing institutional practice

Changing socio-cultural practice

Increasing /maintaining the dynamics of regulating the Sipesmik

Increasing /maintaining the dynamics of managing the natural environment

#### **Worldviews:**

Sustainability

Integrated management with network structure

Correspondence, consistence, and in accordance with Pancasila

#### **Owners (decision makers):**

Government

Depanri/Lapan

#### **Environment (constraints)**

Laws and regulations both national and international

Physical realities

International community behaviour

#### **Control mechanisms**

#### **Measures of effectiveness**

## 5.2 Clients of Sipesmik

This section provides the summary of the respondents' answers to the following question:

*Q2a(i) Who ought to be the beneficiaries of the Sipesmik process?*

In soft systems methodology, beneficiaries are captured as clients. The summary shows a great variation among respondents (see Table 5.9). Their responses defining the beneficiaries can be classified as follows:

- 1) The general population including fishermen and farmers
- 2) Present and future generations
- 3) The general science and technology community
- 4) Space scientists/researchers
- 5) Government agencies
- 6) Industry (Agriculture, Telecommunications, Transport and others)
- 7) Nature (living and non living things)

It appears from the above summary that the respondents deliver a message that space technology is commonly recognised as high technology that requires high investment. It should be used to serve those who are economically poor and have little economic power (fishermen and farmers). This indicates that space technology should be used for public services, that the government (state) should pay the bill. In contrast, space technology should also be used to serve industries and government agencies that commonly recognised as those who have the necessary budget for the services they consumed. This indicates that Sipesmik should include tasks that are both profit making and non profitable.

**Table 5.9 Respondents' perceived clients of Sipesmik**

No	Those who should be the clients of Sipesmik	Respondents' code number (see appendix)
1	Government agencies	101, 102, 103, 104, 105, 110, 202, 203, 206, 209, 210, 301, 302, 402, 407
2	Industry	102, 109, 202, 203, 206, 209, 210, 301, 302, 402, 407,
3	Space Scientists/researchers	106, 107, 202, 203, 209, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 402, 407
4	Science and technology community	102, 106, 107, 108, 109, 110, 201, 202, 203, 205, 206, 207, 208, 209, 210, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 402, 405, 406, 407, 409, 502, 508, 509
5	General population especially fishermen and farmers	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 201, 202, 203, 205, 206, 207, 208, 209, 210, 301, 302, 303, 305, 308, 310, 401, 403, 404, 405, 406, 408, 409, 410, 501, 503, 505, 506, 507, 508, 509, 510
6	Present and future generations	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 201, 202, 205, 206, 207, 208, 209, 210, 301, 302, 303, 305, 308, 310, 401, 403, 404, 405, 406, 408, 409, 410, 501, 503, 505, 506, 507, 508, 509, 510
7	Nature (living and non living things)	204, 304, 309, 504, 306, 307, 502,

### 5.3 Executors (actors)

As discussed, the author uses the term 'actor' to describe participants in the Sipesmik, comprising clients, owners and executors. An executor is an actor in CATWOE.

Table 5.11 presents the summary of the respondents' answer to question 2iii):

Q2a(iii) Who ought to be the planners in the Sipesmik process?
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and from the answer of question 2iv):

Q2a(iv) Who ought to be the experts in the Sipesmik process?
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Planners and experts are the respondents' perceived executors of the Sipesmik. But some respondents expressed the view that the experts of Sipesmik should consist of all actors in the Sipesmik (owners, executors and planners and beneficiaries). If this is so, then the executors of Sipesmik are as follows (see table 5.10):

- 1) Government (Ministers, legislative and armed forces)
- 2) Agencies: Government and private
- 3) Industries: Government and private
- 4) Local government
- 5) Space researchers
- 6) Depanri/Lapan
- 7) Scientist/ academicians
- 8) Fishermen and farmers
- 9) Public figure

In line with respondents' perceived clients, the respondents' perceived actors for Sipesmik also varies from those who work for state administration (ministers, legislative and armed forces), public services (agencies both government and private), industries (both government and privates), local government administration (local government), science and technology (researcher, scientist, academician), farming, fishing and public involvement. All of these deliver a message from the respondents that the activities of Sipesmik should be wide ranging, and they should include benefits to all of those identified above. Sipesmik should not only limit its activities on the development of micro satellites in functional terms. It should include all aspects including those that have the direct impact of micro satellite development such as space science and technology advancement, but also its spin off such as farming, fishing, state administration practice, local government practice and law enforcement practice (by the armed forces).

**Table 5: 10 The respondents perceived executor of Sipesmik**

No	Those who should be the executor (actors) of Sipesmik	Respondents' code number (see appendix)
1	Government (executive & legislative including arm forces)	402, 407, 502, 504
2	Depanri/Lapan	101, 102, 103, 104, 105, 106, 107, 109, 110, 201, 202, 203, 204, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 402, 407, 502,
3	Agencies (government & private)	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 401, 403, 404, 405, 406, 408, 409, 410, 501, 503, 505, 506, 507, 508, 509, 510
4	Industries (government & private)	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 201, 202, 205, 206, 207, 208, 209, 210, 301, 302, 303, 304, 305, 306, 308, 310, 401, 403, 404, 405, 406, 408, 409, 410, 501, 503, 505, 506, 507, 508, 509, 510
5	Local government	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 201, 202, 205, 206, 207, 208, 209, 210, 301, 302, 303, 305, 308, 310, 401, 403, 404, 405, 406, 408, 409, 410, 501, 503, 505, 506, 507, 508, 509, 510
6	Public figures	501
7	Fishermen & farmers	106, 107, 301, 303, 402, 406, 501, 505, 506, 507, 509
8	Researcher	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 201, 202, 205, 206, 207, 208, 209, 210, 301, 303, 305, 310, 401, 403, 404, 405, 406, 408, 409, 410, 501, 503, 505, 506, 507, 508, 509, 510
9	Scientist/ academician	203, 204, 302, 304, 306, 307, 308, 309, 402, 407, 502, 504

#### 5.4 The desired transformations in the Sipesmik

Table 5.11 provides a summary of the perceived desired transformations (outcomes) based on respondents' answers to question 3:

Q3. Based on your (life) experience, would you mind telling me what criteria do you use to measure efficiency, effectiveness, efficacy (ease of use and implementation), equity, ethicality and elegance of a Sipesmik plan?

Some of desired outcomes were also derived from the engagement process. There are **53 items described in the first column of table 5.11** Items are grouped into two basic groups: the first group comprises those that relate to **space science and technology development outcomes** as listed in table 5.11 from 1 to 7 and 53, the second group consists of items that relate to **sustainable food outcomes** (Table 5.11 numbers 8 to 52) which can be regrouped into four subgroups including **social outcomes** (8, 9, 10, 12, 14, 15, 23, 32, 33, 34, 35, 36, 45, 46, 47, 50, 51 and 52) **physical outcomes** (24, 37, 38, 39, 40, 41, 42, 43 and 44), **economic outcomes** (16, 17, 18, 19, 20 and 27) and **institutional outcomes** (11, 13, 14, 21, 22, 25, 26, 28, 29, 30 and 47).

Our analysis of the expressed desired outcomes of space science and technology development, suggests that respondents believe that there is a need to change the system for **developing of space science and technology**. Moreover, this system should not operate in isolation within the research and development world, but in an integrated manner with other elements: basic science, space products demand, space goods production, space system construction, space system commissioning, space system operation, and space products sales and marketing. Also, they believe that there is a need to ensure a minimum level of space debris.

Observing the desired social outcomes, the respondents suggest that there are two different characteristics of outcomes. The first is described as **community understanding** inclusive of (12), attitudes (10), support (23) mode of work and decision making (48), trust (9 and 15) and participation (8). The second is expressed

as equity and justice within the whole system including space science and technology development (32, 33, 34, 35, 36 and 50). To achieve equity and justice in the community, some respondents expressed the need to **change regulation practice** so that procedural, interactional and distributive justice can take place. Thus, to differentiate the two groups: we may regard that the first is distinctively cultural in character and identified with **changing socio cultural practice**, and the second concerns **changes to regulation practice**.

Observing the desired economic outcomes, some respondents consider that the economic transformation mode should focus on **increasing economic productivity through sustainable energy/material flows, controlled inputs/outputs for activities and their impacts, production efficiency, waste minimization, controlling negative externalities in the quest for efficiency and overall sustainability with high levels of economic activity**. The rationale for this will be discussed further in section 6.2.

According to them, the desired physical outcomes should include: a fertile natural environment for food production, (24) ecological sustainability (37) waste reduction (38) water quality and effective drainage (39), quality ground water (40) ecological standards (41) preservation of natural habitats (42) preservation of flora and fauna diversity (43) and vegetation re-growth (44). These outcomes form the set of environmental indicators. Other physical outcomes that do not form part of the environmental indicator set are discussed in section 6.2. Thus up to this phase, the desired physical transformation is one of **changing the physical (environment)** in accordance with environmental indicators.

Observing the desired **institutional outcomes**, we can consider two different types of outcomes. **The first** is a change in government and private agencies practices involving acceptance of Sipesmik (11, 12, 13, 14, 15 and 28), financial support of Sipesmik and resource sharing with Sipesmik (21), training and education for the Sipesmik framework (29), improved domestic and international cooperation (22) and better management links (30). **The second** is a change in local-government practices concerning its knowledge and understanding of Sipesmik (11 and 29), its beliefs (12, 13, 14, 15 and 26), and trust (15) concerning Indonesia's space technology capability, and its participation in Sipesmik (11, 12, 13, 14, 15, 21, 22, 28, 29, 30 and 51). Hence,

to distinguish the two groups the first is concerned with changing general **institutional practice**; the group is concerned with participation involving a defined institutional participant, namely, **local government**.

Thus the required transformations can be described as follows:

- 1) **Developing the space science and technology** including: determining basic science to be implemented in space products, determining space product demand to be fulfilled, determining space products basic engineering, producing or constructing space products, commissioning space systems, operating space systems, marketing and sales space products<sup>7</sup>.
- 2) **Improving sustainable food supply** including production, distribution and consumption of healthier foods.
- 3) **Changes to socio cultural practice** including changes to community understanding, attitudes, support, mode of work and decision making, trust and participation that are conducive to the application of space science and technology to creating a sustainable food supply.
- 4) **Changes to regulation practice** aimed at procedural, interactional and distributive justice for the whole system.
- 5) **Changes to economic productivity through sustainable energy/material flows**, controlled inputs/outputs for activities and their impacts, production efficiency, waste minimization, controlling negative externalities in the quest for efficiency and overall sustainability with high levels of economic activity.
- 6) **Changes to the physical (environment)** that support a fertile natural environment for food production, ecological sustainability, waste reduction, water quality and effective drainage, quality ground water, ecological standards, preservation of natural habitats, preservation of flora and fauna diversity, and vegetation re-growth. These outcomes form the set of environmental indicators.
- 7) **Changing to the institutional practices** of government and private agencies in their acceptance of Sipesmik, financial support of Sipesmik and resource sharing

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<sup>7</sup> The warrant for this transformation can be found in the Chapter Three discussion of the engagement process.



with Sipesmik, training and education for the Sipesmik framework, improved domestic and international cooperation and better management links.

- 8) Changes to local government practice including its knowledge and understanding of Sipesmik, its beliefs, and trust concerning Indonesia's space technology capability, and its participation in Sipesmik

**Table 5.11 Desired transformations in the Sipesmik**

No	The desired transformation in the Sipesmik	Respondents' code number (see appendix)
1	Determine the basic sciences to be implemented in space products	301, 302, 303, 305, 308, 310, 402, 405, 406, 501, 509
2	Determine the space product demands to be fulfilled	301, 302, 303, 305, 308, 310, 402, 405, 406, 501, 509
3	Determine the space product engineering designs based on the basic science to be implemented in space products	301, 302, 303, 305, 308, 310, 402, 405, 406, 501, 509
4	Produce the space goods based on the space product basic engineering designs.	301, 302, 303, 305, 308, 310, 402, 405, 406, 501, 509
5	Construct and commission the space systems based on the basic engineering designs	301, 302, 303, 305, 308, 310, 402, 405, 406, 501, 509
6	Operate the commissioned space systems to fulfil space service demands	301, 302, 303, 305, 308, 310, 402, 405, 406, 501, 509
7	Sell the space system outputs: space systems, space goods and services, also copyrights and patents	301, 302, 303, 305, 308, 310, 402, 405, 406, 501, 509
8	Public participation in achieving and maintaining a sustainable food supply with the help of space technology.	105, 205, 501, 505, 506, 507, 508, 509, 510
9	Community trust in the capability of the system to create and maintain a sustainable food supply with the help of space technology.	105, 205, 501, 505, 506, 507, 508, 509, 510
10	Change dietary habits, farming and fishing	105, 205, 501, 505, 506

	practice in a sustainable direction	
11	Knowledge/ understanding by participants especially local governments, on how to support space technology development and how it can be used to create and maintain a sustainable food supply	105, 106, 107, 505, 506
12	The belief by participants, especially local government, that an appropriate socio-cultural state is required for sustainable food	105, 106, 107, 505, 506
13	The belief by participants, especially local government, on the need for appropriate institutional practices for sustainable food	105, 106, 107, 505, 506
14	The belief by participants, especially local government, on the need for an ecological sustainability for sustainable food	105, 106, 107, 505, 506
15	Participants', especially local governments', trust in the capability of the system to create and maintain sustainable food with the help of space technology	105, 106, 107, 505, 506
16	Sustainable energy and material flows especially for fisheries, agricultural and space industry	402, 406, 407, 410, 509,
17	Input/output accounting for activities and their impacts especially for fisheries, agriculture and the space industry.	402, 406, 407, 410, 509,
18	Policies that maximize production efficiencies, especially for fisheries, agriculture and the space industry.	402, 406, 407, 410, 509,
19	Policies that encourage efficiency and minimize negative externalities, in fisheries, agriculture and the space industry.	402, 406, 407, 410, 509,
20	Policies that encourage a sustainable high level of economic activity especially in fisheries, agriculture and the space industry.	402, 406, 407, 410, 509,

21	Financial support and resource sharing for the Sipesmik	106, 107, 108, 109, 110, 404, 406
22	Interdepartmental and international cooperation to create and maintain a sustainable food supply with the help of space technology.	103, 104, 105, 106, 107, 108, 109, 403, 404, 406, 501, 509
23	Community support for a system to create and maintain the sustainable food with the help of space technology	105, 205, 501, 505,
24	Ecological sustainability for food production	107, 108,
25	The belief by participants on the role of a space technology capability in increasing economic productivity	105, 106, 107, 505, 506
26	The belief by participants in the capability of space technology to support sustainable management of natural resources	105, 106, 107, 505, 506
27	Waste minimization policies	402, 406, 407, 410, 509,
28	Acceptance of the system by government agencies (especially local governments), private and foreign partners	106, 108, 110, 404, 406
29	Well trained and educated system participants (Actors)	106, 107, 108, 109, 110, 206, 209, 210, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 401, 402, 403, 404, 406, 407, 408, 409, 410, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510
30	Active horizontal management links	106, 108, 406, 407, 505, 509.
31	Community understanding and attitudes to the system	205, 501, 505, 506
32	Social, equity & justice empowerment	105, 205, 501, 505
33	New laws and regulations including ratification and accession for international laws/regulations	207, 403, 404, 510

34	Participant understanding of laws and regulations	207, 403, 404, 510
35	Consultation and aid to solve legal cases and to prepare and assess legal documents	207, 403, 404, 510
36	Legal protection and support for the system	107, 108, 207, 403, 404, 510
37	Moved toward ecological sustainability	208,
38	Reduce waste	107, 108, 208, 510
39	Water quality and effective drainage	107, 108, 208, 510
40	Ground water quality	107, 108, 208,
41	Ecosystem health	510
42	Preservation of natural habitats	107, 108, 208, 510
43	Preservation of flora and fauna diversity	107, 108, 208, 510
44	Vegetation re-growth	107, 108, 208, 510
45	Change the image of space activities from 'noble' and 'dangerous' to 'secure and prosperous'.	501
46	Change the image of government institutions from 'work in isolation' to 'an integrated network'	406
47	Changed the image of the country from 'non-sustainable food' to 'sustainable food'	561
48	Open management	306, 307, 502,
49	Working cooperatively with open decision making	306, 307, 502,
50	Regulation support for and protection of space activities	207, 510
51	Local government participation	106, 108, 110, 404, 406
52	National commitment to Sipesmik	102, 103, 104, 105, 106, 108, 109, 110, 202, 204, 205, 207, 208, 209, 210, 301, 303, 306, 307, 310, 401, 402, 404, 406, 407, 408, 502, 505, 506, 508, 509, 510
53	Minimize space debris	204, 304, 309, 504,

## 5.5 Owners of Sipesmilk

Table 5.12 provides a summary of the respondents' answers to question 2.a.ii) and 2.a.v) of the interview questions concerning who ought to be the decision makers and who should be the representatives for those affected by Sipesmilk. From 17 types of answers, they can be grouped into five generic themes:

a) **Central government** (legislative and executive including arm forces). This group includes:

- (1) Depanri (National Space Council)
- (2) President
- (3) Cabinet (President, Ministers and Arm Forces)
- (4) Minister for research and technology
- (5) Lapan (National Institute of Aeronautics and Space)
- (5) Government agencies
- (6) Government (executive & legislative including arm forces)

b) **Local governments**, (executive and legislative including arm forces)

c) **Trade and Industry** that represented the investors and shareholders

d) **Private organizations** that includes

- (1) LSMs (Social Advocating Institutes)
- (2) Professional associations
- (3) Business associations
- (4) Long experienced social organization

e) **Community groups** that includes

- (1) Public via DPR/MPR
- (2) Cultural specialists
- (4) Traditional leaders
- (5) Other groups

**Table 5.12: The desired owners (decision makers) in the Sipesmik**

No	Those who should be the owners of Sipesmik	Respondents' code number (see appendix)
1	Public via DPR/MPR (Legislative)	304
2	Depanri	307
3	President	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510
4	Cabinet (President, Ministers & Arm Forces)	507
5	Minister for research and technology	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510
6	Lapan	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510
7	Government agencies	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 201, 202, 205, 206, 207, 208, 209, 210, 301, 302, 303, 305, 306, 308, 309, 310, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510
8	Local governments	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 201, 202, 205, 206, 207, 208, 209, 210, 301, 302,

		303, 305, 306, 308, 309, 310, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510
9	Community groups	304
10	Investor/ shareholder	101, 203, 204, 304
11	Government central & local (legislative & executive)	102, 103, 104, 105, 106, 108, 109, 110, 202, 204, 205, 207, 208, 209, 210, 301, 303, 306, 307, 310, 401, 402, 404, 406, 407, 408, 502, 505, 506, 508, 509, 510
12	LSMs (social advocating institutions)	201, 304
13	Professional associations	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 201, 202, 205, 206, 207, 208, 209, 210, 301, 302, 303, 305, 306, 307, 308, 309, 310, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510
14	Long experienced social organizations	406, 205
15	Business associations	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 201, 202, 205, 206, 207, 208, 209, 210, 301, 302, 303, 305, 306, 308, 309, 310, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510
16	Cultural specialists ( <i>Budayawan</i> )	205
17	Traditional leaders	201, 501, 505, 506, 507, 509

## 5.6 Constraints of Sipesmik

The constraints on Sipesmik perceived by the respondents are summarized in tables 5.13 and 5.14. Table 5.13 provides the summary of the respondents' answer of question 2.b. asking the condition that are not controlled by the decision makers,

while table 5.14 is the summary of the answer of question 2.c asking the 'ought to be' constraints on the decision makers.

The first belongs to a category that has been named as **fixed constraints** ('constraints' that are out of control of the decision makers, or they can do almost nothing, just accept them as the environment for the system) and the second is **soft constraints** (constraints that decision makers of the system still have the opportunity to change or to diminish their impact of constraining the system). The identified fixed constraints consist of 15 items (see table 5.13, numbers between brackets that follow the items are numbers of the first column of the table) that include: laws and regulations (1 and 2), diplomatic behaviours (3), pressure groups such as those coming from disadvantages groups and opportunists (16) political interest (7), political process (10), macro economy (12), budget limitation (14 and 15), globalization (6 and 9), socio-culture (5), ethics (11), conflict of interest between central and local (13) science and technology (8), and physical nature (4).

The identified **soft constraints** consist of 10 items (see table 5.14). Those are bureaucracy (17) institutional jealousy (18) public perception that space technology is non economical (19), the lack of national blue print (20), the lack of national commitment (21), physical environment (22), the level of knowledge and experiences on space technology and its application (23), pessimism of farmers and fishermen on government's will to create and maintain sustainable food (24), socio cultural condition (25), micro economy (26).

Tables 5.13 and 5.14, show that the perceived constraints of Sipesmik consist of fixed constraints (table 5.14, number 1 up to 15) and soft constraints (table 5.14, number 16 up to 26), and both of them should be included in the modelling of Sipesmik.



**Table 5.13 Perceived fixed constraints of Sipesmik**

No	Environment (constraint) on the owners (decision makers) of Sipesmik	Respondents' code number (see Appendix 1)
1	National laws and regulations	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 203, 207, 210, 403, 404, 406, 407, 409, 410, 501, 509, 510,
2	International laws and regulations such as space treaty, registration convention, MTCR,	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 203, 207, 210, 403, 404, 406, 407, 409, 410, 501, 509, 510,
3	International community behaviour: diplomatic relationship	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 203, 207, 210, 403, 404, 406, 407, 409, 410, 501, 509, 510,
4	Physical condition / power of nature such as meteor shower, cyclone, flood, landslide, volcanic blast and tectonic earthquake	106, 107, 108, 109, 203, 207, 210, 403, 404, 406, 407, 409, 410, 501, 505, 509, 510,
5	Interest of socio-cultural power groups such as green movement, professional associations and gender movement,	201, 204, 205, 207, 210, 402, 403, 404, 406, 407, 410, 501, 505, 509, 510
6	Interest of economical power groups such as free trade, GATT, WTO,	103, 104, 105, 203, 204, 205, 301, 402, 403, 404, 406, 407, 410, 501, 505, 509, 510
7	Interest of political power groups:	103, 104, 105, 205, 206, 207, 209, 210, 301,

	non alignment, G8, equatorial countries, political party,	403, 404, 406, 409, 410, 501, 505, 509,
8	Science and technology power such as copy right, patents and secret formula	109, 110, 202, 203, 204, 205, 206, 210, 301, 402, 404, 405, 406, 407, 409, 410, 501, 504, 505, 509,
9	Mega trends such as global market, free trade, GATT	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 201, 202, 203, 204, 205, 301, 402, 404, 405, 406, 407, 410, 501, 504, 505, 509, 510
10	Political process for national commitment, budget approval, political inspections.	202
11	Ethics/should not ruin anybody	201,
12	Economy crisis	202, 205, 402
13	Conflict of interest between central and local governments	104, 105, 106, 107, 109, 110, 201, 205, 207, 208, 210, 301, 402, 406, 407, 408, 409, 410, 501, 505, 506, 507, 509, 510
14	Macro-economics factors such as value of money and investment risk	103, 105, 109, 202, 203, 204, 205, 301, 402, 406, 410, 501, 504, 505, 509,
15	Budget limitation	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510
16	Interest of disadvantages groups and opportunists	501

**Table 5.14 Perceived constraints on the owners (decision makers) of Sipesmik**

No	Environment (constraint) on the owners (decision makers) of Sipesmik	Respondents' code number (see appendix)
1	National laws and regulations	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 203, 207, 210, 403, 404, 406, 407, 409, 410, 501, 509, 510,
2	International laws and regulations such as space treaty, registration convention, MTCR,	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 203, 207, 210, 403, 404, 406, 407, 409, 410, 501, 509, 510,
3	International community behaviour: diplomatic relationship	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 203, 207, 210, 403, 404, 406, 407, 409, 410, 501, 509, 510,
4	Physical condition / power of nature such as meteor shower, cyclone, flood, landslide, volcanic blast and tectonic earthquake	106, 107, 108, 109, 203, 207, 210, 403, 404, 406, 407, 409, 410, 501, 505, 509, 510,
5	Interest of socio-cultural power groups such as green movement, professional associations and gender movement,	201, 204, 205, 207, 210, 402, 403, 404, 406, 407, 410, 501, 505, 509, 510
6	Interest of economical power groups such as free trade, GATT, WTO,	103, 104, 105, 203, 204, 205, 301, 402, 403, 404, 406, 407, 410, 501, 505, 509, 510
7	Interest of political power groups: non alignment, G8, equatorial countries, political party,	103, 104, 105, 205, 206, 207, 209, 210, 301, 403, 404, 406, 409, 410, 501, 505, 509,

8	Science and technology power such as copy right, patents and secret formula	109, 110, 202, 203, 204, 205, 206, 210, 301, 402, 404, 405, 406, 407, 409, 410, 501, 504, 505, 509,
9	Mega trends such as global market, free trade, GATT	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 201, 202, 203, 204, 205, 301, 402, 404, 405, 406, 407, 410, 501, 504, 505, 509, 510
10	Political process for national commitment, budget approval, political inspections.	202
11	Ethics/should not ruin anybody	201,
12	Economy crisis	202, 205, 402
13	Conflict of interest between central and local governments	104, 105, 106, 107, 109, 110, 201, 205, 207, 208, 210, 301, 402, 406, 407, 408, 409, 410, 501, 505, 506, 507, 509, 510
14	Macro-economics factors such as value of money and investment risk	103, 105, 109, 202, 203, 204, 205, 301, 402, 406, 410, 501, 504, 505, 509,
15	Budget limitation	101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510
16	Interest of disadvantages groups and opportunists	501
17	Bureaucracy of public administrators	304, 307
18	Institutional jealousy	406
19	Public perception that space technology is noble (non economical)	406, 407
20	The lack of national blue print	207
21	The lack of national	102, 103, 104, 105, 106, 108, 109, 110, 202,

	commitment	204, 205, 207, 208, 209, 210, 301, 303, 306, 307, 310, 401, 402, 404, 406, 407, 408, 502, 505, 506, 508, 509, 510
22	Physical environment	208, 209, 210
23	The level of knowledge and experiences on space technology and its application	301, 302, 303, 304, 305, 306, 307, 308, 309, 310,
24	Pessimism of farmers and fishermen on the government will to create and maintain sustainable food	507
25	Socio cultural condition	204
26	Micro economic factors such as production, distribution and consumptions.	103, 105, 109, 202, 203, 204, 205, 301, 402, 406, 410, 501, 504, 505, 509,

### 5.7 Power and conflict problems

From the point of view of power and conflict in the Sipesmik, the respondents' answers on the interview questions and their comments during the engagement process, can be grouped into five categories. Those categories include answers that refer to philosophical approach to problem handling that inferentially could be seen from the followings (see table 5.15):

- a) both technical and social solutions should be created, (2)
- b) expert and local knowledge should be used as inputs, (9)
- c) solutions should consider both existing and forthcoming generations, (2 and 6)
- d) both business and scientific interest should be fulfilled (4)
- e) both direct benefit and environmental preservation should be created (10)
- f) Choice between buy finish products, produce their own and out sourcing (11 and 14)
- g) the interests of both the individual and the community should be considered, (7 and 8)

The perceived conflicts listed above (a, b, c, d, e, and f) indicate the need for an

approach that is in accord with techno-centric and eco-centric political stances. Also the approach should be sensitive to the discord between individual and social needs (7) and to the conflict between local and central interest (8). Therefore, the designed system should include specific mechanisms where those aspects are made unequivocal so that open choice is available. Thus the conflict should be clearly demonstrated, but alternative of solving actions should also be provided for decision making.

**Table 5.15**  
**Perceived problems of power and conflict within Sipesmik**

No	Perceived problems of power and conflict within Sipesmik	Respondents' code number (see appendix)
1	Short term vs. long term policy	207
2	Technical vs. social solutions (physical vs. social scientists)	304, 504
4	Business interest vs. scientific interest	504
5	Getting something done vs. consensual techniques	304, 504,
6	Present vs. future interests	504,
7	Government agency vs. community interests	507
8	Individual vs. community interest	507
9	Expert vs. local knowledge	507
10	Direct benefit vs. environmental damages	208
11	Finish product vs. own product	504
12	Administrative vs. physical boundaries (unit morphology)	209, 505,
13	Rational vs. tendentious fund distribution between actors	304
14	Full in house product vs. outsourcing	309
16	Food sustainable vs. sustainable development at large	510

17	Satellite micro vs. satellite	101, 510
18	Government agency vs. government agency	406
19	Noble vs. economical	406, 407

Some problems regarding operational management that should be handled are:

- a) Both short term and long term policy should be established in an integrated plan (1)
- b) Avoiding operational paralysis when using consensual techniques, ( 5)
- c) Established power bases in agencies do not make the community based power of organisations surrender (7)
- d) Accommodating the manmade boundary establishment of the problem (especially between physical and administrative boundaries) (12)
- e) Self interest in government agencies superseding 'rational' decision making, (13 and 18)
- f) Accommodating the large notion of interest (sustainable development and satellite) within the projected case as sample (16 and 17)
- g) Develop image that a space activity as an economical project to invite public participation is considerable (19).

The operational management problems listed above indicate that they are allied with most fundamental management problems. They are symbols of normal organisational lives such as personal, divisional and departmental self interest, and control overriding of central to local establishments. Even though, the Sipesmik management system should take them into consideration.

### 5.8 Control mechanisms needed for Sipesmik

This section assesses the control mechanisms needed for Sipesmik based on respondents' answer to question 3 and their comments. The summary of those answers and comments is presented in table 5.16. The elements shown in column 2 were thought needed to be measures providing input for control actions in the system, which will rectify the observed discrepancies.

The collected data imply that the control mechanisms should have five basic components as follows: **perceptual, social, physical and process**. Each of these components should have their sub components or elements as follows (see table 5.16):

**A. Perceptual components**

- a) **Images:** secure and prosperous images of space activities, non isolation of government works, openness management practice, sustainable food (27, 28, 30 and 31)
- b) **Objections/ complaints:** public, institutional, governmental both domestic and foreign parties (13)
- c) **Acceptance levels:** public, institutional and governmental both domestic & foreign parties (8 and 14)

**B. Social components**

- a) **Economy:** economic productivity level and amount of funding (9 and 10)
- b) **Regulation:** procedural justice, interactional justice and distributive justice (18, 19, 20, 21, 22, 23 and 24)

**C. Physical components:**

- a) **Space products:** space systems, space goods and space services including copy rights and patents (1, 2, 3, 4, 5, 6, 7 and 9)
- b) **Food product:** fisheries and agricultural products (9, 24 and 26)
- c) **Environment:** flora and fauna diversity, habitat preservation, levels of pollution, waste production, and volume of man made space debris, stream/river health, drainage effectiveness and ground water quality. (25 and 38)

**D. Process components:**

- a) **Space technology innovation cycles:** basic science/ demand, research and development, production/construction, operation, marketing/sales, space debris minimization (1, 2, 3, 4, 5, 6, 7 and 39)
- b) **Foods cycles:** production, distribution and consumption (26 and 29)
- c) **Social cycles:** knowledge/ understanding, belief/trust, support/participation, national commitment, levels of changing habits (fishing, farming, menu) (11, 12, 15, 16, 17 and 32)
- d) **Environmental process:** flora & fauna diversity & preservation, waste processing, drainage engineering, (25)



- e) **Management process:** National blue print, plan having cycles with improvement mechanism bridging the cycles, control mechanism allowing public participation, participants' equitable access for resources, science and technology, information, market and decision making (33, 34, 35, 36 and 37)

**Table 5.16 Perceived control mechanism and measurement of success needed for Sipesmik**

No	Control mechanisms including measurement of success of Sipesmik	Respondent code number (see appendix)
1.	Space product & service demands to be fulfilled (copy right)	301, 302, 303, 305, 308, 310, 402, 405, 406, 501, 509
2	Number of basic sciences that have been implemented in space product and the related copy rights.	301, 302, 303, 305, 308, 310, 402, 405, 406, 501, 509
3	Number of basic engineering designs and the related copy rights & patents	301, 302, 303, 305, 308, 310, 402, 405, 406, 501, 509
4	Number and types of space product (systems & goods), produced and construct and the related copy right and patents	301, 302, 303, 305, 308, 310, 402, 405, 406, 501, 509
5	Number and types of commissioned / tested space system or subsystem and the related copy rights & patents	301, 302, 303, 305, 308, 310, 402, 405, 406, 501, 509
6	Number and types of systems in operation and the related copy rights	301, 302, 303, 305, 308, 310, 402, 405, 406, 501, 509
7	Number and types of space product sold, revenue and the related copy right	301, 302, 303, 305, 308, 310, 402, 405, 406, 501, 509
8	Number of project funded by local governments including their budget	105, 106, 107, 505, 506
9	Economic productivity levels (food, fishing and farming and space industry)	402, 406, 407, 410, 509,
10	Amount of funding	106, 107, 108, 109, 110, 404, 406.
11	Levels of institutional participation	106, 108, 110, 404, 406
12	Actors' levels of knowledge	106, 107, 108, 109, 110, 206,

		209, 210, 301, 302, 303, 304, 305, 306, 307, 308, 308, 309, 310, 401, 402, 403, 404, 406, 407, 408, 409, 410, 501, 502, 503, 504, 505, 506, 507, 509, 510
13	Number of objections/complaints (domestic & foreign parties)	103, 105, 205, 404, 501, 505
14	Sipesmik public acceptance levels	105, 205, 501, 505, 506, 507, 508, 509, 510
15	Levels of community support	105, 205, 501, 505,
16	Community participation levels	105, 205, 501, 505, 506, 507, 508, 509, 510
17	Levels of changing habits (fishing, farming, menu)	105, 205, 501, 505, 506
18	Level of procedural/distributive justice	105, 205, 501, 505,
19	Number of legal document done and assessed	207, 403, 404, 510
20	Number of legal case solved (disputes and enforcements)	207, 403, 404, 510
21	Level of legal understanding of Sipesmik participants	207, 403, 404, 510
22	Number of international laws & regulations ratified and accessed	207, 403, 404, 510
23	Number of laws and regulations need to be respected in running the Sipesmik	207, 403, 404, 510
24	Number of laws and regulation implementation guidance established	207, 403, 404, 510
25	Environmental indicators such as diversity of flora and fauna, ground water quality, stream/river health, habitat preservation, drainage effectiveness, vegetation re-growth, levels of pollution, waste production.	107, 108, 208, 510
26	Import & export of food product	402, 509
27	'Secure, and prosperous image' of space activity	501
28	'Non isolation image' of government agencies work practice	406

29	Food production, distribution and consumption level.	402, 409
30	'Openness image' of management practice	306, 307, 502,
31	'Sustainable food image'	501
32	National commitment	102, 103, 104, 105, 106, 108, 109, 110, 202, 204, 205, 207, 208, 209, 210, 301, 303, 306, 307, 310, 401, 402, 404, 406, 407, 408, 502, 505, 506, 508, 509, 510
33	National blue print	207
34	Plan having cycles with improvement mechanism bridging the cycles	406, 509
35	Control mechanism allowing public participation	306, 307, 502
37	Participants' equitable access for resources, science and technology, information, market and decision making.	205
38	Volume of man made space debris	207, 510
39	Space debris minimization	207

## 5.9 The root definition

In the previous sections, the CATWOE analysis results on interview data have been presented. This section presents the root definition that generally put the desired ideal system in a nutshell of from which the designed system models are established. The following root definition is the summary of section 5.1 up to 5.8.

**SIPESMIK is a system that consists of space technology innovation cycles, foods and environmental management, and community involvement process**

### OWNED BY

**The central and local governments (both legislative and executive including arm forces), trades and industries, private organizations and communities**

represented by DPR, community groups, cultural specialists and traditional leaders.

#### **FOR**

General population, especially fishermen and farmers, present and future generations, science and technology community, arm forces, scientists/researcher, government agencies, trades, industries and nature (living and living);

#### **RUN BY**

Government (Depanri/Lapan and other related government agencies), government and private industries, local governments, public figures, fishermen and farmers, space researchers, scientist/academician and arm forces;

#### **TO PRODUCE**

improved space products including basic sciences to be implemented in space products; space products demand to be fulfilled; basic engineering designs of space products based on the determined basic sciences and or space products demand; space goods/systems based on the determined basic engineering designs, space services based on space products demand, space market / sales services;

improved of healthier foods supply with the help of space technology, escorting to its sustainability;

improved environment condition escorting to its sustainability; waste reduction, and greater long ecological health;

improved economic productivity;

Improved socio-cultural practice, including changes on its understanding, attitudes, support, mode of work and decision making, trust and participation;

Improved regulation practice, and

Improved institutional practice, leading to acceptance of SIPESMIK by governments and private agencies (both domestic and foreign), and greater financial support and resources sharing, creating a more adjustable system, better horizontal management links, larger cooperation among government agencies and government and private agencies, and satisfactorily educated and trained all participants of SIPESMIK.

#### WITHIN THE CONSTRAINTS OF

fixed constraints: laws and regulations, diplomatic behaviour, physical nature, socio-culture, macro economy, political, science and technology, globalization, political process, ethics, conflict of interest between central and local, and interest of disadvantages groups opportunists;

soft constraints: bureaucracy, institutional jealousy, public perception that space activity is noble and dangerous, the lack of national blue print, the lack of national commitment, physical environment, level of knowledge and experiences on space technology and its application, pessimism of farmers and fishermen on the government will to create and maintain sustainable foods, socio cultural condition and micro economy.

#### THE ACCOMPLISHMENT OF THE SYSTEM SHOULD BE MEASURED USING THE FOLLOWING COMPONENTS

Perceptual components: (a) images: secure and prosperous images of space activities, non isolation of government works, openness management practice, sustainable food (b) objections/ complaints: public, institutional, governmental both domestic & foreign parties (c) acceptance levels: public, institutional and governmental both domestic & foreign parties;

**Social components:** (a) economy: economic productivity level and amount of funding (b) regulation: procedural, interactional and distributive justice;

**Physical components:** (a) space products: space systems, space goods and space services including copy rights and patents (b) food product: fisheries and agricultural products (c) environment: flora and fauna diversity, habitat preservation, waste production level, pollution level and volume of manmade space debris, stream/river health, drainage effectiveness, and ground water quality;

**Process components:** (a) space technology innovation cycles: basic science/ demand, research and development, production/construction, operation, marketing/sales, space debris minimization (b) foods cycles: production, distribution and consumption (c) social cycles: knowledge/ understanding, belief/trust, support/participation, national commitment, levels of changing habits (fishing, farming, menu) (d) environmental process: flora & fauna diversity & preservation, waste processing, drainage engineering, (e) management process: national blue print, plan having cycles with improvement mechanism bridging the cycles, control mechanism allowing public participation, participants' equitable access for resources, science and technology, information, market and decision making;

#### **AND ENSURING THAT**

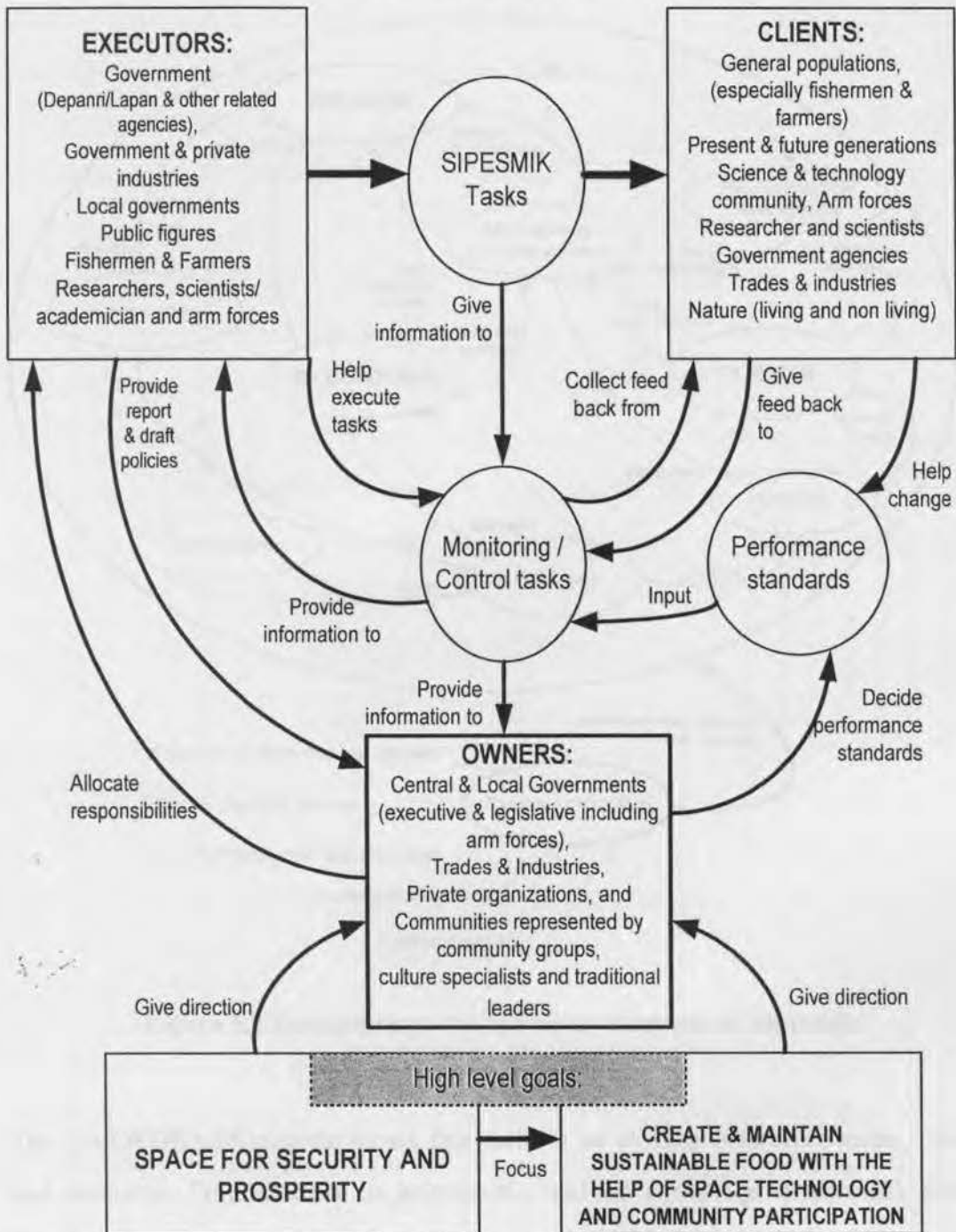
solutions should include both technical and social aspects, they should consider both existing and the forthcoming generations, they should fulfil both business and scientific interest, the input should include the expert and local knowledge, both direct benefit and environmental preservation should be created, choice between buy finish products, produce their own and out sourcing should be considered, the interests of both the individual and the community should also be considered, besides both short term and long term policy should be established in an integrated plan, when using consensual techniques operational paralysis should be avoided, established power bases in agencies should not cause the community based power of organisations relinquish, accommodating the

manmade imaginary border line around the complex problem (especially between physical and administrative boundaries), self interest in government agencies superseding 'rational' decision making, accommodating the large notion of interest (sustainable development and satellite) within the projected case as sample, develop image that a space activity as an economical project to invite public participation is considerable.

How each element of the system relates one another is diagrammatically presented in figure 5.1 - the root definition of Sipesmik. Figure 5.2 presents a more exhaustive analysis of the root definition's elements. It introduces the respondents' perceived main actors (participants) of Sipesmik process (executors, owners and clients), as well as the essential functions of Sipesmik: establishing performance standards, monitoring and controlling, and executing the primary processes within the designed system. The high level goals of Sipesmik are Space for security and prosperity with focus on achieving sustainable foods with the help of space technology and community participation, are presented to attract the participants, that they should be acknowledged when establishing the performance standards within Sipesmik. The diagram shows that most of data needed to monitor Sipesmik come from Sipesmik tasks and all participants either individual institutional or group.

Performance standards indicate the desired target of Sipesmik, they are input for the monitoring systems and they should be set up by all participants (owners, executors and clients). The diagram shows that draft policies (including draft performance standards) of the system are prepared by executors, submitted to owners, exercised and established by the owners, and the clients have the right to help change these performance standards. As compared to the root definition discussed in section 3.3; this root definition not only describes the respondents' perceived CATWOE of the system, but also contains information regarding process, and organizational structures, thus it is richer and a lot more conducive for developing a comprehensive system.

## THE ROOT DEFINITION OF SIPESMIK



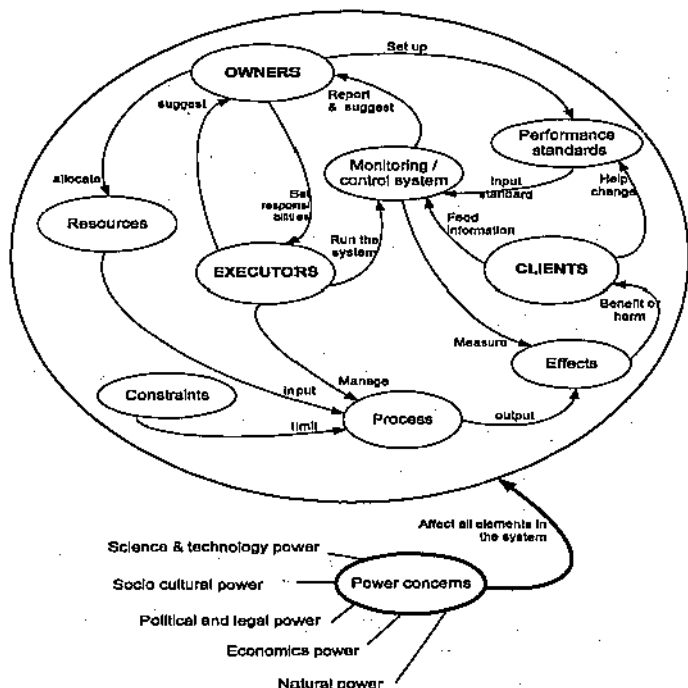
**Note:**

- MPR = The Peoples Consultative Assembly
- DPR = The People Representatives Council
- DEPANRI = The National Space Council
- LAPAN = The National Institute of Aeronautics and Space
- SIPESMIK = The Indonesian system in developing micro satellite

**Figure 5.1 The Root Definition of Sipesmik**



**RELATIONSHIP FEATURE OF ALL ELEMENTS IN  
THE ROOT DEFINITION OF SIPESMIK**



**Figure 5.2 Relationships feature of all elements of Sipesmik**

The CATWOE of Sipesmik shows that there is an overlap between owners, clients and executors. From this can be inferentially derived a message to Sipesmik actors, that they should practice self control. This message is relevant with the thought that based on a starting point of ontological choice, that Indonesians are 'mono-pluralistic human beings', whom have *Tabiat Saleh* (careful, just, simple and firm characters) (Lasiyo and Juwono, 1985, p.28) as their ethical norms (Sujadi and Wibisono, 1986 p.24) where self control is its practical action in real life. This indicates that Indonesians as mono-pluralists human being is well illustrated in the model.

Self control can be seen as one of the practical actions when implementing Pancasila in real life. Basically self control is an actualization of the belief that human is God creation. As a God's creation one should respect other God's creations. Therefore everything one will do, one should have considered the impact to other God's creations. The fact that the perceived clients include the present and future generations, living and nonliving creatures, support the assumption that the respondents were practicing the Pancasila ideas in answering the interview questions. These assumptions could be proved during the models' validation, as to whether the models are in correspondence, accordance and coherence to Pancasila (see chapter 7). Support for this is given by:

- a) Participants' belief in equality in access to information, science and technology, resources, market and decision making is guaranteed by the models where all participants have the access to system monitoring, either provide input or get information.
- b) Including living creatures as clients can be seen as a transformation of participants' responsibility to God's creations.
- c) The mono-pluralism of the Indonesians with the *Tabiat Saleh* not only as an imperative guide but also to inspiration, spirituality and material prosperity (Soejadi and Koento Wibisono, 1986). This is guaranteed by the models' high level goals as '*Space for security and prosperity focusing on sustainable food by the help of space technology and community participation.*'

The most worrying point is that the owners of the designed system included not only government, but also, traders, industrialists, and community groups. The absent of one of them will make the system fail, since Sipesmik has no indication that there is a communal ethos.

The desired outcomes include science and technology, sustainable foods, ecological as well as changing in social, regulation and institutional practices. The latter points will need significant modification in public and organizational norms – a change in

paradigm. The identified constraints indicated in the root definition consist of two types the fixed constraints that the management can do almost nothing, and the second is those that management have to create solutions such as the lack of national commitment, national blue-print of space activities, and pessimism of farmers and fishermen regarding the will of government to create and maintain sustainable food.

### 5.10 Conclusions

The data analysis shows that Sipesmik is considered to be a means of creating and maintaining the Indonesia national sustainable food with the help of satellite technology, which process includes the development of space science and technology and allowing the public/community involvement.

As it was stated in chapter 4 that based on the defined Rich Picture, this research would only create one root definition. Therefore, all the worldviews gathered in the interview has been included in this root definition. The world views that are listed in table 5.1a see that Sipesmik is a complex processes that include technology innovation, technical management, social and education, leading to the public empowerment and having the objective of improving space science and technology innovation, and foods supply, ecological and economic sustainability. Through the inclusion of all points of view in one root definition, based on which the conceptual models are built, will have a holistic/ systemic in character rather than fragmented versions of different system perceptions.

This chapter has specified the requirements of Sipesmik based on interview results. Although there are already some indications regarding tasks, but these will be assessed in depth in the next chapter (chapter 6), that will comprise performance standards, monitoring and controlling actions associated with each task needed to achieve the requests of the designed system.

## Chapter 6

### CONCEPTUAL MODELLING

#### 6.0 General overview

This chapter uses the root definition described earlier in section 5.9 to formulate conceptual models that fulfil the criteria as discussed earlier in chapters 2 and 3 especially sections 2.3 and 3.5. These sections indicate that a system should have 9 conditions that comply with the anatomy of system teleology (see section 4.6). Within a system there are consistent components (tasks) that are needed to achieve the purpose of the system:

- the factors that need to be monitored in carrying out those tasks;
- the functions needed to evaluate the present situation of the factors for which performance levels to be set;
- the setting of the performance levels, and
- the control actions needed to achieve targets.

Each of these components is also a 'system' therefore they have to consistently be described like a 'system', so to differentiate them from the system, they are identified as subsystems.

All subsystems in the conceptual models are derived from tasks in the root definition unless specified. The relationships between those subsystems are problematic and complex therefore only those logical relationships considered to be of most importance are illustrated (see sections 6.2 to 6.11). Section 6.12 presents the lessons learned.

#### 6.1 Monitoring and control functions for Sipesmik

There are three basic monitoring and control elements needed to ensure a system achieve its goals (Robbins et al, 2000). Those elements are:

- the performance standard;
- the monitoring of the required performance, and
- the control actions to correct any discrepancy between the required and the actual values.

The object of monitoring can be internal or external factors of the investigated situation or organization. The following elaborate the external factors.

Table 5.14 lists 26 factors that according to the respondents limit the decision makers of Sipesmik. These 26 factors can be regrouped into five<sup>1</sup>, so that they can be used to identify not only factors that should be monitored but also what kind of Sipesmik is expected by the respondents:

1) **Political and legal forces:**

- Political interest (7). As suggested by a respondent that the political interest of certain powerful parties (either an organization or a country) such as NASA, ESA, USA, Japan should be monitored. The result can be used for Sipesmik limits its choices, such as Japan, due to its geographical position its atmospheric condition is largely influenced by that of Indonesia region, thus Japan certainly has of great interest on observing it, therefore Japan is a potential partner for such an observation.
- Political process (10, 17, 20 and 21). The political process has an important role a national decision making. In an open management, public has the right to know the process of generating a decision and in certain cases they may interfere the process, by submitting algedonic signal, or political pressure. However such action may not have of great opportunity to occur in an autocratic administration.
- Pressure groups (5 and 16). Pressure groups should also be monitored with two purposes in mind, either to be used or to be anticipated. They can be used to support Sipesmik, but those that are in contradictory interest with Sipesmik should be anticipated, for the impact of their actions to Sipesmik is minimized.

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<sup>1</sup> Numbers indicated in each grouped are numbers of constraints for decision makers identified by the respondents as listed in Table 5.14

- Laws and regulations (1 and 2). Sipesmik action should be legal; it should obey the valid laws and regulations, both that of domestic and international.
- Diplomatic behaviour (3). Sipesmik is considered as having involvement with international cooperation therefore it should respect the existing diplomatic behaviour for the success of achieving its objective.

## 2) Economic forces

- Macro economic factors (14 and 26). Sipesmik should be designed as a large project that has impact to various aspects of national life, and in return it will also be influenced by various factors such as macroeconomics, therefore monitoring this will provide great benefit for Sipesmik.
- Budget limitation (15). Sipesmik should be considered as needing to operate within budgetary constraints, therefore its programs should be designed to have high effectiveness and high efficiency.
- Globalization (6, 9 and 12). Sipesmik should be designed to have high survivability within globalization era, that is characterized by *'an economy that the output consist of information, services, and experiences; the consumer's own actions affect the efficiency of the producer; and economic productivity is frequently more an artefact of accounting and of permissible externalizations than of anything else'* (Toffler, 1984, p.63).

## 3) Socio cultural forces

- Ethics (11 and 16). Some respondent suggest that Sipesmik should be ethical, therefore all transformation process within Sipesmik, is expected to be high ethicality.
- Social factors (18, 24 and 25). Some respondents want Sipesmik to be concerned with social factors, such as gender, green movements therefore changes that are contemplated within Sipesmik should

include social changes, where those changes are designed and executed by the participants themselves.

- Cultural factors (19, 23 and 25). Some respondents prefer that Sipesmik should take into account of cultural factors, which inferentially request the process of change within Sipesmik include cultural improvement such as those resulted by education and training programs.
- Conflict of interest between central and local (13). One respondent provides a warning that Sipesmik should take care of the present conflict of interest between central and local government. It is not expected that Sipesmik defeats one party and provides the other with benefit, but both of them should gain benefit.

#### 4) Scientific and technological forces

- New findings (8). One respondent is concerned that Sipesmik should innovate science and technology, so that new findings will characterise its success.
- Patents (8). This respondent also warns the Sipesmik designer to include patent management of all the new findings so that all parties involved are respected and covered by legal bindings.
- Copyrights (8). Legal bindings are also suggested to all products that are relevant to be copyrighted.

#### 5) Natural forces

- Air and space forces (4 and 22). Some respondents are concerned with natural space (air and outer space) factors that can be regarded as natural resource, living-media and other areas of interest (see section 2.2), which are not only regarded as input, but also as output of the system. As natural resource space is input for Sipesmik, it is because the occurrence of some processes needs its involvement such as for air or space craft operations. However in other cases it becomes output of the process, such as minimization of space debris in space.

- Morphological forces (4 and 22). Some respondents are apprehensive of morphological forces that do not merely limit the activities of Sipesmik but also input and objects that should be improved by Sipesmik. Therefore monitoring of them is essential.
- Geological forces (4 and 22). Among other forces geological forces are specific, they are generated by the earth and almost nil percent of them can be used as input for the project, unless gravitation is included in this category, since it becomes key input for managing space craft operation (Clark, 1945).

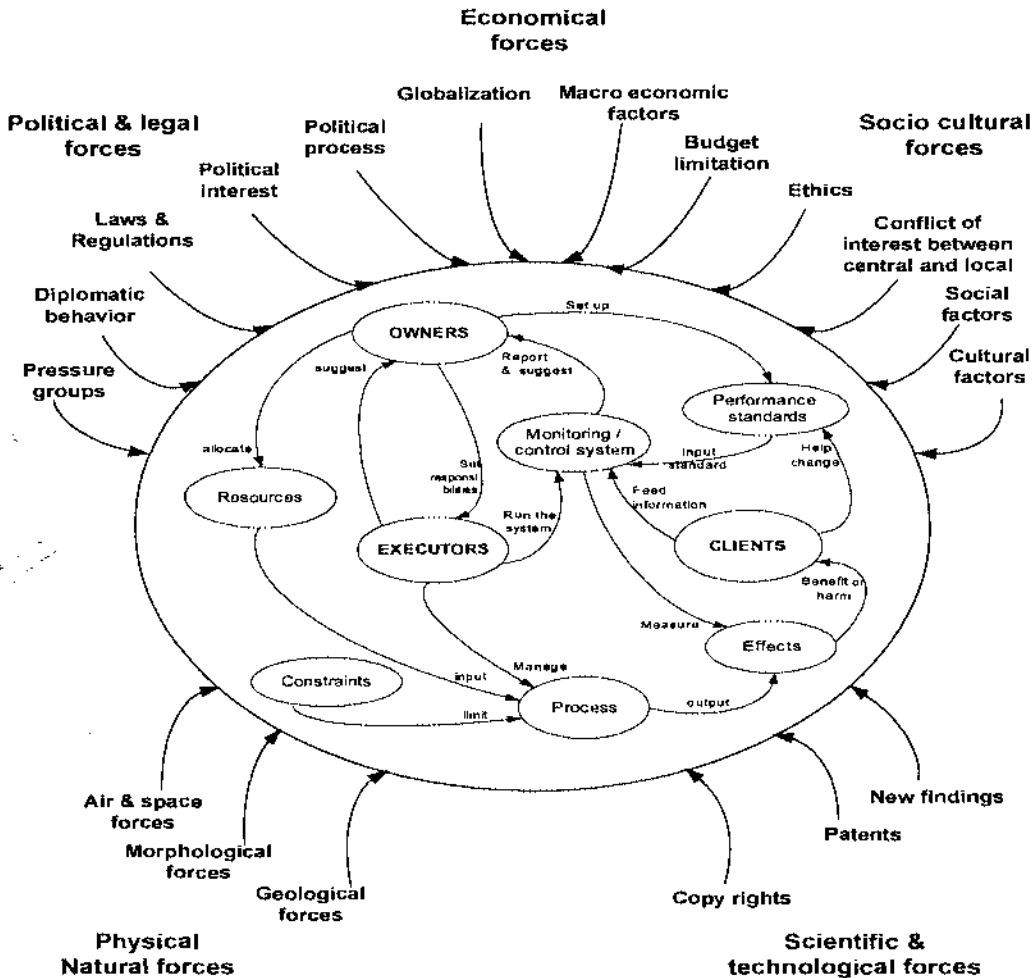


Figure 6.1 External forces need to be monitored by Sipesmik



All of the above factors are illustrated in figure 6.1 that demonstrates them graphically as external factors for Sipesmik. The other factors that should be monitored are internal factors, which are tabulated in table 5.16, and which include 39 items that are needed to be monitored. This implies that Sipesmik actions should be focused on achieving these items that can be regrouped into 16 groups (see section 5.8) as follows<sup>2</sup>:

- 1) **Sipesmik images.** Some respondents (27, 28, 30 and 31) recommended that people's perception on space activities, governmental and management practices and sustainable food should be watched and ameliorated.
- 2) **The number and nature of objection/ complaints.** One respondent (13) suggested that objection/ complaints coming from public, institutions and governments both national and international should be followed up in full of responsibility.
- 3) **Acceptance levels.** Two interviewees (8 and 14) recommended the important of monitoring public, institutions and governments' acceptance (both national and international levels) toward Sipesmik should be monitored and increased.
- 4) **Economic productivity<sup>3</sup>.** One respondent (9) suggested keep an eye on and enhance economic productivity level.
- 5) **Amount of funding.** One respondent was eager with (10) support coming from public, government and private institution both national and international and also other funding generated from Sipesmik products sold. All of these were suggested to be checked and advanced.
- 6) **The level of waste.** Two respondents (25, 38) were concerned with it including the landfill, aquatic, atmospheric and space disposals, therefore it should be examined and minimized.
- 7) **Procedural justice<sup>4</sup>** that is the procedures ensuring everyone get their rights and carry out their responsibilities is suggested by some respondents (18, 19, 20, 21, 22, 23 and 24) be monitored and improved.

<sup>2</sup> Numbers mentioned between brackets behind each items are numbers of items in table 5.16 that are regrouped into the identified item

<sup>3</sup> According to Pearce et al (1989, p. 41) economic productivity can be defined as 'The output of valued product per unit of resource input, with common measures of productivity being yield or income per hectare, or total of production of goods and services per household or nation'

- 8) **Interactional justice**<sup>4</sup>, that is the fairness of interaction between parties involved in a case is also required by some respondents (18, 19, 20, 21, 22, 23 and 24) be watched and enhanced.
- 9) **Distributive justice**<sup>4</sup>, that is the distribution of wealth and power in the country that generate rights and responsibilities were asked by some respondents (18, 19, 20, 21, 22, 23 and 24) be monitored, to ensure they are equitably shared.
- 10) **Space products**. Some respondents (1, 2, 3, 4, 5, 6, 7 and 9) were concerned with them consisting of space systems, space goods and space services including publications, copy rights and patents, therefore they should be scrutinized and improved accordingly.
- 11) **Food products** are requested to be monitored by some interviewees (9, 24, and 26) and the availability of healthier food products should be improved both at regional and national levels.
- 12) **Natural environment**. Some respondents (25 and 38) were concerned with flora fauna diversity, ground water quality, stream/river health, habitat preservation, drainage effectiveness, levels of pollution, and space debris including its volume and distribution. All of these were suggested be monitored and ameliorated.
- 13) **Space technology innovation cycle**<sup>5</sup>. At the engagement process, some interviewees (1, 2, 3, 4, 5, 6, 7 and 39) were attracted by the Interactive Model of Innovation Process (Manley, 2001), and they suggested includes basic science/demand, research and development, production and construction, space system operation and marketing/sales of space products in the improved model, which means that all of these are requested to be monitored and improved.

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<sup>4</sup> Regarding procedural, interactional and distributive justice can be further detail in Moorman (1991), Warren (2009) and Johnston (2003)

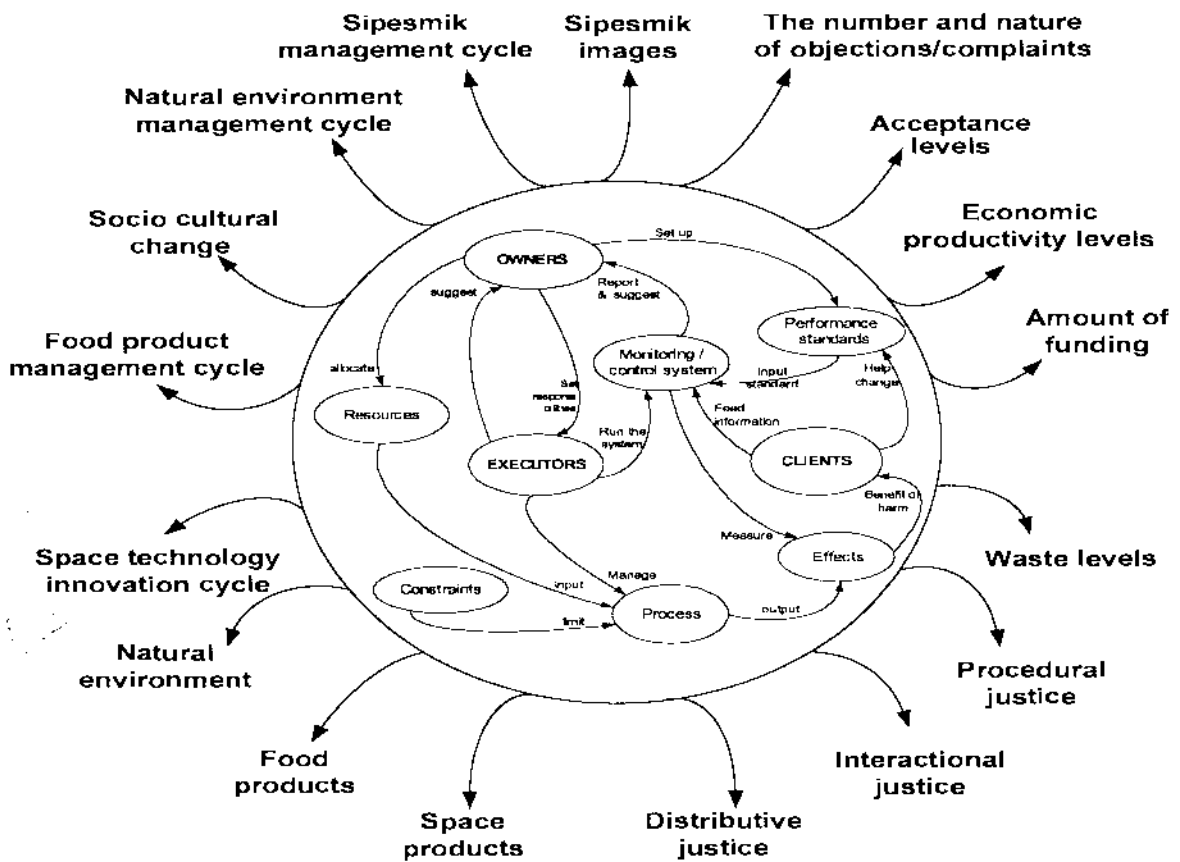
<sup>5</sup> It should be noted that during the engagement process each respondent was introduced to the Interactive Model of Innovation Process (Manley, 2001). There were suggestions improve this model and used it as the nucleus of Sipesnik models (see further figure 6.4)

- 14) **Food product management cycle.** Two interviewees (26 and 29) were concerned with it that includes production, distribution and consumption of food products, therefore they are suggested to be scrutinized and enhanced.
- 15) **Socio cultural change.** Some respondents (11, 12, 15, 16, 17, and 32) were concerned with the process of social change. They expected active public participations in Sipesmik, which includes their level of knowledge/understanding, belief/trust and support/participation.
- 16) **Natural environment management cycle.** One respondent (25) was concerned with this process, and suggested examine the process of planning, organizing, actuating and controlling at national and regional levels; especially with regard to monitoring, amelioration and preservation of environment.
- 17) **Sipesmik management process.** Some respondents (33, 34, 35, 36 and 37) expected that this process both at national level and regional levels are monitored and improved of becoming an open management.

The above indicators of success are displayed in figure 6.2 which shows that those indicators should be produced by Sipesmik. Therefore the designed models should display how these indicators can be resulted. To facilitate the identification of tasks to be performed, the detail of these indicators is elaborated in table 6.1 that complete figure 6.2 into the internal system monitoring of Sipesmik.

Table 6.1 details the indicators of success of Sipesmik. Image of Sipesmik was designed to include the security and prosperity aspects of space activities in general and especially Sipesmik. If it is dangerous, it should be changed into more secured. If it is not economical, it should be changed into economical. If it benefits only limited parties then larger parties should be included as its beneficiaries. Respondents' views inferentially request that the change of image should be actualised as changes of some practices and perceptions. In the real world, 'Sipesmik images' can be weighed up by surveys measuring its acceptance levels, which investigate the community perceptions regarding the credibility, need, and agreement regarding the processes of Sipesmik.

The second indicator is the number and nature of objection and complaint. This implies the need to establish a mechanism that includes receiving and following them up. Although the absence of objection and complaint does not firmly indicate that Sipesmik serves well its clients, but their presence should not also be regarded as the clients' rejection to the project. Their presence should be regarded as interaction's indicator toward improvement. Therefore the designed mechanism should include the system's improvement that may relate to structure, input and or process.



**Figure 6.2: The Internal matters that need to be monitored to established the progress of Sipesmik.**

The nature of the complaints has also major importance, especially with regard to the overall goals of Sipesmik. It has less importance when it is concerned with

operational aspects of Sipesmik, although these minor objections can inexplicably affects various factors such as acceptance levels and community support, even when their trivialities are obvious.

The third indicator is acceptance level. Acceptance can be individual or group that can be in the form of institution or organization. To accept an idea people need to master the necessary knowledge that consist of understanding, skill and value (Kemmis and Taggart, 2003). The lowest level is the understanding of the idea. Using language, people can communicate with one another regarding that idea. Through discursive interaction people can improve their understanding of the idea. When the understanding includes skill (second level) people can take benefit from it to produce some products that can be goods or services, based on which they are able to generate economic benefit from their knowledge. At the third level using social organization, people may use their understanding and skill to establish values of the idea and to use them to gain power for realising their political objective.

The above reflection illustrates that selling the idea of Sipesmik may correspond to these three levels of acceptance. Although not all people complete them all but the Sipesmik designer should take them in consideration.

The fourth indicator is economic productivity. According to Pearce (1989, p.41) it can be defined as *'The output of valued product per unit of resource input, with common measures of productivity being yield or income per hectare, or total of production of goods and services per household or nation'*. This implies that the tasks of Sipesmik should have impact on 'total of production of goods and services per household or nation', or 'output of valued product per unit of resource input, with common measures of productivity being yield', or 'income per hectare'. Respondents' suggestion (see table 5.7 numbers 7, 9, 10, 11, 12 and 13) relates the organization of Sipesmik with natural morphological unit, which implies that the assumption should be used, is that within a natural morphological unit, the income per hectare of the ground surface is relatively homogenic. Hence the appropriate notion of economic productivity should be the latter one: income per hectare of ground surface. Space remote sensing technology is an appropriate technology to improve land use

classification Li et al (2000) and Yan et al (2002), not only because of its digital form that allows to result in real time products with high precision, but also to include other inputs (ground truth or secondary data), so that economic productivity of a region or country can be displayed to support decision making process.

The fifth indicator is amount of funding. Among the three levels of acceptance of Sipesmik, there are two levels that people rationally will be ready to provide funding support. Those who are at the second level may share resources or funding in return to their economic benefit they gain. Analogically for those who are at the third level, in return to power they acquire.

The sixth indicator is the level of waste. Those who are at the 'second level of acceptance' (see third indicator) produce goods or services, accordingly also generate waste. This implies that the design of Sipesmik should consider human impact on environment, since waste harms environment. Human impact on environment (Ehrlich and Ehrlich, 1990) relates to population size, the activity (affluence mix), and the technology used in producing goods, services and waste. With regards to economic productivity of a region (that is the income of that region), the presence of waste may decrease the income's real value, since some of that income should be used to handle waste. Therefore the process of resulting output should be changed into that that results in minimum waste, which does not harm the region. All of this implies that minimise waste in a region may increase its economic productivity.

The seventh, eighth and ninth indicators relating to justice: procedural justice, interactional justice and distributive justice. These imply that the designed system should be concerned with justice or regulation aspect of Sipesmik, not only in the establishment laws and regulations but also law enforcement, which are convoluted with social change as a whole. It is therefore these indicators can also be regarded as social justice indicator.

The tenth indicator is space products. Within the root definition the Sipesmik process components consist of space technology innovation, foods and environment management and community support and participation levels. As discussed earlier in section 5.3 the space technology innovation cycle includes five elements: basic

science/ demand, research and development, production/construction, system operation, and marketing/ sales. Normally progress and results of basic science/demand element are presented in the form of interim reports with high confidentiality, or published in electronic/ technical papers, journals or text books, or presented in a scientific and technical event such as seminar, congress and workshop. Thus, the progress and results of this element can be measured by the number of Sipesmik interim reports of the related topics and the number of publications that Sipesmik hold their copy rights; such as electronic/ technical papers, journals' articles, textbooks and proceedings' papers of: seminars, congresses, workshops and other scientific and technical events. Output of this element becomes input for Sipesmik as a whole, especially the determined basic science to be implemented in space products and space products demand to be fulfilled are intentionally prepared for research and development element.

The eleventh indicator of success relates to food products and should include not only their production, distribution and consumption, but as indicated in table 5.16 that the quality especially food healthiness should also be considered in the design. As suggested by some respondents this indicator is closely related to physical environment that can be monitored using the space remote sensing technology. Therefore the use of space technology in support to food management may not be limited to communication and transportation but also monitoring (remote sensing).

The twelfth indicator is natural environment. As suggested by some respondents as shown in table 5.16, and the system should result in healthier environment including ground water quality, stream/river health, habitat preservation, drainage effectiveness, levels of pollution, and space debris including its volume and distribution (both natural and man made).

The thirteenth to seventeenth indicators are that relate to the process. The thirteenth is associated with the processing of space product, therefore it focus is the space technology innovation cycle. The fourteenth is concerned with the cycle of food management that according to Oroda (2001) includes production, distribution and

consumption. The fifteenth relates to social change process of increasing the acceptance level that is largely depended on the knowledge that includes understanding, skill and values (Kemmis and Taggart, 2003). The sixteenth indicator is about the natural management cycle that includes environmental monitoring, amelioration and preservation. The seventeenth relates with the Sipesmik management cycles, both at national and regional level, which includes planning, organizing, actuating and controlling of Sipesmik as a whole.

All of the above indicators are expected to monitored and openly displayed to all participants, for they can take part in improving them. The use of space technology is expected to make all of the identified requirements be fulfilled in the real world.

**Table 6.1: Summary of all internal elements that should be monitored and detail information of each element.**

No	Elements to be monitored	Monitoring details
1	Sipesmik images	Data to be collected by survey measuring people perception of the changes of the secure and prosperous image of space activities, the non isolation image of government institution practice, the openness image of Sipesmik management practice and the image of sustainable food.
2	The number and nature of objections/ complaints	The number and the nature of objections/ complaints received by the government and Sipesmik administration coming from public, institutions and governments both national and international.
3	Acceptance levels	Data collected by survey measuring the acceptance levels of public, institutions and governments both national and international toward Sipesmik
4	Economic productivity	Data collected by survey measuring the levels of



	<b>levels</b>	net income both regional and national. This needs to ensure the overall wealth of the country/region is not degraded by Sipesmik Policies.
5	<b>Amount of funding</b>	The Sipesmik amount of funding support coming from public, government and private institution both national and international and also funding generated from Sipesmik products sold.
6	<b>Level of waste</b>	Data collected by survey measuring the landfill, aquatic, atmospheric and space disposals including their volume, toxicity level and spatial distribution.
7	<b>Distributive justice</b>	The distribution of wealth and power in the country that generate rights and responsibilities should be monitored, to ensure they are equitably shared.
8	<b>Procedural justice</b>	The procedures ensuring everyone get their rights and carry out their responsibilities. This allocation of power that can be quantified once agreed criteria are established, although these might also be influenced by power elements in the decision making process
9	<b>Interactional justice</b>	Fairness of interaction between parties involved in a legal case. Public and law enforcement officials' knowledge levels on laws and regulation especially related to space activities and sustainable foods should be improved to ensure the equity of treatment of all legal cases.
10	<b>Space products</b>	Data base on space products can show the status and history of the Sipesmik space products consisting space systems, space goods and space services including publications, copy rights and patents held by Sipesmik.

11	<b>Food products</b>	A national network on food product data bases supported with a combined method of space remote sensing and ground truth data collecting methods, can show the levels of foods production, distribution and consumption both at national and regional levels.
12	<b>Natural environment</b>	A national network on natural resources data bases supported by space remote sensing and ground truth data collecting method can show up physical environment data including flora fauna diversity, ground water quality, stream/river health, habitat preservation, drainage effectiveness, levels of pollution, and space debris including its volume and distribution (both natural and man made).
13	<b>Space technology innovation cycle</b>	Data collected through survey on the interaction processes among stages of the cycle: basic science/demand, research and development, production and construction, space system operation and marketing/sales.
14	<b>Food products management cycle</b>	Data collected through survey on the interaction processes among parties responsible for production, distribution and consumption of food products.
15	<b>Social change</b>	Data collected through survey on the process of social change toward active public participation in Sipesmik, which includes their level of knowledge/understanding, belief/trust and support/participation.
16	<b>Natural environment management cycle</b>	Data collected through survey on the process of managing the natural environment (monitoring, amelioration and preservation) it's planning,

		organizing, actuating and controlling both processes at national and regional levels.
17	Sipesmik management cycle	Data collected through survey on the management process of Sipesmik, both at national level and regional levels, especially regarding the present of national/regional blue-print, national/regional commitment, plan having cycles with improvement mechanism bridging the cycles, control mechanism allowing public participation, participant's equitable access for resources, science and technology, information, market and decision making.

## 6.2 The primary tasks of Sipesmik

In the development of the Root Definition that the primary purpose of the whole system is:

- to develop space science and technology,
- to move Indonesia into a state of sustainable food, economic and ecological stability, whilst at the same time,
- to increasing community involvement in decision making and in the operation of the system.

While the indicators of success of achieving the above purpose form 17 categories. Some tasks that should be included in the Sipesmik were also suggested by some respondents, and already discussed in section 5.4. These tasks improve:

- a) Space science and technology innovation
- b) Natural environment
- c) Sustainable food supply
- d) Economic productivity
- e) Socio cultural practice
- f) Regulation practice
- g) Institutional practice
- h) Local government participation

The relationship between tasks and indicator of success are indicated in table 6.2. The indicator of success can be regrouped into five categories: perception, economy, justice, physic and process. In general Sipesmik tasks are designed to have impact on all these indicators, but there are only three tasks that are designed to result in physical output. These tasks are: space science and technology, sustainable food supply and natural environment.

**Table 6.2 Relationship between Sipesmik primary tasks and its indicator of success**

Sipesmik Tasks	Groupings with Indicators of success (see table 6.1)																
	Perception			Economy			Justice			Physical			Process				
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17
<b>To improve:</b>																	
Space science and technology innovation	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y	Y	Y
Sustainable food	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y		Y	Y	Y	Y	Y
Economic productivity	Y	Y	Y	Y	Y	Y	Y	Y	Y				Y	Y	Y	Y	Y
Natural environment	Y	Y	Y	Y	Y	Y	Y	Y	Y			Y	Y	Y	Y	Y	Y
Socio cultural practice	Y	Y	Y	Y	Y	Y	Y	Y	Y				Y	Y	Y	Y	Y
Regulation practice	Y	Y	Y	Y	Y	Y	Y	Y	Y				Y	Y	Y	Y	Y
Institutional practice	Y	Y	Y	Y	Y	Y	Y	Y	Y				Y	Y	Y	Y	Y
Local Governments participation	Y	Y	Y	Y	Y	Y	Y	Y	Y				Y	Y	Y	Y	Y

**Key:**

'Y' indicates that the task should have an impact on the indicator of success

These common indicators of success demonstrate that they should have relationship one another, therefore based on Klir's formula (see section 1.2) Sipesmik is already identified. It has a set of certain things (T = tasks) and a set of defined on T (relationship between tasks). The following discusses the relationships between these tasks.

Better space technology innovation stimulates better practices of foods management, of environmental management and of institutional (including local government) management, of regulation and of socio culture, since it results in better communication, data bases, and environmental monitoring that result in higher quality of environmental data, their precision, complete coverage and real time.

Better space technology innovation also stimulates greater economic wealth that allows greater fund for environmental improvement. This can be explained through the help of better institutional practice, since it is believed that without better institutional practice this logic will never operate in the real world. Better institutional practice characterized by better openness and better horizontal coordination between institutions. As discussed earlier that lessening environmental stress is a leverage of economic productivity. Tools for lessening the environmental stress are provided by space technology innovation therefore fund allocated for space technology innovation can be seen as part of fund allocated for environmental improvement. This will occur when there is better openness and better horizontal coordination between institutions, which are supported by better communication, data base and monitoring as provided by better space technology innovation.

The primary purposes of these conceptual models are to consolidate the tasks outlined in the root definition or implied by this, and to show dependencies between those tasks. The factors needed to be monitored to maintain the system are also outlined, but the details of the control systems are not (these would need further systemic investigations if they were to be required in detail, and would normally be done when designing systems at the operational level).

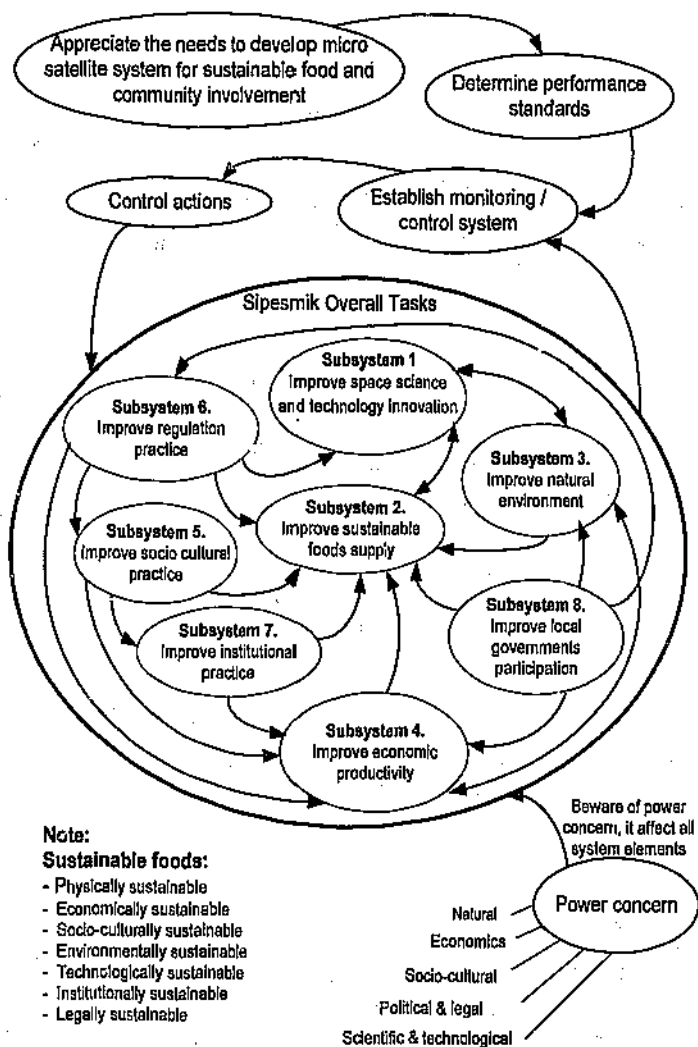
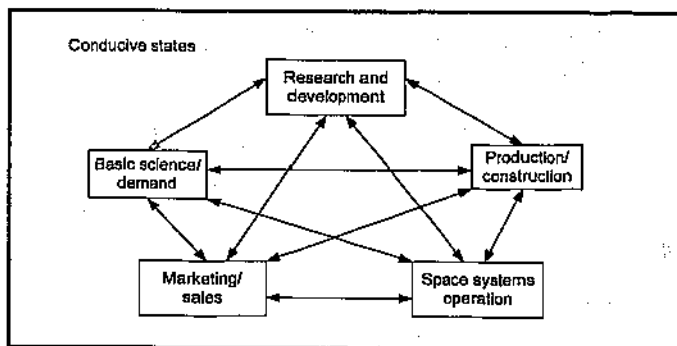


Figure 6.3 Overall Tasks of Sipesmik

### 6.3 Improve space science and technology innovation

As discussed earlier in section 3.2 and 5.1.1 that during the introduction of Sipesmik interviews, the Interactive Model of Innovation Process (Manley, 2001) was used as an engagement tool into systems thinking. Fortunately, this model can be regarded as an embryonic Sipesmik model, since some respondents suggested that this model become a subsystem of Sipesmik with the insertion of two elements: 'space systems operation' and 'conductive-states creation'. So that the model become as shown in figure 6.4. Seen from this interactive model, subsystems 2 up to 8 in figure 6.3 are subsystems for creating the necessary conducive-states for space science and technology to grow in Indonesia.



**Figure 6.4** Interactive model of space technology innovation process  
An embryo for Sipesmik Conceptual Models  
(Adapted from Manley, 2001)

This is consistent with what was described in section 6.1 that 'only major relationships' are represented in the models. Therefore, the dependencies between subsystems represented in figure 6.5, are less complex than those represented in figure 6.14. In figure 6.15, the basic engineering designs resulted from subsystem 1.2 are those that implement basic science or fulfil the demand determined by subsystem 1.1.

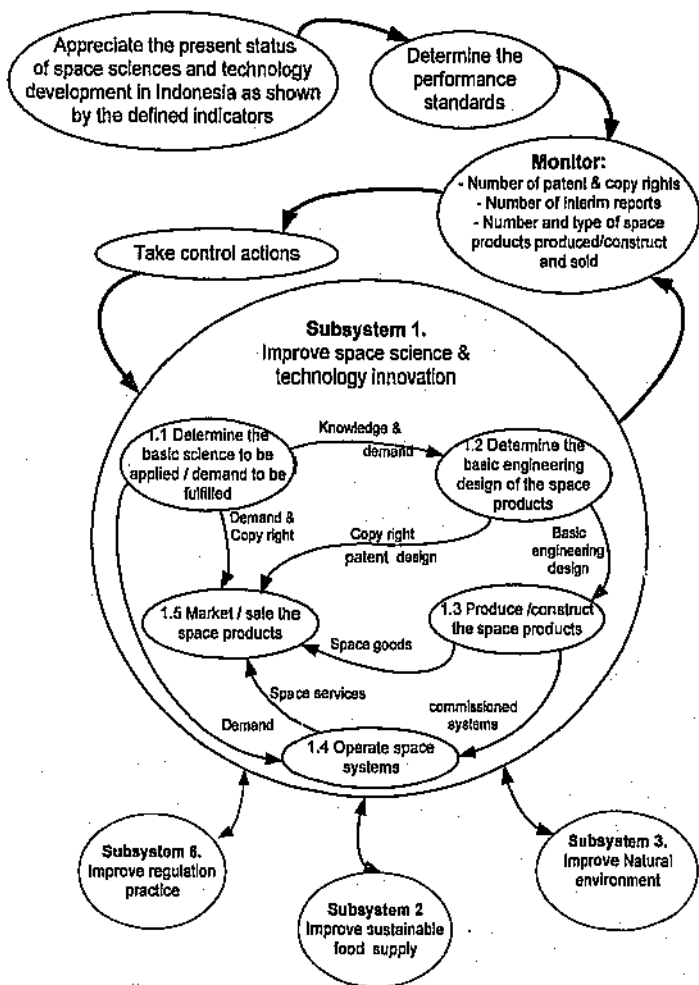


Figure 6.5 Subsystem 1<sup>6</sup>

<sup>6</sup> The relationship of these tasks with respondents' desired transformation (DT) in table 5.11 is as follows: sub system (SS) 1.1 with DT 1 & 2; SS 1.2 with DT 3; SS 1.3 with DT 4 & 5; SS 1.4 with DT 6 and ; SS 1.5 with DT 6 ; SS 1.5 with DT 7.



The model (figure 6.5) illustrates that subsystem 1.2 is presented as the successor of subsystem 1.1. This scheme is also applied when showing the relationships between subsystems 1.3 and 1.2, subsystems 1.4 and 1.3 and subsystem 1.5 and subsystems 1.4, 1.3, 1.2 and 1.1. Subsystem 1.3 produces and constructs only space products based on the basic engineering determined by subsystem 1.2. Subsystem 1.4 operates space systems only those have been commissioned by subsystem 1.3. Subsystem 1.5 is the outlet of the space science and technology development activity, therefore what it markets/sales are products of the other subsystems.

#### **6.4 Improve sustainable food supply**

Whilst Section 6.1 describes that sustainable foods should include sustainability in physical, technological, economy, institutional, socio cultural, legal and environmental, this section will focus only on creating and maintaining physical sustainable character, since the other characters will be created and maintained through other subsystems (subsystem 1: technology, subsystem 3: environmental) subsystem 4: economy, subsystem 5: socio cultural, subsystem 6: legal, subsystems 7 and 8: institutional).

As discussed in Section 6.1 a country can increase its resiliency and sustainability by minimising the stress of its natural environment. Although the type of and how it was produced were changed, the value of the output of a country can remain the same. A combined method of space remote sensing and ground truth (field checked) can help define the appropriate exploitation of natural resources (with high productivity and minimum stress). This method can help establish land and sea classification, based on which an appropriate use/exploitation of each class could be defined. Furthermore, using this classification national and regional data bases of natural resources could also be established, from which history, present and potential use of those natural resources could be derived. As described earlier (chapter 5) Indonesian food products are mainly agricultural products consisting of fishing (ground and sea fishing), farming and cattle breeding, which all of these closely related with the nature (see section 6.1). Thus the above data bases are not only beneficial for food production

but also food distribution and food consumption management.

Space science and technology (especially geographic information system supported by remote sensing and telecommunication) may possibly improve sustainable food supply (Oroda, 2001) including all phases of the economic cycle of food: production, distribution and consumption. Therefore the transformations needed to improve sustainable food supply can be defined as follows<sup>7</sup>:

- 1) Move towards sustainable food supply by taking advantages of space science and technology advancement for managing natural environment and economic cycles of food (10, 11, 12, 14, 15, 22, 23, 24 and 47)
- 2) Increase and maintain<sup>8</sup> high capability level to produce healthy food products with minimum stress on natural environment (10, 24, 39 and 47).
- 3) Increase and maintain high availability level of national healthy food products at national and local stocks (10, 24, 39 and 47)
- 4) Increase and maintain high quality definition of healthy foods demand both at national and local levels (10, 24, 41 and 47)
- 5) Achieve and maintain 100 % fulfilment level of foods demand with national healthy foods products (10, 19 and 20)

The interdependencies between those five tasks are shown in the model as seen in figure 6.6. In the model, task 2.3 is presented as the successor of tasks 2.1 and 2.2 since the availability of national healthy foods is dependent on the national capability to produce healthy foods (2.2) and on the success of taking advantage of space science and technology advancement for managing the nature and the economic food cycles. (2.1). Task 2.5 is also the successor of task 2.3 and 2.4 because the success of achieving and maintaining 100 % fulfilment of food demand is dependent on the availability of national healthy food and the definition of food demand.

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<sup>7</sup> These tasks are relevant with respondents' desired transformations as listed in table 5.11 that the numbers are put between bracket of each of the task. These desired transformations also become input for indicator of success that should be monitored by Sipesmik (see figure 6.6)

<sup>8</sup> At the models validation stage the term increase and maintain was suggested by some respondents to be changed with 'improve', their reason were economy of language used, therefore in this thesis they are treated as synonym.

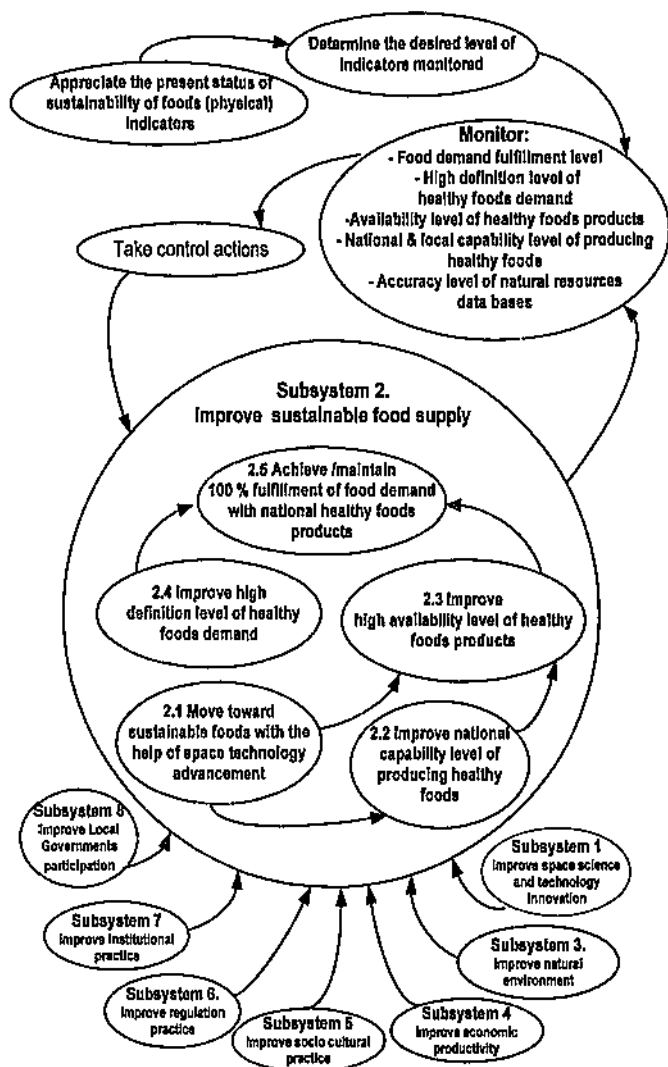


Figure 6.6 Subsystem 2

## 6.5 Improve natural environment

As described in section 6.5 a country can increase its resiliency and sustainability by minimising the stress of its natural environment. Moreover it also shows the importance of managing ground (earth surface) natural environment. Sipesmik activities include air and space areas, thus air and space portions should also be included in managing nature. The same basic scheme for managing ground natural environment can be implemented for air and space. Establish classes and define the appropriate usage of each class to gain high productivity of each class with minimum natural stress, then include those data into the natural resources data bases, from which can be generated history, present and potential usage of each class. This information will be very important for aircraft and space craft operation management. Since air and space elements are more dynamics than ground surface element, the monitoring of those areas needs more intensive and extensive than that of the ground surface.

The above description highlights the possibility of integrating natural environment management, space science and technology development and creating and maintaining sustainable food industry. Therefore some fundamental transformations regarding natural environment could be defined as follows<sup>9</sup>:

- 1) Improve natural environment's support on space science and technology development and sustainable food (9, 15, 21, 23, 24)
- 2) Improve sustainable nature by taking advantages of space science and technology advancement (26, 37)
- 3) Improve ecological health through monitor, ameliorate and preserve the nature (41, 42, 43, 44)
- 4) Improve water health at all phases of water life cycle (water bodies, clouds, rains, runoff and subsurface water) (39, 40)
- 5) Reduce waste through reuse and recycling material and waste minimization during process production, distribution and consumption, (27, 38)

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<sup>9</sup> The numbers put in brackets are numbers of the respondents' desired transformation as listed in table 5.11. These provide input for indicator of success of this task that should be monitored (see figure 6.7)

6) Improve space environment especially for space craft operation (37, 53)

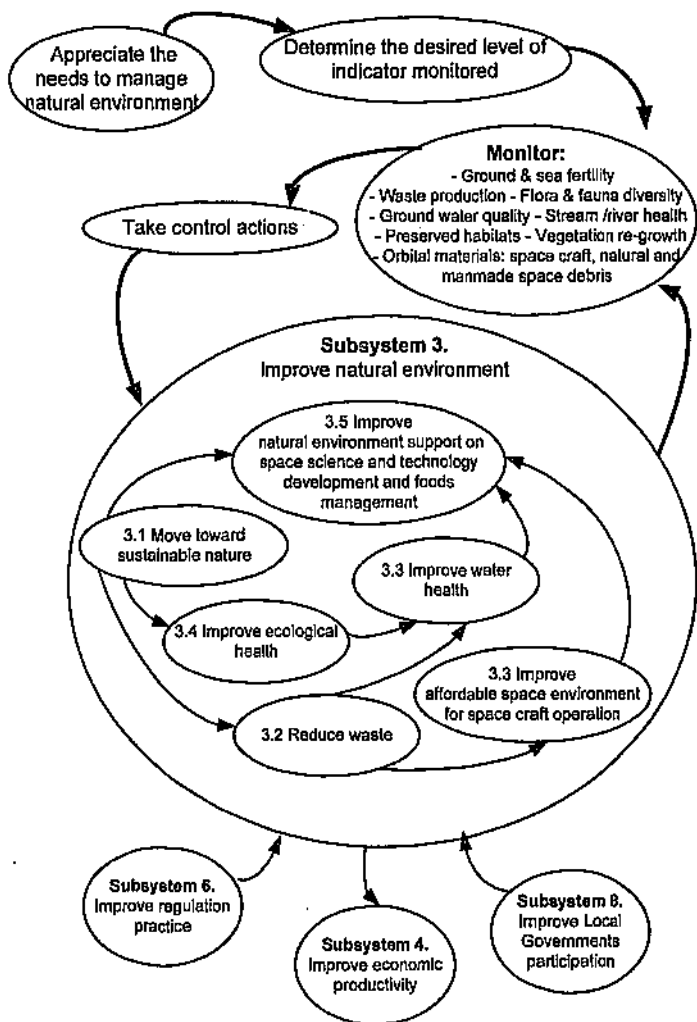


Figure 6.7 Subsystem 3

## 6.6 Improve economic productivity

As discussed in section 5.4 regarding the respondent's desired transformation with regard to the economic productivity, this task should include<sup>10</sup>:

- Sustainable energy/material flows especially for fisheries, agricultural and space industry (16).
- Controlled inputs/outputs for activities and their impacts especially for fisheries, agricultural and space industry (17).
- Policies which maximised production efficiencies especially for fisheries, agricultural and space industries (18).
- Policies which encourage efficiency and minimised harms, especially in fisheries, agricultural and space industries (19).
- Policies encourage sustainable high level economic activity especially in fisheries, agricultural and space industries (20).

The above desired transformation process implies that the whole transformation process is directed toward ensuring high level sustainable economic activity with maximum production efficiency, but the waste and ecological harms should be minimum. In support to the realisation of such sustainable economic activity, a control mechanism to ensure sustainable energy and material flow and an input/output for activities and their impacts should be established. Therefore the desired economic productivity improvement can be organised as follows:

- Set up sustainable energy and material flow (task 4.1)
- Defined input/ output of activities and their impact (task 4.2)
- Establish policies for
  - Maximising production efficiency (task 4.3)
  - Waste minimisation (task 4.4)
  - Minimising ecological harms (task 4.5)
- Ensure high level sustainable economic activity (task 4.6)

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<sup>10</sup> The numbers put between brackets are numbers of the respondents' desired transformation process listed in table 5.11. These also become input for indicator of success that should be monitored (see figure 6.8)

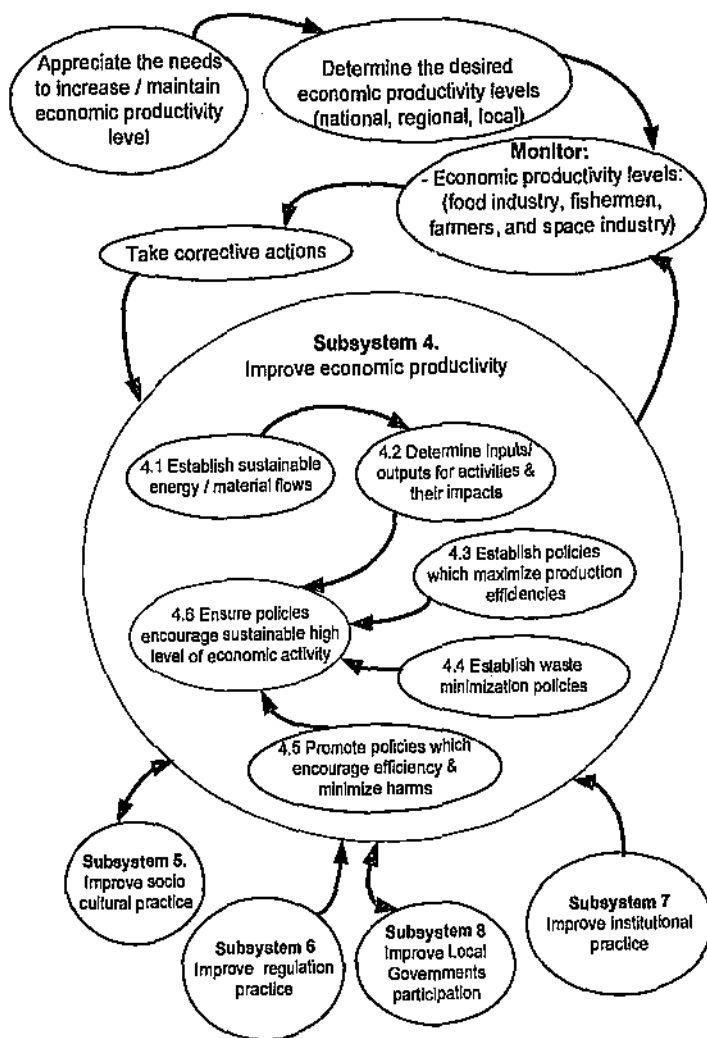


Figure 6.8 Subsystem 4

## 6.7 Improve socio cultural practice

The primary purpose of this subsystem is to increase community involvement with, and trust in Sipesmik, and the process leading to change toward sustainable habits (menu, fishing and farming). As suggested by some respondents<sup>11</sup> that the tasks of this subsystem should include improvement of the following:

- community attitude and understanding (11, 12, 31),
- community support for Sipesmik(23),
- community trust with Sipesmik (9, 12,13, 14,15),
- community participation in Sipesmik (23, 8) and,
- sustainable habits especially menu, fishing and farming(10).

All of these tasks are inter-related and iterative. Improve community understanding and attitudes to Sipesmik (subsystem 5.1) are precursors to increasing support for Sipesmik (subsystem 5.2), community trust (subsystem 5.3), and community participation (subsystem 5.4). Increasing trust and participation will precede the improvement of community's sustainable habits especially regarding menu, fishing and farming (subsystem 5.5) which will lead to increasing social equity, justice, and empowerment (Subsystem 6), which in itself will lead to an improvement in community understanding (the iterative component). Increasing support and trust will also precede increasing public participation (subsystem 5.4).

The respondents' suggestions above synchronizes with what Hutchinson (1997) described on the need to change social practice. It is therefore important to note his warning that it is prone to positive feedback loops as each task is very much reliant on the success of its precursors, which themselves are reliant on the success of their successors. For example, an increase in support for Sipesmik will have a positive effect on the increase in community participation which will have a positive effect on community support in an iterative way. However, the opposite effect can occur if there is little success in increasing support, which will lead to a negative effect on increasing public participation, and so on.

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<sup>11</sup> The numbers put between brackets indicate the number of the respondents' desired transformation as listed in table 5.11.



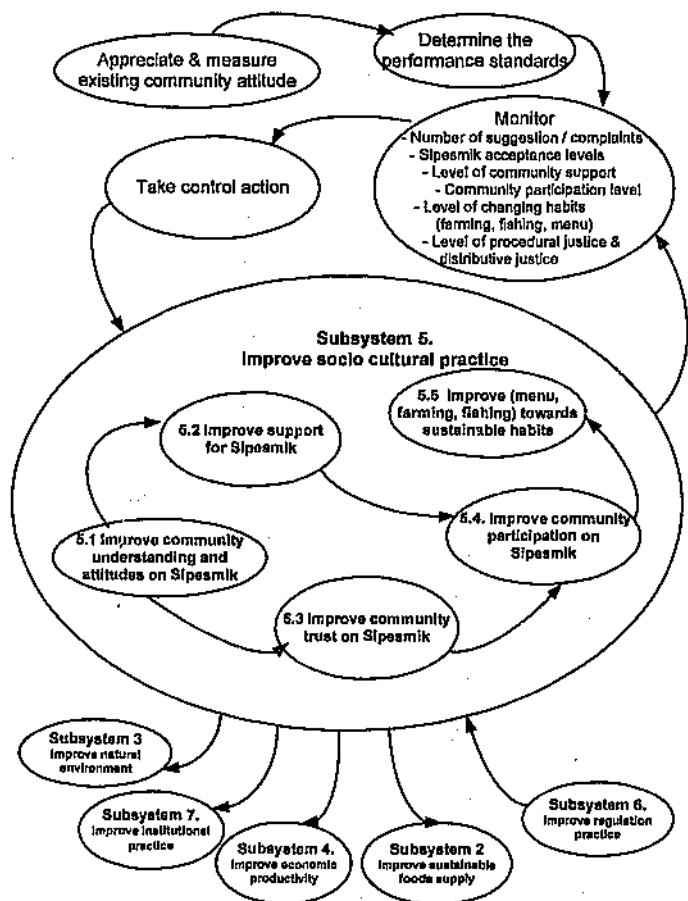


Figure 6.9 Subsystem 5

### 6.8 Improve regulation practice

As described earlier in section 6.1 this subsystem was a part of 'a social practice' subsystem that includes 'socio cultural practice', 'economic productivity' and

'regulation practice' (see section 6.2). The improvement of regulation practice, based on some respondent suggestion, should be directed toward improving social, equity and justice within Sipesmik as well as in the community in general. The tasks suggested by some of the respondents<sup>12</sup> are as follows:

- a) Improve legal documents management, (36 and 50)
- b) Provide consultation and aid to solve legal cases (disputes/enforcements) (35, 36 and 50)
- c) Initiate the creation or renewal of laws and regulations relevant to Sipesmik (33, 36 and 50)
- d) Ratification/accession of international laws/regulations relevant to Sipesmik
- e) Improve implementation of laws and regulations (32, 36 and 50)
- f) Improve legal knowledge and understanding of Sipesmik participants (29, 34, 36 and 50)

The performance of the above tasks should be measured with regard to some indicator of success including those suggested by some respondents<sup>13</sup> as follows:

- Levels of procedural, interactional and distributive justice (18,)
- Number of legal document's done and assessed (19)
- Number of legal case solved (disputes and enforcements) (20)
- Level of legal understanding of Sipesmik (21)
- Number of international laws and regulation ratified and accessed (22)
- Number of laws and regulations need to be respected in running Sipesmik (23)
- Number of laws and regulation implementation guidance established (24)

The above indicators of success indicate that this subsystem should improve the level of procedural, interactional and distributive justice. However within the desired

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<sup>12</sup> The numbers put between brackets indicate the number of the respondents' desired transformation as listed in table 5.11.

<sup>13</sup> The numbers put between brackets indicate the number of the respondents' desired transformation as listed in table 5.16.

transformation this was not explicitly suggested, therefore to ensure that all of those tasks are directed toward their realisation, within the model this task is included. All of these tasks are presented in the model as seen in figure 6.0, where some of those tasks are combined.

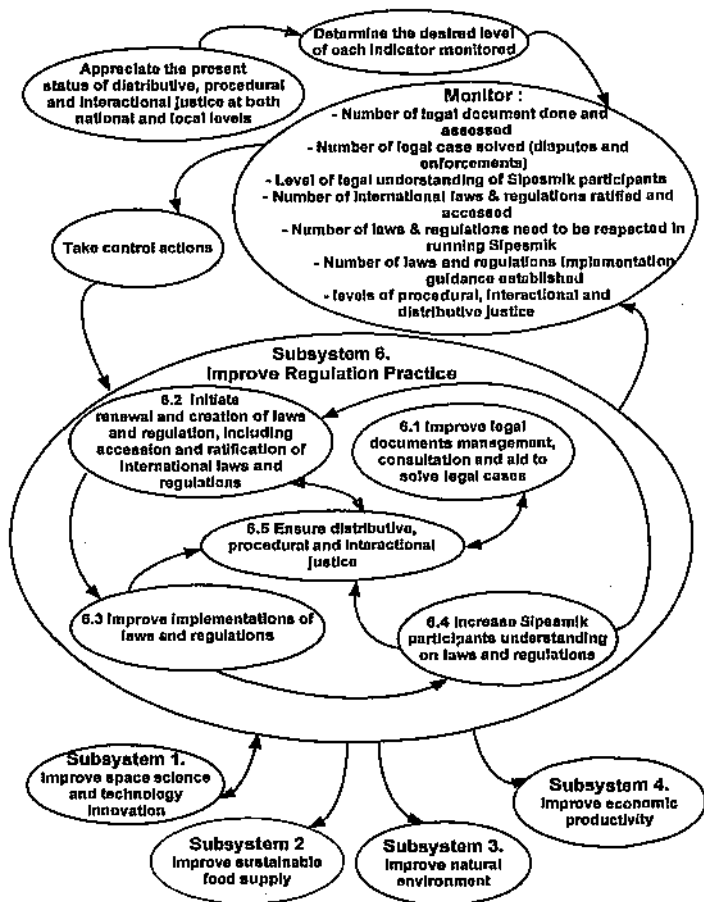


Figure 6.10 Subsystem 6

Subsystem 6.1 'improve legal documents management, consultation and aid to solve legal cases' is the combination of tasks a) and b). Subsystem 6.2 'Initiate renewal and creation of laws and regulations including ratification and accession of international laws and regulations' represent tasks d) and e).

All of these tasks are interdependent. Only the major dependencies are shown in the model. Task 6.1 can be seen as a mapping of the present legal situation, then manage documents and solve existing case for ensuring the distributive, procedural and interactional justice. Experiencing this can generate the need of renewing or creating new laws and regulations (task 6.2). Due to the present new laws and regulations, there is a need to establish their implementation guidance (task 6.3) and to inform all participants about those new laws and regulations (task 6.4). Therefore, task 6.1 is presented as a precursor of task 6.2 that is a precursor of task 6.3 that is also precursor of task 6.4. The increase of legal knowledge and understanding of participants can also generate the need of renewing and or creating new laws and regulations. Therefore new cycles may rise. This is presented in the model where task 6.2 as a successor of task 6.4.

The success of ensuring the distributive, procedural and interactional justice (task 6.5) depends on the success of tasks 6.1 up to 6.4, therefore task 6.5 is presented as the successor of tasks 6.1, 6.2, 6.3 and 6.4.

## **6.9 Improve institutional practice**

The main purpose of this subsystem is to improve institutional practices, primarily within national (government and private) agencies, and secondary with regard to foreign partners. This subsystem was also designed to facilitate Sipesmik processes. As suggested by respondents<sup>14</sup> there are five primary tasks that should improve:

- acceptance level of agencies (government and private), and foreign partners on Sipesmik (11 and 28),
- horizontal management links between agencies involving national and

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<sup>14</sup> The numbers put between brackets indicate the number of the respondents' desired transformation as listed in table 5.11

- foreign partners (22,30, 46, 48 and 49),
- financial support and resource sharing for Sipesmik from agencies, national and foreign partners and other sources (21 and 49),
- and ensure inter-agencies cooperation (national and international) (22, 48 and 49), and
- and to train and educate Sipesmik actors to acquire the skills needed to run Sipesmik (11, 29).

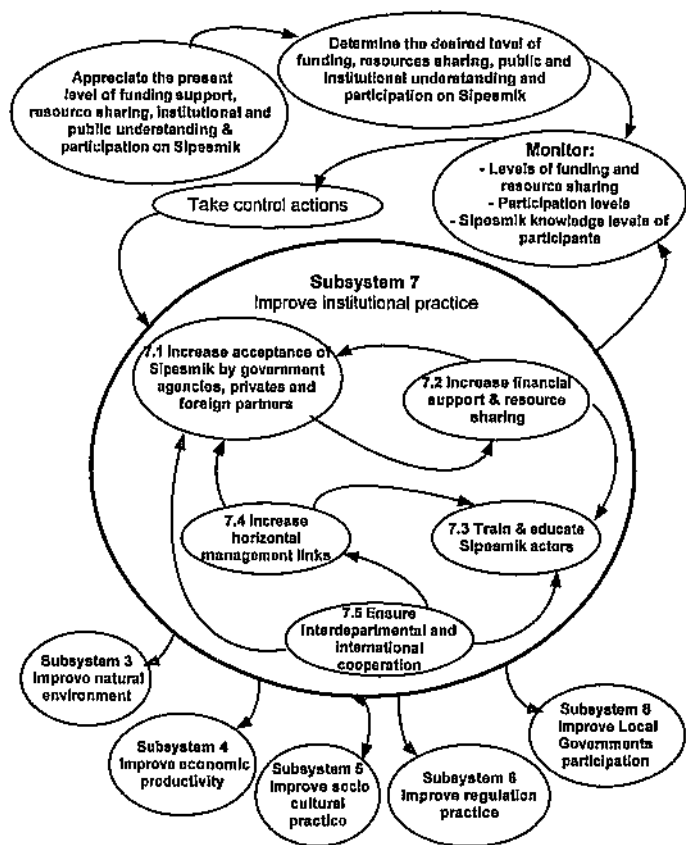


Figure 6.11 Subsystem 7

Consistent with the assumption of this research that the distribution of power in Indonesia is neo-elitist, it was considered that government and private agencies needed to accept the concept first (task 7.1) to facilitate the national commitment. Those officials and higher management levels of agencies belongs to neo-elitist groups. Without this acceptance the support given to Sipesmik would be spasmodic and reliant on the goodwill of operational staff. Their supports will become the grass-root support to the Sipesmik so that grasping wider support will be easier comparing to that without their supports.

The author agrees with Hutchinson (1997) that the need to promote and increase horizontal management links (task 7.2) is an attempt to combat the compartmentalisation of problems<sup>15</sup> within government agencies. Beside, as suggested by some respondents<sup>16</sup> that Sipesmik should be organised in a network whose integrated nature requires a less hierarchical structure to deal with complex and pluralist Sipesmik problems (see section 4.4). This network should include both government and private institutions and community (see table 5.16 especially number 11, 8, 14, 15, 16). These suggestions are in a line with Carley and Christie (1992) who promote the idea of 'action centred networks' which link government and community groups. However, modelling Sipesmik in that way, it may be paradoxical in as much as it has to gain acceptance (Hutchinson, 1997), since it has to face politicians and bureaucrats those who are expected to have the need to promote horizontal management structures before Sipesmik can work.

The above reflections suggest that the appropriate leadership model for Sipesmik is that driven more by vision and value rather than positions and functions. This is consistent with the assumptions about the idea of local empowerment, where vertical management structures are likely to cause problems; as Carley and Christie (1992) point out, that it is common politicians and bureaucrats who already have power have a vested interest in keeping the hierarchy and the *status quo*.

Some respondents suggest that the supply of funds to Sipesmik (task 5.3) also needs

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<sup>15</sup> See table 5.6 especially the anxiety of the respondent on the presence of institutional jealousy (2) among institutions.

<sup>16</sup> See table 5.7 especially the suggestion of some respondents (7, 9 and 10) Sipesmik should be organized in a network structure.

to be increased and maintained. To train, educate Sipesmik actors (task 5.5) and execute all Sipesmik tasks in such things as designing, constructing, launching and operating space crafts, remote sensing application including sampling, interpreting remote sensing images, requires a large investment. Funding support is also required for such activities as research, projects (for example: surveys, tree planting, and rehabilitation), planning, travels, promotions, and communications, and office services. Whilst all this funding derived from task 5.3 need not generate only from government sources. That is initially that this source has the ability to fund at the level needed. However, other sources of funding (from international funding, foreign partners, user of remote sensing data such as mining, logging, and other companies, plus local authorities and organisations such as the fisheries and farmers' corporation) could also be tapped.

#### **6.10 Improve local governments' participation**

As described earlier in section 6.2 this subsystem was part of the institutional practice subsystem, therefore in the model (see figure 6.3) this subsystem is presented as having interdependencies with subsystem 7: institutional practice. Due to its crucial role for the success of Sipesmik, the local government is defined as a subsystem. Local government is the closest parts of government before the community, which consist of legislators and executors of their territories, so that their participation is crucial for grasping national wide participation of Sipesmik. Moreover with decentralization their power is increasing.

Since local governments are the legislators and executors for their territories, which power should be accountable before public, their participations should be decided based on their knowledge, understanding, belief and trust, that Sipesmik has the capability to realize the high level goals *'space for security and prosperity focusing on sustainable food with the help of space technology and community participation'*. Therefore their participations should be designed to have positive impact on sustainable food supply (subsystem 2), natural environment (subsystem 3) economic productivity (subsystem 4), and (subsystem 6). In the model, (see figure 6.5) these interdependencies are shown that this subsystem as being the precursor for

subsystems 2, 3, 4, and 6.

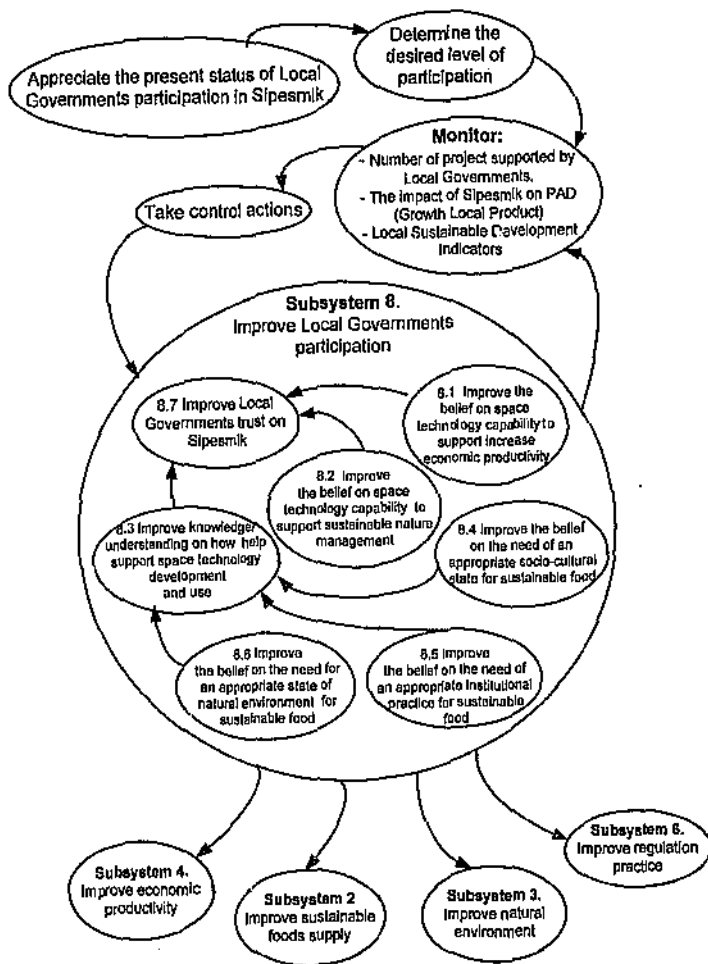


Figure 6.12 Subsystem 8



Based on the suggestion of some respondents<sup>17</sup> this subsystem has to improve:

- 1) knowledge /understanding how help support space technology development and use (11)
- 2) the belief that space technology can be used to help support sustainable nature management (26)
- 3) the belief that space technology can be used to help support improve economic productivity of a region (25)
- 4) the belief on the need for an appropriate state of natural environment for sustainable food supply (14)
- 5) the belief on the need of an appropriate institutional practice for sustainable food supply improvement (13)
- 6) the belief on the need for an appropriate socio-cultural practice for sustainable food supply improvement (12)
- 7) Local Government trust on the capability of the designed system to improve sustainable food supply with the use of space technology and community involvement (8, 9, 51, 28)

The above tasks are included in the model illustrated in figure 6.12. One assumption was that the Local Governments' trust can only be improved by increasing their understanding on the capability of space technology relating to the improvement of:

- economic productivity
- natural environment

It is therefore the tasks that improve these items (tasks 8.1 and 8.2) become precursors of the task that improve Local Governments' trust (task 8.7). Beside this, to understand how they support the system, Local Governments also need to understand on how help support space technology development and use. This assumption determines the task that improves this knowledge (task 8.3) is also a precursor for Local Government trust improvement (task 8.7). As discussed earlier that Local Governments are expected to participate in improving socio cultural practice, natural environment and food sustainable supply. This provides reasoning why tasks that improve them are precursors for task 8.3.

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<sup>17</sup> The numbers put between brackets indicate the number of the respondents' desired transformation as listed in table 5.11

### 6.11 Learning benefits from this chapter

A major learning point that emerges from this chapter is that conceptual model is not the end of the process, as the system is dynamic. Furthermore, the author can omit opinions, concepts, and tasks from initial models but recognize that they may be included in later versions. For instance, the respondents tended to ignore detail of sustainable food that sounds new for them (see section 6.1.8 and 6.8) but it needs to explore further by the author (see section 6.3). This shows that conceptual models development is an evolutionary process.

Additionally, whilst respondents comprised a purposive sample that were chosen based on the author's own holistic concept of what was relevant to Sipesmik, others might choose them based on geographic distribution or professionalism; in that case the models would contain different elements. An ability to reflect on these factors and the ability to recognise and change them characterize this method as influential.

Sipesmik conceptual models do not provide the complete solution, but they appropriately represent the respondents' framework for managing space science and technology development in Indonesia. Also, those models can be used as the basis for Sipesmik either at national or natural unit levels; as they are generic in nature. However, it should be noted that that natural unit is different one another, and there are great differences between the problems of urban and rural areas.

## Chapter 7

### SIPESMIK MODELS VALIDATION

#### 7.0 General overview

As discussed in chapter 4, the validation of the models produced by this research includes two steps. The first was carried out by the researcher based on theoretical judgments. The second was based on interviewees' knowledge of Sipesmik. The researcher carried out legitimization tests that consisted of viability, teleological and compatibility evaluations, which are presented in section 7.1, and evaluation on the desirability and feasibility of the identified tasks, which is outlined in section 7.2.

Section 7.3 displays and evaluates the quantitative results of the interviewees' validation of the models derived from questions numbers 1 to 6 of the models validation questions (see section 4.2). Section 7.4 evaluates comments and suggestions collected using question number 7. Section 7.5 ends this chapter with a summary.

#### 7.1 Legitimation test

As discussed in section 4.6 legitimization tests are concerned with the accomplishment of a model with regards to the laws of system structure or any other adopted system rules. The adopted system's rules in this research are

- The anatomy of system teleology that include nine conditions of system teleology (see section 4.5).
- The viability of the systems model that includes six viability characteristics of a model: effectiveness, efficiency, efficacy, equity, ethicality and elegance (see sections 3.2, 3.6 and 4.6).
- The compatibility of systems model with Pancasila that includes three attributes: correspondence, consistent and coherence.

The following presents the teleological evaluation.

### 7.1.1 Teleological evaluation

Table 7.1 presents the teleological characteristics of the Sipesmik models. The first column of this table contains nine conditions included in the anatomy of the system teleology (see section 4.6). The second column shows the level of compliance of the Sipesmik models with the teleological conditions identified in the first column. This level was judged by the author based on the supporting arguments presented in the third column.

**Table 7.1 Teleological characteristics of Sipesmik**

<b>Conditions (see section 4.6)</b>	<b>Judgment</b>	<b>Supporting arguments</b>
<b>Teleology</b>	High	Sipesmik' decision makers should consider the internal and external environment that change with time.
<b>Teleological components</b>	High	Sipesmik has teleological components that consist of 8 subsystems
<b>Clients</b>	High	Sipesmik has clients whose interests are served,
<b>Measure of performance</b>	High	Sipesmik has a measure of performance that is continuously improved
<b>Boundary</b>	High	Sipesmik has a boundary that limits the system to its environment.
<b>Decision makers</b>	High	Sipesmik has decision makers that have the necessary power to change in the measure of performance.
<b>Designers</b>	High	Sipesmik has designers that consist of actors who provide reports and suggestions to decision maker.
<b>Build in guarantee</b>	High	Sipesmik has a built in guarantee that relies upon wisdom and hope
<b>Stability mechanism</b>	High	Sipesmik has a general stability mechanism that controls the whole system

The root definition of Sipesmik (see figure 5.1) shows that a decision making mechanism should consider both the internal and external environments whose characteristics are dynamic. Therefore, at any moment of time, Sipesmik is conceived as having a number of choices at its disposal, and selects its choices to pursue the goals appropriate to it. This characteristic complies with the first condition of the system teleology.

The overall tasks model (see figure 6.3) shows that Sipesmik has eight tasks or subsystems that interactively work together to achieve their own goals and the goals of Sipesmik. This characteristic complies with the second condition of system teleology. The root definition (see figure 5.1) shows that Sipesmik has clients whose interests are served. Those clients are general population, especially fishermen and farmers, present and future generation, science and technology community, armed forces, researchers and scientists, government agencies, trades and industries, and nature including both living and non living creatures. This characteristic fulfils the criterion of third condition of system teleology.

The root definition and all task models (figure 5.1 and 5.2, and figures 6.3, 6.5 up to 6.12) display the existence of measure of performance within Sipesmik models. These facts satisfy the fourth condition of system teleology. These models also show the boundary of the Sipesmik, which is represented by those who are included in the Sipesmik (owners, executors and clients), tasks that will be executed (8 tasks) and constraints (fix and soft constraints, see table 5.13 and 5.14) that limit the Sipesmik tasks. The existence of Sipesmik's boundary meets the fifth condition of system teleology.

The root definition shows the presence of decision makers within Sipesmik, they are also the owners. They have the necessary power to change the measure of performance. They consist of Central and Local Governments (executive and legislative including the armed forces) trades and industries, private organizations, and communities represented by communities groups, cultural specialists and traditional leaders. Their existence conforms to the sixth condition of the system teleology.

Sipesmik has actors whose aim is to increase the value of Sipesmik from its clients' viewpoints. In achieving their aims, those actors provide reports and suggestions to owners that may include changes of measure of performance. This arrangement matches up with the seventh condition of system teleology regarding the existence of system designers.

Sipesmik has a built in guarantee that the purpose of the system defined by its measure of performance, can be achieved and secured. This can be seen from the higher level concern of creating and maintaining sustainable food with the help of space technology and community involvement (see figure 5.1: root definition), which directs the owners to taking decisions for the system. However, this guarantee certainly counts on wisdom and hope, which are dependent on one's importance and potency. Wisdom is thought combined with a concern for ethics (Churchman, 1982) and hope is the spiritual belief in an ethical future (Churchman, 1997). This characteristic meets with the eighth condition of the system teleology.

The conceptual models (derived from root definition), show that Sipesmik has a general stability mechanism that controls the whole system especially in the decision making process, performance standards and their measurement and improvement mechanisms, communication channels, information flows, and responsibilities' allocation. Apart from the conceptual models, this stability mechanism is better shown in the organization of Sipesmik, which is presented in Appendix 4 (A suggested Viable System Model for Sipesmik).

### **7.1.2 Viability evaluation**

Table 7.2 shows the viability of Sipesmik models, based on the author's judgments. As described in section 4.1, a system will have high effectiveness and high efficiency if it complies with the conditions of the anatomy of system teleology. As shown by table 7.1 that Sipesmik models have high compliance with the conditions of the anatomy of system teleology therefore it can be judged as high effectiveness and high efficiency.

The efficacy of a model depends on its tasks' feasibility and desirability to the actors. The most important is its tasks' feasibility. However, a feasible task that is easy to do will become difficult if the actors do not have the desire to do it. A feasible task that is difficult to do will become easier if the actors have the strong will to do it. As shown by table 7.3, Sipesmik's tasks are considered feasible and the actors have strong desires to do them therefore, they can be judged as high efficacy.

The term equity was derived from the first principle of Pancasila that implies 'before God, everyone is equal'. God treats everyone equally therefore procedural justice, distributive justice and interactional justice should occur for everyone before God. This ideal situation becomes the concern of Sipesmik models, which is shown in the regulatory subsystem. This subsystem monitors procedural, distributive and interactional justice within the community, and it will improve the situation to the ideal. The author therefore judges the models as having a high level of equity.

**Table 7.2 Viability of Sipesmik Models**

<b>Viability character</b>	<b>Judgment</b>	<b>Supporting arguments</b>
Effectiveness	High	They compose a teleological system
Efficiency	High	They compose a teleological system
Efficacy	High	Their tasks are feasible and desirable
Equity	High	They are concerned with procedural justice, distributive justice, and interactional justice that represent equity principle.
Ethicality	High	They are concerned with regulation, where ethical norms belong to its elements.
Elegance	High	They are an expression of the inner feelings of a purposive state of mind of the designer.

As described by Checkland et al (1990), the ethicality of a model, is the moral correctness of the designed transformation of a model. 'Correct' is comparative, which means that for ethicality investigation or measurement, one needs a relative 'moral standard' such as military ethics is for military and medical ethics is for

medical professionals. This means that different person may use a different moral standard for ethicality investigation. In this investigation the author used the ethical or moral standard of Pancasila as the accepted norm. Thus, investigating the ethicality of Sipesmik models can be seen as examining its compatibility to Pancasila. Sipesmik models are compatible to Pancasila (see section 7.1.3) therefore they can be judged as having high ethicality in the context of Pancasila as the state philosophy.

According to Checkland et al (1990) a model is elegant when it was designed based on aesthetical bases. Although as a branch of philosophy Aesthetics tries to make clear the laws and principles of beauty, but aesthetics includes personal taste or values (Budd, 2001). When designing the Sipesmik models, the author did not have any intention to represent an object in the model, as an element of beauty, but expressed his inner feelings of a purposive state of mind, to achieve high quality of beauty. The models resulted appear to be structurally complex. Their elements relate to one another in a harmonious fashion composing a unified whole. Each element appears to be an integral part of the design fittingly related to the other elements. According to Budd (2001) this kind of appearance can be judged as a beautiful representation. Therefore the Sipesmik models could be judged as having high level of elegance.

### **7.1.3 Compatibility evaluation**

The term correspondence was derived from the correspondence theory of truth, which is concerned with the relationship between reality and representation. A representation is a true representation if it has correspondence with reality. However reality is infinite and its representation is finite, therefore a representation is always less perfect than the reality. Thus a correspondence relationship is a partial truth. A model as a representation of reality should hold a specific characteristic of the reality as its major representation. Thus reality can be represented in a number of models where each of them amplifies at least one characteristic of that reality. The strongest characteristic represented by a model becomes the basic idea of that model. Since reality can be represented by a number of models then to get a holistic view of those models, the 'basic idea' of each model should consistently compose the 'basic idea' of all the models. To be in correspondence with that reality, a model should hold a 'basic idea' that is in agreement with the 'basic idea' of the reality.



The term coherence was derived from the coherence theory of truth. Truth of any (true) propositions consists in its coherence with some specified set of propositions (Young, 2001). Coherence is an adjective of a verb cohere, that means stick together, or correctly respond to what is requested by the other parts to which a part will be added to. The requested characteristic may be the form, the size, the weight or the others, or may be a combination of them. Hence, coherence truth is used as functional truth, since a part will cohere with other specified parts if they function well together. Like a spare part of a machine, it will function well if it is in coherence with the other specified parts within the machine. In line with the idea that reality is infinite and a representation is finite, a model can be coherence with reality if it correctly responds to the request of some specified parts of the reality.

The above reflection outlines that to investigate the compatibility of Sipesmik with Pancasila, where Pancasila is treated as the reality and Sipesmik models as a group of representations, there is a need to identify:

- The basic idea of Pancasila;
- The basic idea of the whole Sipesmik models;
- The basic idea of each of those models;
- The consistency of all Sipesmik models in supporting the idea of Sipesmik models as a whole;
- The consistency of Sipesmik models as a whole with Pancasila;
- The coherency of each Sipesmik model within Sipesmik; and
- The coherency of Sipesmik models as a whole with Pancasila

As discussed earlier in the teleological evaluation of Sipesmik models that, they have a built in guarantee. This guarantee relies on wisdom and hope that are dependent on one's importance and potency. Wisdom is thought to be combined with a concern for ethics and hope is the spiritual belief in an ethical future, where the adopted basic ethical norm is Pancasila. Based on this consideration Sipesmik models were judged as having high correspondence with Pancasila.

**Table 7.3 Compatibility of Sipesmik models with Pancasila**

Compatibility elements	Judgment	Supporting arguments
Correspondence	High	The basic idea of Sipesmik models is wisdom and hope on which, its built in guarantee relied. Wisdom is thought combined with a concern for ethics and hope is the spiritual belief in an ethical future. The basic ethical norm that will be used as foundation is equity, that is derived from the first principle of Pancasila (see viability evaluation)
Consistence	High	The overall tasks model shows that all tasks are designed to consistently support the idea of creating and maintaining sustainable food with the help of space technology and community involvement. The success of achieving this is guaranteed by wisdom and hope.
Coherence	High	The role of each task and the whole structure of Sipesmik were designed to stick together in actualizing the idea of creating and maintaining sustainable food with the help of space technology and community involvement. In general this can be seen in the overall tasks model. In a more detail can be seen in the causality relationship model of Sipesmik Tasks, presented in appendix 4. Table 7.4 provide highlight of this coherency characteristic of the models with Pancasila principles.

It is important that the Sipesmik models are consistent with the basic idea of Sipesmik. This can be seen in figure 5.1 that presents the root definition of Sipesmik. All tasks within Sipesmik are directed to create and maintain sustainable food supply with the help of space technology and community involvement. Also figure 6.3 presents the over all tasks of Sipesmik. In this figure every subsystem within Sipesmik works together with other subsystems in realizing the basic idea of

Sipesmik. The consistency of Sipesmik models as a whole with Pancasila can be seen as the consistency of the idea of Sipesmik with Pancasila. This becomes a representation mainly the fifth principle 'Social justice for the whole people of Indonesia' since Sipesmik is directed to continuously fulfil the need of healthy food for the whole people of Indonesia. This evaluation shows that Sipesmik models have high consistency with Pancasila.

**Table 7.4 Coherence characteristic of Sipesmik models with regards to Pancasila principles**

<b>Pancasila principles</b>	<b>The compliance elements of Sipesmik models' to Pancasila principles</b>
The belief in the one and only God	The models actualize an appreciation of space as God's creation in the form of using it for the creation and maintenance of sustainable food supply in Indonesia.
Just and civilized humanity	The models implement equity principles into practice where regulation and enforcement are arranged to ensure the procedural, distributive and interactional justice.
The unity of Indonesia	The models convert this principle into a framework that includes all parties involved with food production, distribution and consumption to cooperate in the creation and maintenance of sustainable food supply in Indonesia.
Democracy guided by the inner wisdom in unanimity arising out of deliberations amongst representatives	The models transform this principle into a mechanism of work that respect everyone's views and implement the accord agreed by the community involved in the project (owner, executor and clients)
Social justice for the whole of the people of Indonesia	The models translate this principle into actions for the completion of the need on healthier food of everyone in Indonesia by taking benefit the efforts taken for micro satellite development. These actions include improvement in regulatory, socio cultural and institutional practice.

The coherence characteristic of each model with other Sipesmik models is shown by the root definition and the task models. The root definition shows relationships between system's actors, tasks and other elements. The overall tasks model shows the coherency of each subsystem within the Sipesmik. Each task model shows the coherency of each task within subsystem. In fulfilling the need of healthy food Sipesmik must comply with the requested characteristic by each principle of Pancasila. Table 7.4 shows the coherence characteristic of Sipesmik models with each of Pancasila principles. Based on the above evaluation Sipesmik models were judged as having high coherency with Pancasila.

## 7.2 Desirability and feasibility of Sipesmik tasks

Table 7.5 summarises the tasks and their associated desirability and feasibility. Here, the desirability and the feasibility of a subsystem are ranked into three levels: high, medium and low (see section 4.6). From this table we can see that the most workable task is subsystem 1: develop space science and technology, which already occurs and spreads out over a number of agencies (government and private) and in the form of research and development cooperation with foreign partners. These activities demonstrate the important role of space science and technology for sustainable development (Depanri, 1998b, c). The most crucial problem for this subsystem is how to move this organisational/ institutional situation into an integrated national situation, so that the power of space science and technology could function as the 'accelerator' for Sipesmik. For this a **national commitment** was indicated by the respondents as the necessary trigger force to integrate the resources. However, some of these activities are technological experiments to develop and prove the capability of space science and technology in help managing natural environment and economic cycle of foods but they are not yet in integrated manner. An optimistic situation was presented during the National Space Congress in 1998, where almost all participants with enthusiasm agreed five manuscripts that lead to the creation of an integrated space activities in Indonesia. (Depanri, 1998a)

The other workable tasks are subsystems 2 and 3 regarding natural environment management and create and maintain sustainable foods by taking advantages of space science and technology advancement and community participation. As described

earlier experimental evidence showing the capability of space science and technology to help move towards sustainable development is there. The question is how to move from experimental into operational mode. The answer provided by the respondents (see table 5.11) is that a **national commitment** is needed, since this needs a large investment and an integrated effort. The key suggested by the respondents (see table 5.11) to come to a national commitment is to change image of space activity from **'high investment and high risk'** into **'secure and prosperous'** and grasp public and agencies support and participation through increase and maintain their knowledge/understanding, belief and trust that space science and technology has the capability to help create sustainable foods and increase and maintain high economic productivity with minimum stress of natural environment. For this, pilot projects are thought necessary by the initiator of Sipesmik (LAPAN).

**Table 7.5 Desirability and feasibility of Sipesmik tasks**

No	Tasks	Desirability	Feasibility	Comment
1	<b>Develop space science and technology</b>	<b>High.</b> The activity exists in several organizations but public is reluctant since this is a high investment with high risk.	<b>High.</b> This task occurs in a number of agencies (government and private) including the existence of cooperation with foreign parties, but in unintegrated manner.	To move from individual/sectoral to national integral sound feasible. This is inferentially shown by the success of the National Congress in Space 1998.
2	<b>Creation and maintenance sustainable food supply</b>	<b>High.</b> This is shown by the deployment of intensification and extensification programs for agriculture to	<b>High.</b> A national network is available to handle natural disaster by taking advantages of space technology advancement. This includes monitoring rice field and its product,	That needs to improve data bases with establishing natural cells (classes). Optimize the natural cells to create and maintain

		sustain foods	which is the main foods product in Indonesia. See SIMBA web-side.	sustainable food supply.
3	Manage natural environment	<b>High.</b> A minister is appointed to be responsible for this task	<b>High.</b> BAPPEDAL has deployed a network to support to natural environment management and to cover the whole area of Indonesia.	Optimization of the natural-cells should be meant for increasing productivity with natural environment minimum stress
4	Increase and maintain economic productivity	<b>High</b> A minister is appointed to be responsible for this task	<b>Medium</b> Everyone has their own superior approach to achieve high economic productivity, therefore acceptance to implement an integrated approach is still arguable	To convince the high level managements responsible for economy needs pilot projects to demonstrate the approach.
5	Change socio cultural practice	<b>High</b> Fundamentally desirable since this is the pioneer for Sipesmik public /agencies acceptance	<b>Medium</b> To change public image that <i>'space activity is high tech that is high investment and high risk'</i> to be an image that <i>'space activity is secure and prosperous'</i> is not an easy task.	Pilot project is necessary to demonstrate the performance of the models.
6	Regulate Sipesmik	<b>High.</b> It is nationally expected that equity and justice for all people should occur in the	<b>Medium.</b> Five space laws and regulations are newly ratified and accessed. Also a new science and technology law was promulgated recently.	Due to the possible reluctant action from law enforcement officials, since this concern to change their behaviour,

		country	All of this can be used as incentives in regulating Sipesmik. Anyhow, due to the suggested approach difficulties will arise when measuring equity and justice especially when power involved.	this subsystem shall be successor of the change socio cultural practice subsystem.
7	<b>Change institutional practice</b>	<b>Medium</b> The parties, who need to change this, mostly outsiders the insiders might be reluctant to change.	<b>Medium</b> An established institutional practice is developed since the birth of that institution and was incrementally constructed by their pioneers and leaders through a long period of interaction. To change this is not an easy task.	The changes should start from internal institution, through increase of knowledge and understanding to create belief and trust on Sipesmik concept.
8	<b>Increase and maintain local governments participation</b>	<b>High</b> Due to decentralization, local governments are searching method to explore and exploit their territories to increase and maintain high level of security and prosperity of the region.	<b>High</b> By showing evidence that space technology is capable to help create and maintain sustainable foods and increase/ maintain high economic productivity through appropriate management of natural environment and community involvement.	They will enthusiastically participate when they belief and trust that Sipesmik concept capable lead of creating and maintaining sustainable foods and high economic productivity of the region.

Anyhow, the feasibility of 'managing the environment' is a task which has, as yet undetermined results. Whilst attempts are being made to halt such phenomena as increased salinity, species destruction, and soil degradation, the processes are still continuing (such as those demonstrated by BAPEDAL and its network, (JICA, 1999)). Besides, the natural environment and its 'environment' (the human systems) have complex interactions, and it is difficult to see anything significantly changing in the former, unless human system does as well. Initiatives to increase water and ecological health, and reducing waste are feasible. However, the move toward sustainability involves fundamental changes in economic, social, political, and psychological systems.

The changing of attitudes of executors and clients within Sipesmik is something of a paradox. This can be seen in the need to change institutional practices. The Indonesian administration system, which divides responsibilities into ministries and departments with associated Presidential decrees, do not encourage interdepartmental cooperation but institutional jealousy. (This was a suspicion of some respondents, see table 5.11). It appeared that incentives to cooperate should come from the top of the hierarchy, in this case, the President. Experience in Indonesian administration has shown evidence of neo-elitism; for example, as soon as the President handed over direct responsibility to a single ministry or department, cooperation and commitment from other ministers began to increase. Therefore, Sipesmik needs a powerful 'champion' as powerful as the President. Of course, inter-departmental cooperation can come from the bottom-up with 'field' personnel cooperating on projects at an unofficial level. However, the author's experiences teach that in a hierarchical structure this does not lead to a consistent level of resource availability, or commitment.

### **7.3 Interviewees validation judgments**

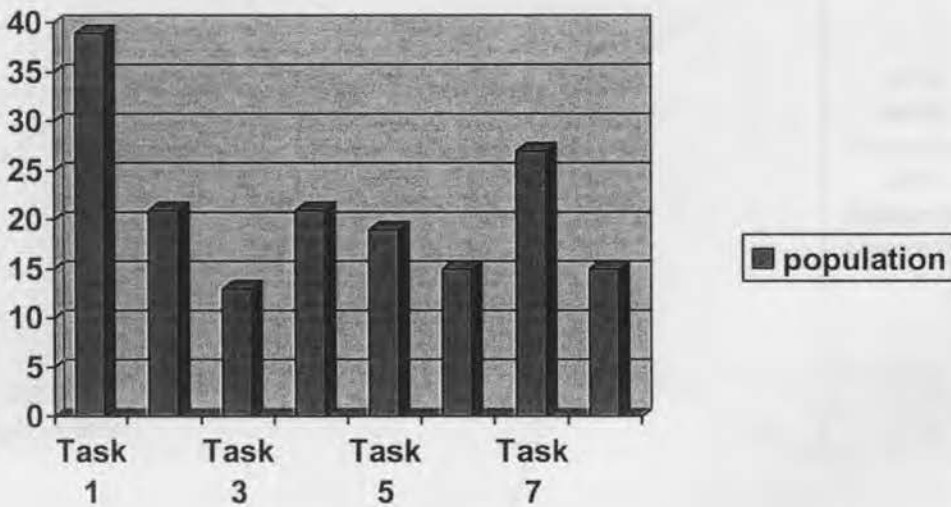
The first validation question is 'where do you position yourself in the Sipesmik?' 18 respondents identified themselves as owners, 41 respondents as executors and 23 respondents as clients. These figures indicate that the respondents generally understand the models. This also indicates the enthusiasm of the respondents to actively participate in the Sipesmik by selecting the role as the executor. Based on the



Root Definition, it was predicted that the number of clients would achieve 50, however only 23 were interviewed, since all of them belong to the present generation. The interviewees expressed approvals for the following tasks (see figure 7.1):

- a) Task 1: Science and technology innovation development: 39 respondents
- b) Task 2: Create and maintain sustainable food 21 respondents
- c) Task 3: Managing the natural environment: 13 respondents
- d) Task 4: Increase/maintain economic productivity: 21 respondents
- e) Task 5: Change socio-cultural practice: 19 respondents
- f) Task 6: Regulate the Sipesmik: 15 respondents
- g) Task 7: Change institutional practice: 27 respondents
- h) Task 8: Increase/ maintain local government participation: 15 respondents

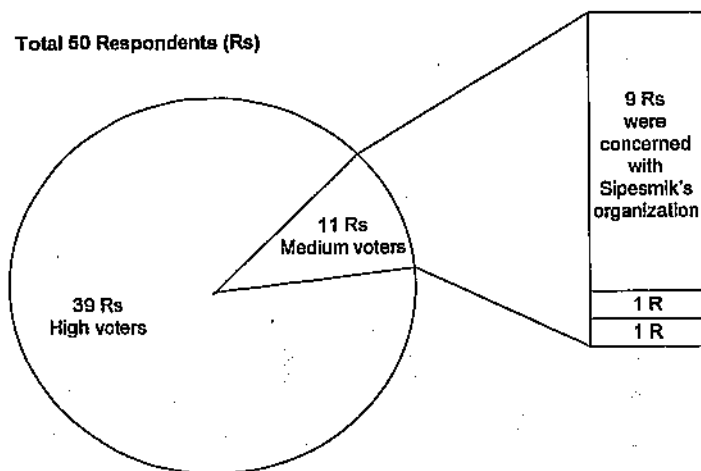
**Total 50 respondents**



**Figure 7.1 Sipesmik' tasks voters**

Relevant to the assumption taken (see section 4.3), this number (39) indicates that 78 % of the respondents found that the first task is realistic and acceptable to them. This indication conforms to suggestion received to use the Manley model (see figure 3.6) as the core or basic model for Sipesmik. Moreover some of them suggested that this model be completed with two other components or tasks: operate the space system and create conducive states for the five components of the model well function. See figure 3.6 and compare it with figure 6.4. The original model consists of four tasks or components (see figure 3.6), and the new form should include six components (see

figure 6.4). These are the basic science or space product demand, the space research and development, the space system production or construction, the space system operation and the marketing or sales of space products. It appears reasonable that the other tasks are less favourable to them than the first task. Based on this view, the second to eighth tasks are to create what they called the conducive-states or situation for the space science and technology to grow. However, the number of respondents who stated accept and participate in each of these tasks also indicate that they are enough realistic and acceptable. Among the conducive-states creation tasks, the most favourable to the respondents (27/50) was the seventh task: change institutional practice. This is a good sign for the feasibility of the task, since those who accepted and would like to participate in this task came from institutions within the boundary of Sipesmik (see section 7.2).



**Figure 7.2 Respondents' judgment on how well Sipesmik conceptual models include their views**

The respondents' judgments on how well the Sipesmik conceptual models include their views are: 78 % High, and 22 % Medium (see figure 7.3). The reason that many thought the models were only 'Medium' generally relates to the organization of

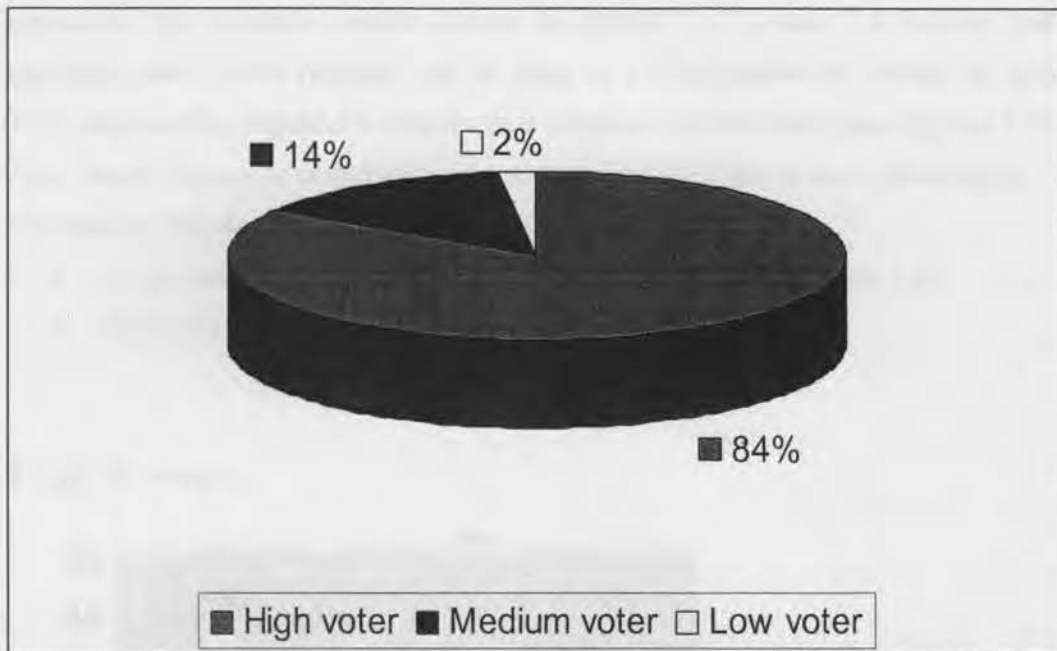
Sipesmik. During the interview some of them provided input for the organization of Sipesmik (see table 5.7), but the conceptual models did not include organizational aspects. When they were shown the suggested VSM, (see Appendix 4) almost all of those who had the interest of Sipesmik's organization accepted it with enthusiasm. If the suggested VSM was included in the models' validation, the percentage of 'High' voter may be a lot more than 78 %.

With regards to the third question asking for respondents' judgments on how well the conceptual models transform the high level goals of Sipesmik: 'space for security and prosperity, with focus on sustainable food and community involvement', into comprehensive and realistic actions, among 50 respondents, 42 High voters, 7 Medium voters and 1 Low voter (see figure 7.3). Again some of those who voted 'Medium' and 'Low' argued that, it were not realistic to create and maintain sustainable food supply with the help of space technology and community involvement using the conventional organization.

The creation and maintenance of sustainable food supply, needs the parties involved in the production, distribution and consumption of food, to work together, in an integrated manner. Some respondents (see table 5. 5) found that the present organization appeared to be inappropriate to fulfil that mission. In the contrary, they found that the suggested VSM was better than that of traditional. Therefore they recommended include the 'VSM of Sipesmik' (see Appendix 4) into the suggestion of the Sipesmik investigation report.

Regarding the question number 5 that asking for respondents' judgment on how well Sipesmik conceptual models transform the Pancasila values and goals into comprehensive actions, the answers varied in term of their consistence, coherence and correspondence (see figure 7.4). However, the overall result indicates that the approach used was judged as having high capability to transform Pancasila values and goals into comprehensive and acceptable actions. This result is akin to the researcher evaluation as presented in table 7.3.

**Total 50 voters**



**Figure 7.3 Respondents' judgment on how well Sipesmik conceptual models transform high level goals into realistic and acceptable actions.**

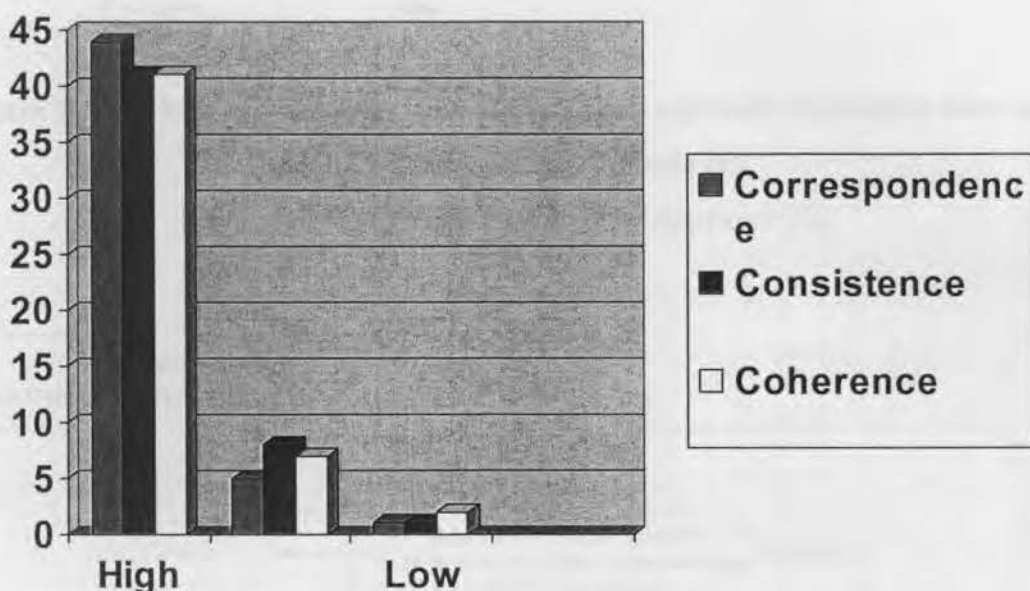
Both research results as presented in figure 7.3 and 7.4 indicate that Sipesmik conceptual models transform the high level goals and the Pancasila values well, and also change goals into comprehensive, realistic and acceptable actions to the interviewees. This can be seen as a good representation of top down approach. Additionally, Sipesmik conceptual models were also judged highly as including the respondents' views (see figure 7.2). This indicates that it can also be seen as a good representation of bottom up approach. All of these indicate that the approach used in this research can represent well both top down and bottom up approaches. This is reasonable as the interviewees consisted of the 'top' and the 'bottom' elements. The 'top' element were represented by decision makers and the 'bottom' element were represented by researchers, farmers etc.

As discussed in section 1.4 history demonstrates some failures which arose when treating Pancasila as the state ideology, caused the top down approaches dominate the decision making process in Indonesia. Figure 7.5a exemplifies a mechanical logic that leads to top down approaches that dominates decision making framework in

Indonesia. Figure 7.5b presents the used of MMA that demonstrates bottom up approach. The validation results shown in figures 7.2, 7.3 and 7.4 indicate that the approach used in this research can be seen as a combination of bottom up and top down approaches. Figure 7.6 introduces a combination that integrates figures 7.5a and 7.5b, where Pancasila is not anymore a state ideology but a state philosophy. This substitution was decided based on two basic considerations:

- All political ideology has methodological failure (see section 1.4).
- Pancasila is formally a state philosophy (see section 1.4).

**Total 50 voters**



**Figure 7.4 Respondents' judgment on how well Sipesmik conceptual models transform Pancasila values and goals, into comprehensive actions.**

Figure 7.6 illustrates that all derivation products<sup>1</sup> resulting from Pancasila should be verified by public, before they are implemented to serve the public. Also all ideas that come from public should also be validated as to whether they are in correspondence, consistent and coherence to Pancasila principles. Also this combination holds a build-in mechanism that provides guarantee for the effectiveness efficiency, and efficacy, equity, ethicality and elegancey (see section 4.6).

<sup>1</sup> Derivation products of Pancasila include laws, regulations, policies and programs

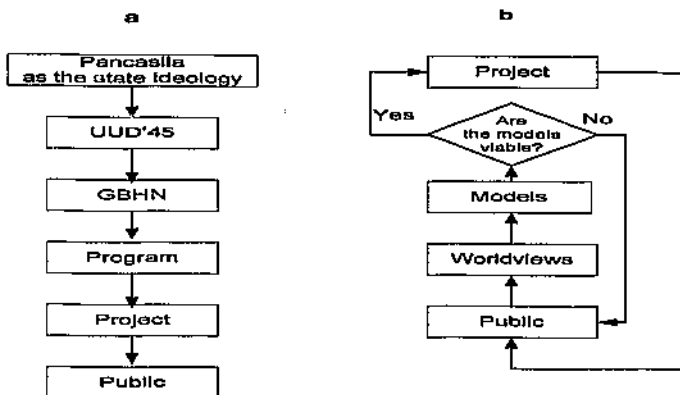
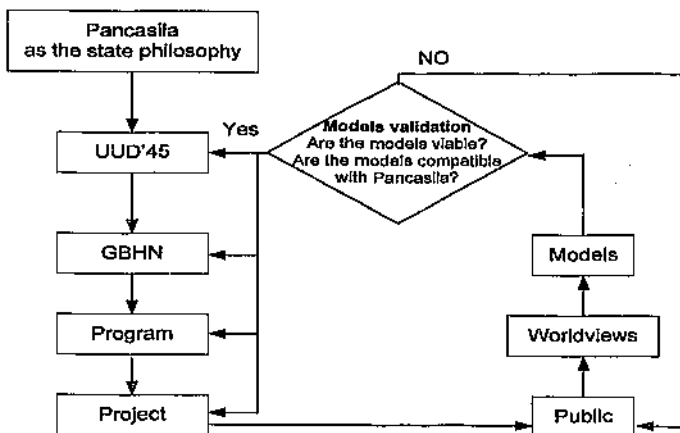


Figure 7.5 Mechanical logic that leads to top-down approach dominates decision making framework in Indonesia (a).

The use of MMA shows bottom-up approach (b).



Note:

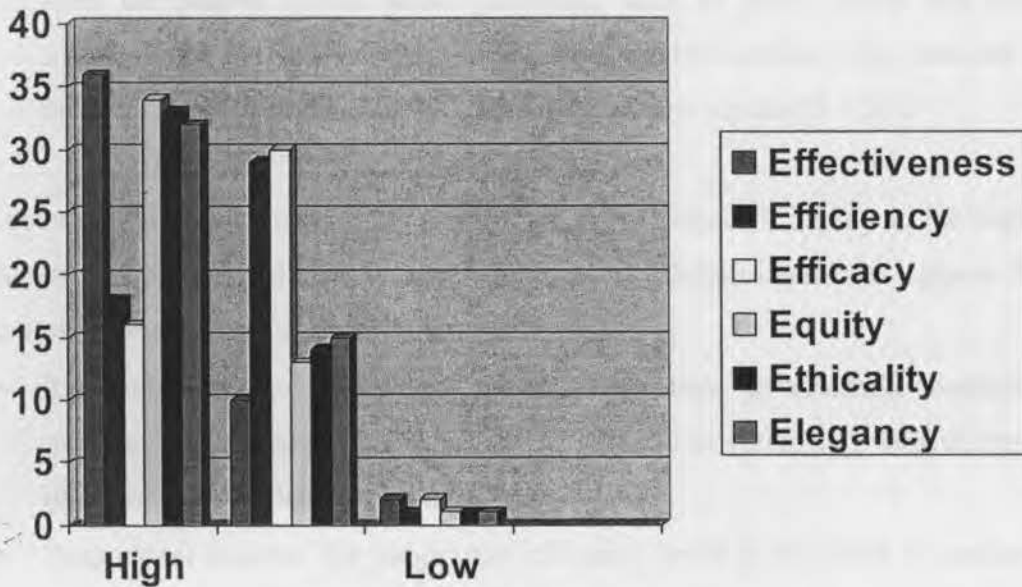
Indicators measured during the models validation:

System viability: effectiveness, efficiency, efficacy, equity, ethicality and elegance  
 Pancasila compatibility: correspondence, consistency and coherency

Figure 7.6 The use of MMA in the context of Pancasila as the state philosophy.

The respondents' judgments on how they regard Sipesmik conceptual models in term of their effectiveness, efficiency, efficacy, equity, ethicality and elegancy are presented in figure 7.4. Among 50 respondents, 48 provided judgments. Due to the perception that his views were not included in the models one respondent did not want to give any judgment. At the interview, he argued that the viability of a model is sufficiently represented by its effectiveness and efficiency. The other respondent who did not want to judge, argued that **Sipesmik conceptual models are pre-requisite to achieve the objective: space for security and prosperity of the general population**, therefore it is not necessary to judge as to whether they are effective, efficient, equitable, easy to use, ethical and elegant.

**Total 48 voters**



**Figure 7.7 Viability of Sipesmik conceptual models judged by 48 among 50 respondents**

The 48 respondents' judgements of the Sipesmik models indicate that the models are found effective in achieving the long term aims of Sipesmik. This means that the framework deployed by Sipesmik models can be used to lead the actors (owners, executors and clients) make sustainable food supply in Indonesia to happen, and achieve the tasks objectives that are translated as the performance measurement of each task model as well.

The following evaluation traces the reasons that might support respondents' judgements on the efficiency of the models.

- **First assumption (FA).** Assuming the amount of output acted by the general objective<sup>2</sup> equals O, and the amount of resources used in the period of time represented by the total investment of Sipesmik equals I, then the efficiency of Sipesmik equals O/I. The objective is food sustainability supported by space technology usage and community involvement.
- **Second assumption (SA).** This assumption considers not only the objective but also the spin off that can be derived from the achievement of that objective. A part to the above objective, the space technology can also be used for maritime surveillance in support of law enforcement at sea (illegal trading, smuggling, piracy etc). There are a lot number of spin off that can be derived from the project related social gathering, such as sport, music and other cultural activities. If all of the spin off is considered include in the outcome of the project, and identified as 'S' then the efficiency equals (O + S)/I.

The above reflection indicates that the more holistic a project is managed, the higher efficiency can be resulted. The results of the model validation seem to support this indication. Some examples are as follows:

- Respondent number 504 judged the efficiency level of Sipesmik conceptual models as low, since his main concern is limited to technical practical aspect of micro satellite development.
- Respondent number 101 judged the efficiency level of Sipesmik as medium, since his main concern was on the strategic rather than holistic aspect of Sipesmik. Strategic is yet more holistic than technical practical aspect, since a part to technical aspect, strategic considers political, social, legal, economy and other aspects that have strategic influence to the project (Robbins et al, 2000).
- Respondent number 509 judged Sipesmik models as having high efficiency. His concern related to the wholeness characteristic of Sipesmik investigation. This was expressed by his comment that the comprehensiveness and linkage among aspects are really demonstrated perfectly by the models.

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<sup>2</sup> By the general objective is meant for major outputs therefore it does not consider the spin off of the project.



The efficacy of a model can be defined as the 'ease' use of the model, which can be evaluated based on its feasibility and desirability. It appeared during the validation stage that the respondents also considered these two factors when judging the efficacy of the model. Most of them started from observing the desirability of the task then its feasibility. When a respondent does not have any desire to do the tasks then a 'low' grade is given. When the tasks are desirable and feasible a respondent will give them a 'high' grade. A respondent will give a 'medium' grade when he or she is not sure upon the desirability or feasibility of the tasks.

The above situation is in accordance with the interpretive character of the method used (SSM and CSH), where 'desirability' is likely more dominant than 'feasibility' of the tasks when evaluating the efficacy of models.

Figure 7.4 illustrates the variation in the number of respondents who judge 'high', 'medium' and 'low' on the ethicality of Sipesmik models. Table 5.11 suggests the basis used to judge the ethicality of the models varied. Some used professional mindsets such as military and scientific and some general ethics. All of this completes the holistic views of the respondents.

As discussed in section 7.1 the elegance of a model relates to whether the model is aesthetically satisfying or not. Aesthetics includes personal taste or values (Budd, 2001), the judgment of the 'beauty' of a model should also be dependent on them. The varying responses about the grade given by the respondents on the elegance of the models also indicates the variation of taste and values held by the respondents. This completes the holistic views collected during the research.

#### **7.4 Respondents' comments, suggestions, and rejections**

Respondents' comments, suggestions and rejections can be classified into five groups.

- Those that relate Sipesmik conceptual models and
- Those that are concerned with Sipesmik in general.
- Those that are concerned with truth.
- Admiration and support.
- Those who reject the proposals.

One respondent (101) sees that the conceptual models show only the functional and structural policies of Sipesmik. They need to be worked out in a more detail including its organization, time scheduling and resources needed. Another respondent (106) suggested further exploration of the roles of owners and to provide more detail. This respondent also provided a warning that there should be an awareness of critical and crucial points, especially in formulating the performance standards, and also suggested further exploration of other critical and crucial processes.

To comprehend the above two respondents' comments, two assumptions were made. The first, these comments and suggestions might indicate that the models did not include satisfactory details that made them comprehensive. The second, these could also be seen as an indication that they were impressed by the models and asking for further detail for their implementation. To see which one is relevant for them, the interviewees' judgments on the validation of the models were explored. It appeared that the second assumption was more relevant than the first. This can be seen that they can be categorized as high voters on the viability characteristics of the models.

Another respondent (201) was concerned with the overlapping of owners, executors and clients. This respondent considered that equitable access for all (to information, to science and technology, to market, to resources and to decision making) is well translated in the model. This also indicates how 'self-control' of the main characters the *tabiat saleh*, virtuous behaviour, of Pancasila practitioner may be well translated in a modelling of 'science and technology development'. This respondent congratulated the modeller, and stated that this research can be seen as an exercise of Pancasila as being a '*genetivus subjektivus*' (as a subject of investigation).

One respondent (209) was concerned with a mechanism that caused system's participants to continuously improve themselves by practicing the role they should perform in the system. This respondent was also concerned with security and resilience aspects of Sipesmik, so that further investigation on this was thought as necessary. An introduction to the 'suggested VSM for Sipesmik' helped this respondent to understand the self improvement mechanism shown by this model.

Another respondent (306) was concerned with operational aspect of a space system that can commonly be divided into two sub-systems: the mission subsystem and the house keeping subsystem. The first has the role to execute the satellite mission such as remote sensing and telecommunication, and the second is to maintain its life as an earth satellite. This becomes further input for Subsystem 1: manage space science and technology development, especially task 1.2 Determine the basic engineering design of a space product.

Some respondents (such as 404 and 107) were concerned with further steps after conceptual modelling. They found that the models were attractive and promised a better future especially in term of food supply, environment preservation, and space science and technology development. This concern implies the importance of identifying future actions following this research.

One respondent (510) thought the high level goals should be changed to 'sustainable development'. This respondent also suggested that Sipesmik should also consider gender aspects in its programs especially gender equality, equity and justice.

Some comments that relates to truth are:

- (1) *The truth is not easy to do and even resource consuming, but surely it will achieve the expected result with less (might be no) conflictive actions ..... (110).*
- (2) *The truth is not easy and eventually resource consuming. This is one of the risks that should be faced when searching the truth. I remember the first interview, when you asked me about 'what ought to be', I understand that you need to know the 'truth'. (205).*
- (3) *As you wished, you get what you want: 'the truth' which is derived from 'what ought to be'. The truth is hard to get, but it does not always serve you in practice, even in certain cases, you might get difficulties to use it. ....I am sure this is not an easy task. (402).*
- (4) *What you can get by asking 'what ought to be' is a truth but not the truth. The truth is only Thy truth. What you get now is a relative-truth therefore beware of the coming disagreement of people. It was not a truth since everyone said so,*

*but it is a truth since everyone says so, therefore do not stop from truth searching if you would like to be up to date (410).*

- (5) *It is true. When you develop satellite for sustainable food, you have not to limit your self on building and operating satellites, you have to include in your program, how sustainable food could be achieved by the help of satellite technology (509).*

These comments are assessed rigorously in Appendix 4. Five truth theories were used: correspondence theory of truth, disquotationally theory of truth, pragmatist theory of truth, coherence theory of truth and semantic theory of truth. In summary:

- This assessment concludes that reality is infinite and representation is finite.
- A model is a representation, thus it is less perfect than its reality. Therefore in designing a model a designer should select one or more characteristic to be held by the model, and this characteristic (s) should be derived from the reality it represents.
- The strongest characteristic held by a model becomes its basic idea.
- To be in correspondence with its reality, the basic idea of a model should be in agreement with the basic idea of its reality.
- To be in consistence with its reality a model should have logic relationship with its reality. This logic relationship can be shown by a model of causality relationship.
- To be in coherence with its reality a model should correctly respond the requests of specified parts of its reality.

Some admiration, support and other comments for the Sipesmik models and project, were given by some respondents, such as<sup>3</sup>:

- (1) *We hope that General Sipesmik Concept will be applicable in Indonesia and by this concept could give wide contribution in outer space exploration and also support national security effort (105)*
- (2) *I'm admire the Sipesmik Conceptual Models that the researcher has designed. It is a new innovation (107)*

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<sup>3</sup> Some of these comments will be assessed in the next chapters.

- (3) *Sipesmik will encourage the opening new business activities for the application of remote sensing technology (108)*
- (4) *I find this research interesting and surely that it will become important input for national planning (109)*
- (5) *This research is quite good as an exercise to function Pancasila as a 'genetivus-subjectivus' (110)*
- (6) *This model can be used in any field (202)*
- (7) *As I explained earlier (in the interview), 'equity', 'ethicality' and 'elegancy' are included in the 'effectiveness', therefore no need to further exploration. To manage effectively a national development I suggest you to consult the attached model (203) (see figure 7.8)*
- (8) *Please continuously improve (Make continuous improvements) (206)*
- (9) *Personally, as a lawyer, I am very much impressed by the Sipesmik conceptual models which has been explained and developed comprehensively. Hopefully, this can be presented academically. I am convinced these conceptual models can be used as the principle of decision making (207)*
- (10) *Sipesmik conceptual models must be valuable for implementation in the real world, not just a concept (304)*
- (11) *Sipesmik is quite good because the stakeholders has already been taken into consideration (403)*
- (12) *This method resemble to Delphi method that is not scientific, since in certain cases solutions taken were not rational but compromised (406)*
- (13) *It should be given the concept for transforming this management model to the real model in order to assist the engineers in absorbing/interpreting this idea (409)*
- (14) *If I were still in power I would promote the implementation of Sipesmik conceptual models that I found in line with the existing national concepts: 'Wawasan Nusantara' (Nusantara Weltanchauung), 'Ketahanan Nasional' (National Resilience) and 'Kewaspadaan Nasional' (National Alert) (501).*

- (15) Sipesmik is very theoretical for me as a practical person, and it is too difficult for implementation.*
- (16) The comprehensiveness and linkage among aspects are really demonstrated perfectly (509) by the models.*
- (17) Sipesmik conceptual models should not be limited to sustainable food, but sustainable development as a whole, and a new concept for this needs to be applied (please refer to Johannesburg WSSD September 2002). Also gender concept should be taken into account in the models (please refer to Johannesburg and Beijing Conference on Woman '78: gender equality, equity and justice (510)).*

It should be noted that there were some changes of respondents' status, during the period of interview and validation dates. One previously had power and legitimacy in the running of Sipesmik, at the validation stage, he stated that he was now retired and had no more power to promote Sipesmik. Seen from dynamic theory of stakeholder he represents a dominant stakeholder who moved to a non stakeholder. At the interview stage he was a deputy minister responsible for national system. He had the legitimacy to recommend a proposed concept on a national system to the Minister of Defence and Security.

One respondent who previously had involvement in the environmental aspect of Sipesmik had at the validation stage a powerful position that gave more urgency but in a different aspect of Sipesmik: gender empowerment. Both of these had changed their opinions by the validation stage. These facts indicate that the stakeholder status of Sipesmik has dynamic characteristics in relation to their views.

It should also be noted that some requested respondents (ten people) rejected the proposal to be respondents of this research. No reasons were obtained, since they were all busy persons. The author assumed this because they were occupied by other businesses. But it is not impossible that they rejected the proposal because they did not have any interest in practicing the system approach.

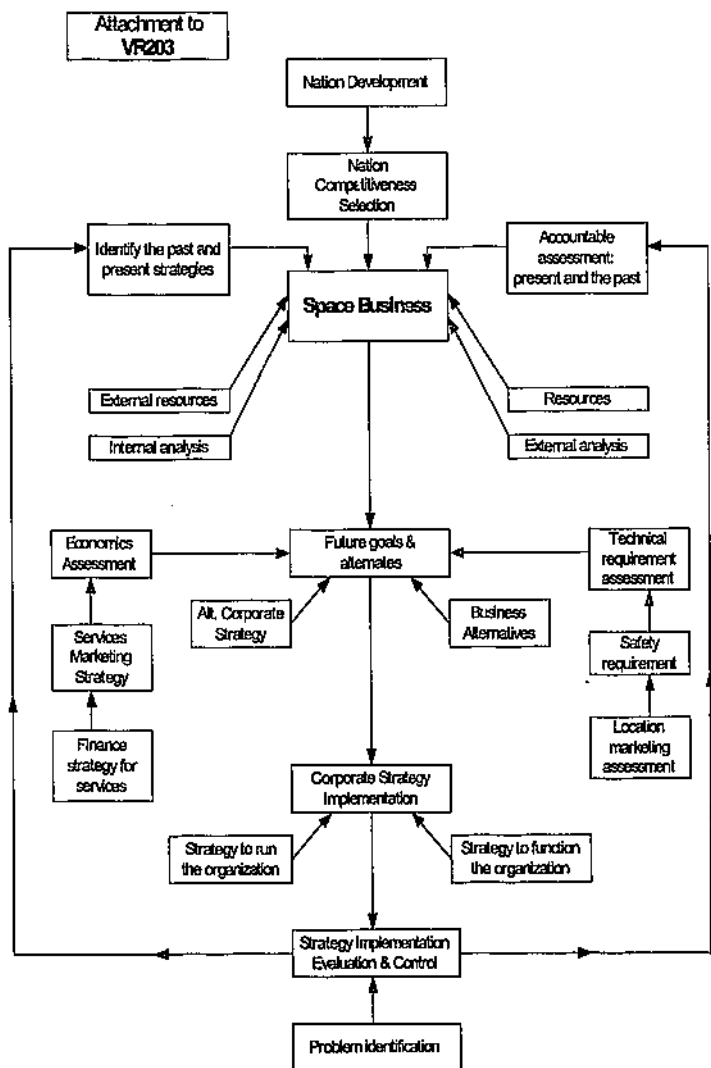


Figure 7.8 Attachment to the comment of respondent 203

(Source Respondent number 203)

## 7.5 Summary of the chapter

Based on the researcher's evaluation, the Sipesmik conceptual models comply with the nine conditions of the anatomy of system teleology. An evaluation of their effectiveness, efficiency, efficacy, equity, ethicality and elegancy, indicates that Sipesmik conceptual models can be seen as viable models. In term of their correspondence, consistence and coherence characteristics they are compatible with Pancasila. Also in term of their desirability and feasibility, these models represent a desirable and feasible system in Indonesia.

The above evaluation results provided the data to develop seven validation questions. Questions 1 to 6, were designed to collect quantitative data regarding the acceptance and participation to Sipesmik, viability, and compatibility of the models to Pancasila principles and the last question to get comments and or suggestions regarding the models and the research as a whole.

The quantitative data indicates that the respondents well understood the models, and knew what kind of participation they could contribute to Sipesmik. Some of them asked for further details that were considered as part of implementation, such as the organization of Sipesmik, its schedule of actions, and resource allocation. However, as a suggested VSM was designed based on previous input, this was shown to respondents. Those who were interested in the organization of Sipesmik were enthusiastic and provide some suggestions for improvement, which are presented in Appendix 3.



## Chapter 8

### REVISITING THE RESEARCH QUESTIONS

#### 8.0 General overview and discussion

This chapter discusses responses to the research questions. Before considering the responses some assumptions or basic understanding that relate to each research question will be introduced so that the answers can be easily understood.

The research questions will be consecutively discussed in the sections 8.1, 8.2 and 8.3. Each of these sections has subsections presenting how responses to the research questions should be considered. At the end section 8.4 provides a conclusion of this chapter.

#### 8.1 The first research question

*Can a western systemic approach be successfully used to define solutions of complex pluralist and coercive problems in a developing eastern world country such as Indonesia?*

Results from validation of the models indicate that the answer is affirmative (see Chapter 7). Some reasons that might support this affirmation relate to method of defining solutions and interviewees' participation. Those reasons include:

- the subjective characteristic of the research (see section 3.2),
- person to person interview is an excellent tool to tap the complete view of respondent regarding an investigated situation,
- an engagement process to systems thinking (see Chapter 4) is a helpful 'warming up' for a person to person interview on system investigation,
- moral values represented by the Anatomy of System Teleology (see Chapter 4) is relevant with the philosophical stance of Indonesian in general.
- open mindedness and patient are two significant characteristics the participative respondents of this research.

However some problems which relate to non affirmative comments on inclusiveness, organisational limitations, method of investigating viability of models, and value of conceptual models, did exist.

The following sections provide deliberation of each of the above items covering method of defining solutions and respondents' participation. The non affirmative comments will be evaluated within the context of second research question.

#### **8.1.1 Subjective characteristic of the research**

As discussed in section 3.2 the assumption of both SSM and CSH that are combined in this research, is that individual or social consciousness is determined by the views of individuals. This assumption requires the views of the respondent should be respected and acknowledged in the research.. This provides flexibility for the interviewer to manoeuvre the interview into a free discussion, and use the list of question as guidance to collect as much as possible of the respondent's views regarding the investigated situation.

The interview results indicate that all views of the respondents were driven by the need to change the situation. This indicates that this type of question is acceptable to them, including those who are responsible for managing the investigated situation.

#### **8.1.2 Person to person interview**

The personal interview may not only lessen the power interference that may happen in group interview, but also allows the researcher innovate special manoeuvres for each interviewee. There were a number of examples of this, but the one presented here relates to question 3 of the interview question (see section 4.3). This research experienced some misunderstanding of question 3: *'Based on your (life) experience, would you mind telling me what criteria do you use to measure efficiency, effectiveness, efficacy (ease of use and implementation), equity, ethicality and elegance of a Sipesmik plan?'*. Some respondents came to give formula or definition of each requested viable characteristics of a plan. When the end part of the question was modified into: *'What criteria or conditions should be fulfilled by an effective / efficient/ efficacy/ equitable/ ethical or elegance plan?'* This manoeuvre resulted data

as presented in a number of tables such as table 5.6 regarding present failure, table 5.7 regarding management detail, table 6.1 regarding elements should be monitored etc.

The key words that made them difference are 'measure' and 'fulfil'. The word 'measure' indicates that what will be measured already exists. It is impossible to measure something that does not exist. The question relates to a plan that does not yet exist. However, the word 'fulfil' can be used for both, that is when the plan is ready and when it is in the designing stage.

Due to such flexibility in interview manoeuvring, this type of interview can be comparable to 'Talkative knowledge gathering' (Sundberg, 1999), which interview method seeks to create an open dialogue between interviewer and interviewee. This type of interview can avoid the practice of hiding answers within the questions, as happens in the multiple choices questionnaire, which practice may be regarded as contradictory with the holistic spirit of this research.

### **8.1.3 Engagement process**

Almost all respondents asked the reasons for doing interview, and why they were selected. Although a general background of the research was already mentioned in the letter of request for interview (see Appendix 1), they were interested to know more. Some of them were familiar with the term 'systems approach' even use it for their interests. During the engagement process most of them asked for details of the research and what kind of participation they had to provide. This kind of openness position is relevant with the position taken by the researcher as practicing an action research where all participants should know what is happening with the research, so that they can best perform their roles.

Some respondents stated they understood systems approach, but they never used it for handling a problematic situation. For them an engagement process was used as a refresher in their understanding of systems approach.

The other group of respondents were those who did not know about systems approach. They can be regrouped into two categories. The first group consisted of

those who understand the use of a model. The second includes those who did not understand modelling. For those who understand how to use a model, the Manley (2001) model was used to introduce systemic approach that considers interaction rather than linear relationships between parties involved in a situation. For those who did not understand how a model functions, the systems approach was introduced using a parable 'an elephant and the blind men' (see section 3.3).

The above reflection shows how important the role of an engagement process as suggested by Ledington and Ledington (2001) in investigating and intervening of a social system, especially when the research include both those are and are not involved in the situation (stakeholders and non stakeholders). It is important when the knowledge and understanding of the interviewees have a great variation such as that described above.

It should be noted that practicing an engagement process, seen from Coetsee (2000), it can be classified as practicing an innovating system, since it considers the essential principles concerning effecting change (ontology), the nature of knowledge (epistemology), and the use of knowledge (ethics). With an engagement process the participants of a research have been made involved in effecting change of a situation. They become directly or indirectly involved in the development and use of knowledge. Therefore an engagement process is relevant for the preparation of an action research that needs comprehensive involvement of the participants since action research is participatory and itself a social and educational process (Denzin and Lincoln, 2003) that need comprehensive participation of those involved in.

#### **8.1.4 The Anatomy of System Teleology**

In the discussion about the philosophy of Pancasila (see section 9.1), it can be seen that Indonesians are concerned with the creation and maintenance of the harmony between supernatural, social (human) and natural elements in the world. It appears that this philosophical stance is compatible with that of Churchman as represented in

the anatomy of system teleology, especially in that it guarantees the effectiveness and efficiency of system teleology wisdom<sup>1</sup> and hope<sup>2</sup>.

The above Indonesian philosophical stance is well demonstrated by the Sakerti respondents (see section 9.4) when answering the question about their strategy in facing the 1997 crisis and its impact to family life. Their answers reflect their concern on divinity or supernatural aspects, besides that of human and natural.

### 8.1.5 Participative respondents

This research uses the key criterion for defining success is respondents' participation; without their participation there would by definition be no solutions. There were two reasons for them to participate in this research:

- they wanted to change the situation and
- they can use this research as a vehicle to express their views on what and how to change the situation.

Up to the engagement process stage a change occurred within the respondents, from those who were unfamiliar with Sipesmik and some new comers for systems thinking and action research into willing participants in defining solutions and in implementing them (system thinking and action research) to solve the problem or improve the situation. Up to the validation stage they have identified their roles (owners, executors and clients) and tasks, commented and express their will to implement the models for improving the situation. Seen from figure 2.3 that was adapted from Kemmis and Taggart (2003), the above process of change is at the cycle of individual knowledge (understanding), social practice (communication), social structure (relation), and social media (language).<sup>3</sup>

<sup>1</sup> Wisdom is thought that is combined with a concern for ethics (Churchman, 1982)

<sup>2</sup> Hope is the spiritual belief in an ethical future (Churchman, 1997).

<sup>3</sup> At the implementation stage the social media will be the work, based on which one will achieve skill mastery (individual knowledge). Improvement in skill will result in improving production capacity (social practice) and economic benefit (social structure) that will affect improvement on the work (social media). In certain cases the above process of changes can affect on political life (social structure) of a person that will result in grasping political power (social media) that improves

Really, this process can only happen with the participative character of the respondents. Also they have the right to be characterised as patient, since they took parts of the process and waited for follow up actions or future activities. Although there were no strong statements supporting this, but it can inferentially be derived from some comments /wishes expressed at the validation stage such as:

- *If I were still at power I would promote the implementation of Sipesmik conceptual models that I found in line with the existing national concepts: 'Wawasan Nusantara' (Nuzantara Doctrine), 'Ketahanan Nasional' (National Resilience Concept) and 'Kewaspadaan Nasional' (National Alert Concept) (501).*
- *We hope that General Sipesmik Concept will be applicable in Indonesia and by this concept could give wide contribution in outer space exploration and also support national security effort (105).*
- *Sipesmik will encourage the opening new business activities for the application of remote sensing technology (108).*
- *It should be given the concept for transforming this management model to the real model in order to assist the engineers in absorbing/interpreting this idea (409).*

The situation described above leads the researcher to conclude that research of this nature results in solutions leading to solved problems or improved situations. This kind of research can be seen as practicing systems approaches where a variety of information based on a system's perspective is used to design system's models of a purposeful activity system (Love, 2003). Moreover, this research theoretically tested that the models created are theoretical viable (see Chapter 7).

The above results and evaluations indicate that the answer of the first research question appears to be affirmative.

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personal knowledge on values (individual knowledge) that affect one's practice in social organization (social practice).

## 8.2 The second research question

*Will the solutions generated in this context be acceptable to Indonesian stakeholders?*

It should be understood that there are no exact answers to this research question. Since this research is interpretive, where the results are generated based on sample's views, there is no absolute measurement that can verify it.

The answer to this research question relates to the relationship between reality and representation, where reality is infinite and representation is finite. The notion of 'Indonesian stakeholders' is limited to the Sipesmik's stakeholders. They are the reality in this context thus they are treated as infinite. In support of this, figure 3.4 helps describe the problematic characteristics of Sipesmik's stakeholders. The interviewees were selected as representative of Sipesmik's stakeholders, and they are finite (50 persons). The above situation leads to the conclusion that the results of this research are just indications of the possibilities for Sipesmik's stakeholders rather than absolutes.

As discussed earlier, the basic indication of acceptance was whether the respondent understood how the system works which was then followed by their statement of acceptance. If they stated acceptance of the models and they had no understanding, their statements were worth less. As discussed in section 8.1 that this research participative respondent is compulsory, to be participative a respondent need understanding of what going on. The results show that all interviewees settled their choices whether they were owners, executors and or clients (see Section 7.1), and what tasks they would focus on within Sipesmik (see Figure 7.1). This indicates that they understood how the system works and how they could and or would participate. Some indications of this can also be seen in section 8.1.5.

To identify the indicators of acceptance of the generated solutions, this research asked all respondents to verify whether all of their views are included in the models (see Chapter 4). If the answer was affirmative, it meant that the respondent accepted that the models represented his or her views. However, the verification and comments given by the respondent was depended not only on the models but also on the

respondent's situation. Changes in roles often meant changed perspectives on the problem situation (see section 7.5).

The research results indicate that the research question was answered in the affirmative. The following subsections provide indicators that support that answer.

### 8.2.1 Affirmative comments

The affirmative answer of this research question might be caused by various reasons. Assessing this, some positive scenarios can be developed, such as:

- Many interviewees asked for the interview records when validating the models. They then rigorously compared the two. This indicates a disciplined approach to the process.
- Some respondents did not need the interview records but judged the models by their comprehension of them. This was drawn from comments such as:
  - *The comprehensiveness and linkage among aspects are really demonstrated perfectly by the models (509)*
  - *I'm very admire the Sipesmik Conceptual Models that the researcher has been designed. It is a new innovation (107)*
  - *I find this research interesting and surely that it will become important input for national planning (109)*
  - *This model can be used in any field (202)*
- Some respondents fully understood that a comprehensive process to change situation needed an initial step. They appeared ignorant of the inclusiveness of their views, but found that the models would be a positive step in improving the situation therefore they judged them positively and commented the models. The following comments support the above judgment.
  - *Please continuously improve (Make continuous improvements) (206).*
  - *Sipesmik will encourage the opening new business activities for the application of remote sensing technology (108).*
- Some respondents put a special attention on how this research approach coped in transforming Pancasila values and goals into comprehensive actions,



therefore judged and commented the models from this perspective. They were all positive. Respondent's comment below inspired this scenario.

- *This research is quite good as an exercise to function Pancasila as a 'genetivus-subjectivus' (110).*
- *By overlapping members of 'owners, executors and clients, these models show how equal access for all to information, to science and technology, to market, to resources and to decision making is well translated in the model. This also shows how 'self-control' the main character of the 'tabiat saleh' of Pancasilaist is well translated in a modelling of science and technology development. This can be seen as an exercise of Pancasila as a 'genetivus subjectivus' (201).*
- *... You used it (Pancasila) as a 'genetivus subjectivus' to help develop Sipesmik Models. I am sure this is not an easy task. Congratulation you did it (402).*
- In some cases, the models might not fully include respondents' views, however they still approved, as they thought that this research differ from that of conventional as it considers representations of stakeholders' views. They thought that it would advance space and technology and other related fields, thus it will become interesting input for national planning; therefore affirmatively judged and commented the models. This scenario was developed based respondent comments such as:
  - *Sipesmik is quite good because the stakeholders' views have already been taken into consideration (403).*
  - *I find this research interesting and sure that it will become important input for national planning (109).*

### 8.2.2 Comments on inclusiveness

78 % of respondents voted 'High' for the third validation question, which meant that the conceptual models fully include their views. There were eleven respondents (22 % of the total) who judged that Sipesmik conceptual models did not fully take in their views and they voted 'Medium' for this question. Nine of them argued that during interview they identified ideal conditions of Sipesmik which embraced its

organisational characteristic, but the conceptual models did not include any organisational models.

When a VSM for Sipesmik was introduced to them, they were enthusiastic about it and suggested it be included in the solutions for the problematic situation. This indicates that if the solutions include the organisational model of Sipesmik, they would have voted 'High' for the third validation question. If this assumed then the percentage of 'High' voter becomes 96% (78 % plus 18%) of the total voter.

The other two respondents who voted 'Medium' for the third validation question are respondent numbers 203 and 504. The first argued that conceptual models were not the solutions he expected. He identified himself as practical person, and judged that conceptual models have no practical value, therefore he voted 'Medium' for the third validation question. The second argued that his suggestion to limit the viability criteria of a model strictly into effectiveness and efficiency was not included in the solution, therefore he also preferred to vote 'Medium' for the third validation question.

Whilst there were some limitations in acceptance, the negative comments were not based on the process but personal concepts of non inclusiveness of idiosyncratic ideas (see further elaboration in section 8.2.4)

### **8.2.3 Organisational limitation**

The concern of respondents on organisational improvement of Sipesmik, appears to be in line with the views of respondents as a whole, as outlined in the root definition (see Chapter 5). Based on which the author designed a VSM for Sipesmik as presented in Appendix 3. The enthusiasm of respondents when the VSM was introduced to them, indicate that the model may solve the problematic situation including its organisational limitations that include:

- No real coordination between departments/ministries is actually enforced, it was due to institutional jealousy where each department/ministry guards their own portfolios (see table 5.6 number 2).

- The above situation results in lack of integration efforts, where the occurrence of efficiency is hard to achieve.
- Networking among qualified human resources is still very limited (see table 5.6 number 3) which means that social process as a driver of knowledge development within multi organisations is less empowered.

Their eagerness may indicate that the VSM is in compliance with the criteria of an ideal Sipesmik organisation expressed by them during the interview, which should:

- be a network (106, 107, 206)
- include existing facilities that have the capability to support Sipesmik (101, 105, 106, 107, 206, 409, 510)
- have self improvement mechanism (102,106,107, 206, 509) and
- consider morphological situation (408) of the earth surface.

The VSM for Sipesmik is a network that consists of three levels: national, cluster and unit levels. The cluster and unit levels were identified based on natural morphological situation of Indonesia. The VSM has a self improvement mechanism shown by the recursion mechanism that includes all levels. And within each unit, cluster and national structure there are actors (owners, executors and clients) who have the access to improving performance measurement. In this way the criteria of success of the system is improving based on actors' agreement.

The above reflection indicates that there was a need of an organisational model to satisfy the requirements of the respondents. It appears that these requirements are relevant with bioregional economies concept that belongs to a framework of a conservation economy that considers: social, natural and economic capitals. A bio region is defined by its biological, social and geographic coherence, rather than political consideration. Bioregional economies belong to that of economic capital, which the centres of policies are fair trade, true cost pricing and product labelling (Korten, 1999). Although Hutchinson (1997) argued that bioregional economies concept would be irrelevant with the globalization, but Ecotrust Canada is one success example of economic conservation practice (see [www.ecotrust.org](http://www.ecotrust.org)).

#### 8.2.4 The viability of the models

Most of the respondents judged that the models are viable in the context of Pancasila as the state philosophy of the country. This stimulates optimism for the models will be acceptable to the stakeholders. However it should be noted that there were two respondents who made a case on the viability of the models.

One respondent (504) rejected the viability of the models as he thought the models should be only judged by their effectiveness and efficiency, where effectiveness relates to objective achievement and efficiency relates to the use of resources in achieving the objective. Superficially it looks consistent with the concerns of Churchman (1971) on system teleology, but when it is scrutinised, they are different, since this respondent also rejected the concept of ethicality, efficacy, equity and elegance of system models. While Churchman (*ibid*) identifies nine conditions of an anatomy of system teleology for its effectiveness and efficiency (see section 4.2). However, regarding the process of transforming resources to achieve the objective, Churchman (1982, 1997) expresses his view that it should be based on wisdom and hope, where wisdom is thought that is combined with a concern for ethics and hope is the spiritual belief in an ethical future. Therefore in this way he inferentially states that a viable social system model should not be only effective and efficient but also ethical. This differ social system from machine (mechanical system). The parts of a machine are non living things, but the parts of a social system are living things. Only the living things are concerned with ethics. This reflection teaches that Sipesmik should be regarded as a social system that should be concerned with ethics. In contrast, the respondent tended to view the investigated situation as a mechanical system where ethical consideration is neglected.

The second respondent (504) who judged the Sipesmik models were not viable, used an argument that as practical person, he regarded the models were theoretical and impractical. Therefore all viability elements of the models were judged as having a low grade. To appreciate his judgment, the author consulted Checkland and Scholes (1990a) who state that a viable system model should be effective, efficient and easy to use (efficacy). Easiness use of a model is not only dependent on its easiness of being understood to the actors (especially excutors), but also its feasibility and its

desirability (see section 7.3). Its feasibility relates to the feasibility of the task to achieve the objective. Its desirability relates to the actors desire to run or operate the model. Although a model is easy to be understood by its actors, if the tasks are not feasible then the model is not viable. Although a model is easily understood, its tasks are feasible but the actors have no desire to run the model, it is also not a viable model. As an example, a model of pig business is theoretically and operationally well proved in several regions to increase economic productivity of the region. If this model is introduced to a Moslem community, and it might be easily understood by the proposed actors, but **they will have no desire** to implement it in their live since pig (pork and its derivative products) is 'haram' (forbidden by the religion) for Moslem, it means that that model is not a viable model for Moslems.

It appeared that this respondent had a great desire on the Sipesmik situation, since he was the person who was responsible for running the air launch<sup>4</sup> business in Indonesia. The Indonesian success on micro satellites production will give him a fertile market for his business. It came into view that he would prefer a model that can be used to help solve practical problems so that micro satellites can be produced, placed on orbit and operated for defined objectives. It can also be comprehended that he preferred to view Sipesmik situation as a pure technical management problem. In contrast, this research, it regards Sipesmik as a socio technical management problem. Discussion on these two different views can be seen in section 1.5.

### 8.2.5 Value of conceptual models

The author believes that the value of a research work will increase with its implication to other people's works and its practical usages. These models provide the users a framework for improving food sustainability by taking benefit of space technology development and community involvement. This becomes the main usage of the

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<sup>4</sup> The air launch system is a system for putting on orbit satellites, by using an air craft (T.124 made in Russia) that functions as a rocket carrier to an air launching base. T. 124 carries the rocket that hold satellites in side its nose cone, flies up to around 30 km over the sea surface, and drops the rocket that a parachute holds it in vertical position from which attitude the rocket's igniters is switched on. This rocket transports the satellites into their orbital positions (Air Launch Corp, 2001).

models. However some implications may arise from the application of the models. These implications can be classified into four elements<sup>5</sup> :

- **Individual knowledge;**  
The actors of the project, such as the researchers, farmers and fishermen, will certainly gain individual knowledge from the jobs they executed and from the provided training and educational programs.
- **Social practice;**  
Method of fishing may change from traditional that determine position location based on stars, to that of satellite guided position and location determination that is real time, automatic and more detail. This is more relevant to be used to search schools of fish in the ocean, which position and location are dynamics. This practice will impact in a more productive fishing.
- **Social structure;**  
Due to its productivity, the above fishing practice theoretically will elevate the economical live of the fishermen. Also their knowledge on natural conservation will make them sensible to the fishing standard of practice, which makes them respectable fishermen.
- **Social media;**  
Their knowledge, living practice and social position, can lead them to a better practice in using the social media including language, work and power to achieve their objectives.

To end this section, it can be concluded that the answer of the second research question is positive. Most of the respondents accept that the models include their views, which means that the models represent well their views. The existence of problems was caused by the different of views concerning the investigated situation.

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<sup>5</sup> These implication cases were developed based on the work of Kemmis and Taggart (2003) on participatory action research.

### 8.3 The third research question

*Can these systemic methods be used to transform the high values and goals held within the state philosophy of Indonesia 'Pancasila' into realistic and acceptable actions?*

To find the answer of this research question, three questions need to be reflected upon:

- What are the high values and goals held within Pancasila?
- What kind of actions mentioned in the models, represent the high values and goals of Pancasila?
- How can the actions be examined to show they are realistic and acceptable to Indonesian stakeholders?

In this research, context realistic and acceptable action is means action that works in real life and is acceptable to Indonesian stakeholders. An action that works in the real life is a task that is feasible, and an action that is acceptable equals to task that is desirable to the actors. Therefore realistic and acceptable actions to Indonesian stakeholders in this research context equal to tasks that are feasible and desirable to the respondents who represent actors of Sipesmik. An evaluation on this matter is done in section 7.2 that results in identifying some indicators that Sipesmik tasks are realistic and acceptable to Indonesian stakeholders. Therefore the following sub-sections will focus on answering the two other questions.

#### 8.3.1 The high values and goals held within Pancasila.

The values held within the first principle, includes among other two basic religious values: the belief in the one and only God and the pious of God's instruction : and prohibitions. These values become the spirit of the four other principles and also the goals that should be realised in the real live of the people of Indonesia. This means that it should always efforts to deepen the understanding about God and God's instructions and prohibitions. These efforts can be in the form of research and development and or live experiences so that the people's belief and the pious of God are continuously improved. This interpretation rationalises the view that

philosophically Pancasila is a combination of western and eastern culture (see section 1.2).

The second principle embraces among other three human values:

- human esteem,
- equality status for all people, and
- people's creativity, taste, will and belief,

These values are spiritually derived from the first principle and they provide spiritual basis for the three other principles. The presence of these values become indicators that Indonesian different to animal. Therefore they also become the goals that should be realised in the real world.

The third principle takes in a number of values that include:

- Unification of Indonesian territory,
- Unification of various ethnics who lives in Indonesian territory, which is popularly represented in a motto *Bhineka Tunggal Ika*, unity in diversity.

The fourth principle contains a number of values such as:

- States sovereignty is held by the people.
- The people's leadership is wisdom that is based on healthy rationality.
- All Indonesian as a resident and a member of a community has equal status, rights and responsibilities.
- The deliberations and votes for peoples' decisions are taken by the people's representatives.

The spiritual basis of these values is derived from the first, second and third principles. These values become the spiritual basis for the fifth principles. History shows that that there were some failures in the past (see section 1.5) such as the totalitarian characteristic of the elites. This research has designed a framework that limits the possibilities for the occurrence of totalitarian in the Indonesian's future.

The fifth principle includes social justice values that also become the goals of Indonesians. Some of them are:



- The occurrence of justice within the social life of Indonesians including that of procedural, distributive and interactional justice<sup>6</sup>.
- Indonesians community that is secured and prosperous.

### 8.3.2 Pancasila representations in the Sipesmik models

As described in the section 7.3 in the context of Sipesmik models, Pancasila is seen as the 'reality' therefore it is infinite, whilst the models are finite. Therefore it is impossible for a model(s) to represent the whole values held by the reality. Table 8.1 provides some Pancasila values that are and are not represented by Sipesmik models. All religious values are not represented in the models, since Sipesmik models can be classified as worldly models. Some representations can be inferentially recognised as representations of religious values, but they represent better human values such as avoiding unlawful acts.

Some Pancasila values are better represented by several models than single model, such as people's taste, will and belief. People's taste relates to aesthetics. Since the models represent inner feeling of purposive state of mind. To be recognised as beautiful they should fulfil certain criteria that according to Budd (2001) are as follows:

- It should be structurally complex.
- The elements relate to one another in a harmonious fashion composing a unified whole.
- Each element appears to be an integral part of the design fittingly related to the other elements.

However, some models are able to represent a number of Pancasila values such as Root Definition that can include human esteem, equality for all people, people's creativity and people's representation.

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<sup>6</sup> Distributive justice refers to the perceived fairness of outcomes or rewards related to performance inputs. Procedural justice refers to the perceived fairness of organization-wide procedures used in decision-making. Interactional justice refers to perceptions of receiving adequate information from managers and fair treatment in the way in which procedures are carried out (Moorman, 1991).

Belief values can be religious or secular. The belief in God is a religious value, and people's belief can be secular. Examples of belief value that is worldly such as:

- The belief on the guarantee of effectiveness and efficiency of a model,
- The belief on the power of money, and
- The belief on ethical future.

**Table 8.1 Pancasila values and goals and their representations within Sipesmik models**

<b>Pancasila values and goals</b>	<b>Representation in the Sipesmik models</b>	<b>Arguments</b>
The belief in God	None	None of the models represent religious values with religious but lay actions
The pious in God's instructions	None	None of the models represent religious values with religious but secular actions such as the practice of human esteem recognitions.
The pious in God's prohibitions	None	None of the models represent religious values with religious but worldly actions, such as avoiding unlawful or unethical acts.
Human esteem	Root definition	This model appreciates the role of human in managing the nature.
Equality for all people,	Root definition	This model provides equal access for all people on information, resources, marketing, science and technology and decision making
People's creativity,	Root definition	This model provides all actors to be creative for recuperating the situation through improving the measurement standards.
People's taste	Sipesmik models as a whole	According to Budd's (2001) criteria the models can be judged as beautiful representations (see section 7.1.2)

People's will	Sipesmik models as a whole	The models include almost all views and comments of the respondents
People's belief	Sipesmik models as a whole	The guarantee of success for the models is wisdom and hope <sup>7</sup> that both are concerned with the belief on ethics.
Unification of Indonesian territory	VSM for Sipesmik	This model shows how to organize the Sipesmik that cover the whole territory of Indonesia (see Appendix 3)
Unity in diversity	VSM for Sipesmik	This model provides each region to develop according its natural and social environment (see Appendix 3)
States sovereignty is held by the people	None	The root definition model encapsulates all view of the people on how to manage the Sipesmik but not the state.
Wisdom and healthy rationality	Root definition	The guarantee of success of these models is wisdom and hope <sup>8</sup> .
Equal status, rights and responsibilities	None	These models recognise roles and responsibilities that might be different from one to another.
People's representation.	Root definition	This model recognises representation of people and the nature.
Social justice	Task models	Task models includes actions to improve social justice
Secured and prosperous community	Task models	Task models contain actions to improve the security and prosperity of all people including communities

<sup>7</sup> Wisdom is thought combined with a concern for ethics (Churchman, 1982) and hope is the spiritual belief in an ethical future (Churchman, 1997).

## 8.4 Conclusion

The results of this research indicate that the answers of the research questions are all confirmatory. Therefore it appears that:

1. *A western systemic approach can be successfully used to define solutions of complex pluralist and coercive problems in a developing eastern world country such as Indonesia.*
2. *The solutions generated in this context are believed to be acceptable to Indonesian stakeholders.*
3. *These systemic methods can be used to transform the high values and goals held within the state philosophy of Indonesia 'Pancasila' into realistic and acceptable actions.*

Hence, to avoid historical failures (see section 1.2) to happen in the future, the combination of the 'top down' and the 'bottom up' approaches as shown in figure 7.7 is advisable.

## Chapter 9

### REFLECTIONS AND RESEARCH EVALUATION

#### 9.0 General overview

This chapter evaluates three major topics of investigation of this research: systemic approach, Pancasila and Indonesia as the third world country. Sections 9.1 to 9.3 consecutively elaborate:

- o The systematic philosophy of Pancasila
- o The practice of Pancasila in Indonesia
- o Future prospect of Pancasila.

Section 9.4 discusses the use of systemic approach in the context of Pancasila

- o The hard systems approach
- o The MMA

This chapter ends with a summary presented in section 9.5.

#### 9.1 The systematic philosophy of Pancasila

According to Tamburaka (1995, p.56) the systematic philosophy of Pancasila includes:

- Metaphysic
- Anthropology
- Cosmology
- Ontology
- Epistemology
- Axiology
- Methodology

The term cosmology comes from the Greek cosmos (space) and logia (study). It studies about space. The cosmology of Pancasila is a deliberation about Pancasila and the space (cosmos). Section 2.1 introduces the INCS that has discussed Indonesian's vision about the space based on Pancasila therefore this chapter will not discuss about

the cosmology of Pancasila but the other six topics of systematic philosophy of Pancasila. This chapter was designed to provide other indications and or evidences that support the research result as discussed in the previous chapters.

### **9.1.1 The metaphysic of Pancasila**

The term Metaphysic comes from Greek, it means everything after physical matters. It was introduced by Andronikos from Rhodes and was made popular by Ariston from Kees, about 226 Before Christ (BC) (Bakry, 1975). It belongs to systematic philosophy (Tamburaka, 1995) that attempts to understand the working of the universe, particularly why do we exist (Welborn, 2003)?

The first principle of Pancasila, indicates that it is concerned with supernatural aspects of existence. The four other principles indicate its concern to social and natural aspects of existence. Pancasila that consists of five principles was designed to define single philosophical concern the harmony between the three aspects of existence: supernatural (God), social (human), and natural (nature), within which human becomes the centre of investigation (Drijarkara, 1966, Priyanto, 1980) from which, larger structure is extrapolated (all existence including cosmos).

The human as the model (the centre of investigation) is used because it holds all element of existence (Tamburaka, 1995). The superiority of human is that it is the only reasoning, analytical, self reflecting species (except to a lesser degree, the apes) known to exist (at present) dominating and threatening all other species in the world (Welborn, 2003). These superiority elements of human can be seen as the supernatural element of human, while the body is his natural element. Its social element exists when those two other elements are present. A cadaver/corpse is a human that losses his supernatural and social elements.

It is ideal in the context of Pancasila, that due to its superiority humans have placed them selves as the managers to harmonise the supernatural, social and natural aspects of the world. The first principle emphasises that human should acknowledge God as the supernatural existence. This principle indicates acceptance for transcendental truth for knowledge that is derived from the human's relationship with God. The second

principle states that human should be just and civilized. This principle indicates acceptance for empirical truth for knowledge that is derived from human experiences based on his relation with the supernatural and natural elements.

These two principles become the foundation on how the harmonisation of the three elements of existence should be based. Using transcendental and empirical knowledge a unified Indonesia (in term of territory, nation and language) should be realised and run in a communal way to make real social justice for the whole people of Indonesia.

**This metaphysical evaluation provides support why the use of systemic approach in the context of Pancasila is acceptable**, since philosophically Pancasila can be classified into those that accept subjective investigation, that becomes the position of **human centred methods** that take an interpretivist, ideographic stance: *'the world is seen as determinable only from the viewpoints of human participants'* (Lehancy, 2000, p.5). Methodologies that belong to this class among others are

- Soft System Methodology (SSM)
- Critical System Heuristic (CSH)
- Strategic Assumption Surfacing and Testing (SAST)
- Interactive Planning (IP)
- Strategic Options Development and Analysis (SODA)

### 9.1.2 Anthropology Pancasila

The word anthropology was derived from the Greek 'anthropos' (human) and 'logia' (study), therefore it can be defined as the study of humans. According to the American Anthropological Association it is defined as the 'study of human kind' (Givens, 2004). The anthropology of Pancasila describes what kind of human an Indonesian should be. This type of human should be relevant with what was expected by the founders of Indonesia, who have established the country on the top of a foundation namely Pancasila.

The above reflection teaches that there are two possible vision of seeing an Indonesian. The first is a general term that anthropologically an Indonesian as a human should be an autonomic substance (Tamburaka, 1995, p.58) that is:

- definite,
- unified, in term of not contradictory to him self, and
- self evidence that his existence does not depended on or belongs to other existence.

Therefore an Indonesian should be a **subject**, a substance that is self acknowledged (Hamersma, 1990). This philosophical stance is relevant with the interpretivist and ideographic stance taken by the human centred methods. Thus this is a more theoretical support to the fact that the use of systemic approaches is acceptable in the context of Pancasila.

The second is in a specific term that can be called an Anthropologically Pancasilaist, which means that as a substance that is self acknowledged as an Indonesian but is faced with some constraints as follows:

- believes in the one and only God,
- be a just and civilised human,
- unify Indonesia in term of one territory, one nation, and one language,
- be communal, and
- improve social justice for the whole people of Indonesia.

Due to these constraints, an Indonesian should become an object of his or her own action. Since it is factual that not all Indonesians are ideal (anthropologically Pancasilaist), each of them has a mission given by the founders of Indonesia to make him or herself and relatives be Anthropologically Pancasilaist. However it should be noted that in doing so, an Indonesian should practice the true transcendental and empirical knowledge, where the **human is the subject as well as the object of intervention**. This kind of intervention is relevant with action research that the aim is improving individual and social knowledge and practices through cooperative actions (Kemmis and Tazgart, 2003). This is one more theoretical support to the affirmative results of this research.



### 9.1.3 The ontology of Pancasila

According to Witmer (2004) ontology is the study of what there is or the attempt to say what entities exist. To show the difference of ontology to metaphysics, it can be defined as the difference between the attempt to say, of those entities, and what they are. In effect, one's ontology is one's list of entities, while one's metaphysics is an explanatory theory about the nature of those entities. Therefore Pancasila's ontology equals to the list of entities that exist within Pancasila. To identify entities within Pancasila Notonagoro (1967, p.17) provides guidance that there are three categories of existence:

- 1) Anything that exists in reality and its existence is not depended to other existence.
- 2) Anything that imaginary exists, but in reality it does not exist.
- 3) Anything that imaginary exists, in reality it does not exist but that is possible to be existed.

Based on the above definition Tamburaka (1995, p.63) identified the entities exist within Pancasila, they are: *Tuhan*, God, *manusia*, human, *satu*, one, *rakyat*, people and *adil*, justice. To evaluate the truthfulness that Pancasila has such entities, the author consulted to Quine's theory of ontological commitment: 'On what there is' (Quine, 1948) that the criteria are as follows: A sentence S is committed to the existence of an entity just in case either

- (i) there is a name for that entity in the sentence or
- (ii) the sentence contains, or implies, an existential generalization where that entity is needed to be the value of the bound variable.

In other words, one is committed to an entity if one refers to it directly or implies that there is some individual which is that entity. Based on this theory, the ontology of Pancasila should be: **divinity, humanity, unity, communality and justness**, which consecutively represents the value of the bound variable within each principle of Pancasila. Therefore with regards to the use of systemic approaches that is value dependent, its success is partly due to the achievement of transforming these values into realistic action. This achievement can be seen in section 7.1.3 that evaluates correspondence, consistence and coherence characteristics of the models compared to Pancasila, where these values become the criteria to be respected within each of the evaluations.

The following deliberation leads to better understand of each of these values, which becomes the basis for the evaluation done in section 7.1.3. The word 'divinity' is the appropriate representation for the value of the bound variable within the first principle of Pancasila. Although the word 'God' is in the sentence but it does not represent the value of the whole variable within the principle. According to Sudarodji and Arief (1993, p.883) the appropriate translation of 'Ketuhanan' is 'belief in God', 'divinity' or 'deity'. Thus 'Ketuhanan yang maha esa' can be translated into 'The divinity to the only one'. Who is the only one? The answer is God. Therefore that principle can be translated into 'The divinity to God'. This principle does not commit to the 'God' of Moslem, Christian; Hindus, Buddhist, or other religions. But this principle commit about the divinity that can be to the God of Moslem, Christian or the others. It can also be said that there is a generalisation of the existence of relationship between human and God.

A part to the presence of the word in the sentence, 'humanity' is thought as the appropriate word to represent the value of the bound variable within the second principle: *Kemanusiaan yang adil and beradab*, 'Just and civilized humanity'. Also the same reason for the word 'unity' that represent the value of the bound variable of the third principle: *Persatuan Indonesia*, 'The unity of Indonesia'.

The fourth principle: *Kerakyatan yang dipimpin oleh hikmah kebijaksanaan dalam permusyawaratan perwakilan*, is commonly translated as 'Democracy guided by the inner wisdom in the unanimity arising out of deliberations amongst representatives'. However the appropriate key word for this principle is 'Kerakyatan'. It represents the value of 'common people or community'. Therefore it can be translated as 'democracy', 'democratic' (Sudarodji and Arief (1993, p.813) or 'communal'. As for Mubyarto (2003a, b, c, d and e) who develop the Pancasila economic theory', prefers to use communal for 'kerakyatan'. This thesis uses communality to represent the generalization of human value of Pancasila. Notonagoro (1967) has judged the communality type held by Pancasila as having the similar characteristic with that of hylomorphism<sup>1</sup> that believes in the power of 'anima mundi' who always provides

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<sup>1</sup> Hylomorphism comes from the Greek Hyle (material) and morph (form). The hylomorphist believes that everything that has 'material' and 'form' is under the supervision of 'anima mundi'. When there

central position among two extremes for keeping the harmony of the world. This judgment was based on traditional leader's behaviour that always takes compromise way to solve the problem that persists among antagonistic parties.

This judgment has resulted in an interpretation that distorts the value of this principle. This can be seen in the deliberation of this principle at the material for the Pancasila courses that based on this judgment all deliberation among representatives should be directed to achieve compromise solution, (*musyawarah untuk mufakat*, deliberation for compromise) (Lasiyo and Juwono, 1985, p.34, Tamburaka, 1995, p52). This leads to the occurrence of oppression by those who are at the power. It is therefore the Pancasila courses are judged by some thinkers (Soeseno, 2000) as repressive.

This cultural phenomenon should be considered when having the intention to practice western systemic approaches in Indonesia. Accepting the above Notonagoro's (1967) judgment may lead to choose the Soft System Methodology that the assumption is that the participants involved in the situation are pluralist in character. In fact some participants may need to be released from oppression feelings, which situation directs the selection of Critical System Heuristic.

'Justness' is the entity that represents the fifth principle of Pancasila: Keadilan social bagi seluruh rakyat Indonesia, 'Social justice for the whole people of Indonesia'. The author does not agree with Tamburaka (1995) who considers 'justice' as the entity that represents the value of the fourth principle of Pancasila. There are different performance measurements for 'justice' and this principle does not commit to any preference of justice's value<sup>2</sup>. This principle commits for justness, the generalization aspect of justice.

All of these entities (divinity, humanity, unity, communality and justness) are generalization of the related value. They were designed on purpose so that Pancasila is expected to always valid for any situation. These generalizations also hold a

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are two extreme, or antagonistic situation, the anima mundi always provides central position that keeps everything in harmony.

<sup>2</sup> We can see that different state has different law, this indicate different justice value. Such as cohabitation (unmarried couple) and gay couple, are legal in a certain countries, but not in Indonesia. Value is dynamic it causes the need in certain period of time reform laws and regulations.

message that these values should be further detailed in the UUD 45 and its derivative products.

This ontological evaluation provides further understanding on values that should be respected when measuring the compatibility of Sipesmik models with Pancasila. Beside, since the human centred methods (SSM and CSH) implemented in this research have the characteristic that is 'reflective of values respected by the participants of the investigated situation' (Flood and Jackson, 1991), it can be concluded that the affirmative results of this research indicate that those values are representative values respected by the respondents.

#### **9.1.4 The epistemology of Pancasila**

Epistemology is a branch of philosophy that studies about knowledge. It attempts to answer the basic questions of what distinguishes true (adequate) knowledge to false (inadequate) knowledge (Heylighen, 1993). The epistemology Pancasila discusses about what Pancasila has given to distinguish which knowledge is true or adequate and what knowledge is false or inadequate to be used in realising the social justice for the whole people of Indonesia.

As discussed in section 9.1.1 that there are two principles that provide the basis for distinguishing what kind of knowledge will be acceptable for Pancasila. The first principles indicate an acceptance for transcendental truth for knowledge that is derived from the relation between human and God. This can be an equivalent of Kant's transcendental idealism of truth (Ross, 2003). However it does not mean that Pancasila automatically denies the truthfulness of Kant's transcendental realism, or subjective realism of Berkely, or objective idealism of Hegel that could be an appositive of the Kant's transcendental idealism, since it might complete the truth that is derived from Kant's transcendental idealism and or empirical realism.

The second principle of Pancasila indicates an acceptance for empirical truth for knowledge that is derived from human experiences that are just and civilized, which can be comparable to Kant's empirical realism of truth. However this is not meant that Pancasila automatically denies the truthfulness of Kant's empirical idealism. It

will be acceptable to Pancasila with condition that it completes the truth derived from Kant's empirical realism and or transcendental idealism.

The ontological aspect of Pancasila indicates its acceptance on both subjective and objective investigations of a situation. As presented in chapter 7, this research provides evidence that the use of subjective methodologies as represented by the CSH and SSM are acceptable in the context of Pancasila. Also discussion in section 7.4 indicates that the use of VSD (see Appendix 4) is also acceptable in the context of Pancasila. While VSD is known as having objective characteristic (see table 3.3).

### 9.1.5 The axiology of Pancasila

The word axiology comes from the Greek *axia* (value/ worth) and *logia* (study). It attempts to uncover the value of something and in certain cases it involves aesthetics and ethics. The axiology of Pancasila discusses what kind of guidance given by Pancasila to value something and or one's work, such as for this research the MMA, SSM, CSH and Sipesmik models.

According to Notonagoro (1967, p.25) there are three categorical values that Pancasila is concerned:

- Material values include everything that is useful for human as a substance.
- Vital values include everything that is useful for human activities.
- Spiritual values include everything that is useful for human spirit. These can be categorised into three elements:
  - Truthfulness values that can be derived from human ratio, will and creation.
  - Aesthetical values that can be derived from human taste and aesthetics
  - Religious values that can be derived from God's law and will.

Axiology Pancasila evaluates something based on its material, vital and spiritual values. Since value is comparatives in nature therefore when practicing the axiology of Pancasila, it uses the values and goals of Pancasila as the performance measurement standard. As discussed in section 9.1.3 these values are divinity,

humanity, unity, communality and justness. The goals are the divinity to God, the just and civilized humanity, the unity of Indonesia (territorial and population aspects), the communality of the process of realising the social justice for the whole people of Indonesia.

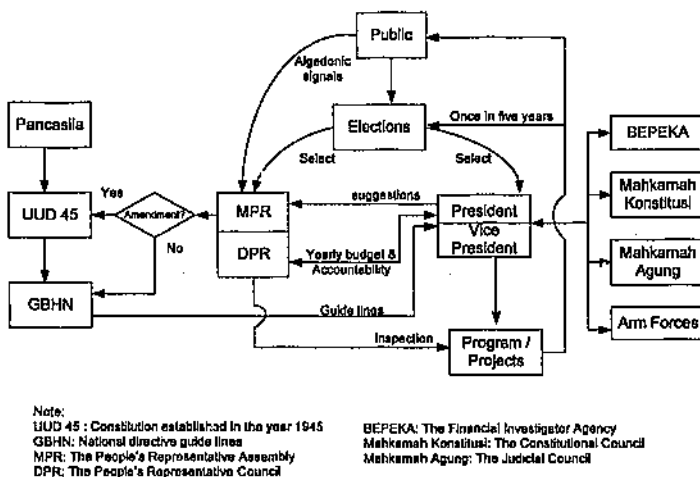
The axiological aspect of Pancasila signals that measuring the value of something including a plan or programme should consider material, vital and spiritual values. The latter should include truthfulness, aesthetical and religious values. These are indications of reasons why Sipesmik stakeholders represented by the respondents mostly accept that the viability of a model includes effectiveness, efficiency and efficacy that represent material and vital values, and equity, ethicality and elegance that represent spiritual values.

#### 9.1.6 The methodology of Pancasila

The word methodology comes from the Greek *methodos* (ways or means) (Tamburaka, 1995) and *logia* (study). Therefore methodology can be defined as a study of ways and means to achieve objectives. As discuss in section 9.1.1, the philosophical objective of Pancasila is to realise the harmony between the supernatural, social and natural elements. Therefore the methodology of Pancasila discusses ways and means that are needed to realise the harmony between the supernatural, social and natural elements.

Based on ontology Pancasila there are five entities that should be considered in realising the harmony of supernatural, social and natural elements. Those five entities are 'divinity', 'humanity', 'unity', 'communality', and 'justness'. As discuss in the section 9.1.2 that 'human' is the subject of Pancasila who should manage 'Indonesia' in a 'communality' way to realise social justice for the whole people of Indonesia. In executing his function 'human' should implement the acceptable transcendental and empirical knowledge in such a way that in realising the social justice for the whole people of Indonesia, the harmony between supernatural, social and natural elements should be secured.

This methodology is translated into a governmental framework in the UUD 1945, which is illustrated in figure 9.1.



**Figure 9.1 Governmental Framework of the Republic of Indonesia  
 Based on the UUD 45 after the fourth amendment in 2002**

Up to now the amendment process of the constitution is progressing. However the occurrence of some crucial points is due to the lack of comprehensive scenario or framework in amending it. Some of these crucial points are as follows:

- 1) Validity of MPR to amend the constitution is arguable (Iskandar, 2002) since the article (1.2) stating that the state's sovereignty is at the people and handed by the MPR, has been deleted.
- 2) No regulation that governs the validity of the amendment, especially when it is valid and how the transition is managed (*ibid*).
- 3) No comprehensive scenario demonstrating that the amendment has considered the dynamic environment (*ibid*). The lack of comprehensive scenario also become the concern of Mubyarto (2003c), who suspects that it causes some technical and conceptual faults such as:

- a. Three different terms are interchangeably used in the manuscript: *Kesejahteraan Sosial*, Social Welfare, *Kemakmuran Rakyat*, Public Prosperity, *Kesejahteraan Rakyat*, Public Welfare.
- b. The deletion of the explanation of article 33 caused the notion of democratic economy becomes blurred.
- c. Under judgment of the power of the public economy is due to the belief of capitalism – neo liberal economy.

The above evaluation indicates the need of a comprehensive model that includes as much views as possible, which can be used as framing out the thought to amend the constitution. In the figure 9.1, such a model is needed in the amendment deliberation, which can be developed by the MPR or suggested by the President.

## 9.2 The practice of Pancasila in Indonesia

As described in section 9.1.6 that UUD 1945 describes the framework for running the government of the Republic of Indonesia based on Pancasila methodology. This framework provides the basis that every law, regulation and policy established for running the country, should comply with Pancasila as the ideal basis. Before a law or regulation is formally established, a law or regulation should be approved by the *Mahkamah Konstitusi*<sup>3</sup>, constitution council, for its compliance to Pancasila. When it is at the implementation stage, the performance of a law or regulation is regularly evaluated toward the realisation of the values and goals held by Pancasila. This indicates that to be accepted and implemented in Indonesia, suggestions that affect large population and territory such as Sipesmik, they should be proved compatible with Pancasila. Especially if they regard to an establishment or reformation of laws and regulations, they should have the approval from the constitution council.

Within the presidential era of Suharto, the second president, Pancasila courses were organized for the whole people of Indonesia. These courses are also accompanied by a number of superficial practices of Pancasila such as displaying Pancasila in each household and strategic place. However due to its repressive characteristic (Souseno,

<sup>3</sup> UUD 1945's articles that govern the role of Constitution Council are 7A and 7B (UUD 1945 after the second amendment).



2000) these courses were suspended with the termination of Suharto from presidential office (Anwar, 1999). Despite of some failures with regard to the misuse of Pancasila in the past, positive thinkers have taken the initiative to sustain Pancasila values and goals. A number of Pancasila study centres are established such as the Pancasila Study Centre and the Economy Pancasila Study Centre have been established in Gadjah Mada University, Yogyakarta (see *ekonomipancasila* website). Similar research centres have also been established in a number of universities such as in Agricultural Institute of Bogor, and in Taman Siswa University, Yogyakarta. Up to now, Pancasila courses are obligatory for students. Pancasila hymns and marches have been created for stimulating sentimental feeling to Pancasila. Also, some religious rites are dedicated for the success of Pancasila.

All of these indicate that Pancasila has a deep grassroots within the people of Indonesia. Due to this, it was manipulated by some parties that resulted in totalitarian of the elites, and oppressions over the people. The affirmative result of the compatibility evaluation of systems thinking methodologies used in Indonesia, in the context of Pancasila, has a strategic value for steps that may lead avoid the misuse of Pancasila in the future (see section 9.1.6). Moreover history shows that the main benefit of practicing Pancasila for the state administration is the existence of an ideal from which policies and strategies can be developed. This is because it holds values to be respected and goals to be achieved. History shows that during the absence of an agreed ideal a chaos appeared and resulted in power seizures (Hariyono, 2003). Examples of this situation occurred between 1957 up to 1959 when a governmental crisis caused the establishment of a Presidential decree of the 5<sup>th</sup> of July, 1959 stating the revalidation of UUD 1945 including Pancasila.

### 9.3 Future prospect of Pancasila

Based on historical evaluation from 1945 to 2003, Pancasila methodology is not yet well implemented realise its values and goals however improvements in all aspect of Pancasila are on the way (Ibid, p .4), those are:

- Spiritual aspects are mainly based on the first principle that the special concern is on divinity values.

- Cultural aspects are mainly based on the second principle that the special concern is on humanity values.
- Political aspects are mainly based on the third principle that the special concern is on unity values.
- Social aspects are mainly based on the fourth principle that the special concern is on communality values.
- Economical aspects are mainly based on the fifth principle that special concern is on justness values.

Previous policies that are suspected by Hariyono (Ibid) as incompatible with Pancasila and create the rupture of public economy is the acceptance of foreign investments (The Law Number 1, Year 1967) that are liberal capitalistic and is combined with the practice of trickle down effects investment whose larger benefits come to the investors (conglomerates). (Ibid): Some phenomena that indicate the rupturing processes of national economy were reported in the MPR yearly meeting in 1993, however no special attention was taken by the parties responsible for (Mubyarto, 2003c). The suspected cause of this ignorance is the World Bank's yearly report 1993, illustrating the *East Asian Miracle*, which demonstrated the success of eight countries in the East Asia (including Indonesia) that were described as having "*Sustainable rapid growth with highly equal income distribution*". However the fact was that in Indonesia there was a great deviation of income between the 'rich' (conglomerates) and the poor (public). This ignorance resulted in unprepared situation for facing the 1997 crisis.

Five years after the crisis boom, there are policy makers who consider the crisis is only economical crisis, establishes policies that are also limited to macro economical aspects. However, the facts shown that there is a multi dimensional crisis (Mubyarto, 2003d), which needs to be handled in a systemic way (multi dimensional aspects). As discussed earlier that Pancasila suggests consider a situation from five aspects (spiritual, cultural, political, social and economical aspects) to realise a harmony between supernatural, social and natural elements.

That the above Pancasila suggestion is relevant to the fact reported by Sakerti<sup>4</sup>, on the way Indonesian copes with critical situations such as the 1997 crisis and its impact to family life. The practices may be different one another but their philosophical basis is the same: 'harmony between supernatural, social and natural elements'. These reports illustrate that Indonesians has special '*coping strategy*' in production, distribution and consumption, and '*survival strategy*'. There are various forms of strategy or attitude but among other<sup>5</sup>:

- (1) They view 1997 crisis as God's penance or warning to the country, due to faults in the past<sup>6</sup>;
- (2) Increase working hours, on the average of 25 hours more per week;
- (3) Work without payments; 1997 – 2000:
  - Women interviewed increase from 19.2% - 25,5%;
  - Men interviewed increase from 6.1% - 7.9%;
- (4) Rearrange consumption behavior and reschedule activities accordingly;
- (5) Ask richer relatives for help taking care of one or two member of the family;
- (6) Borrowing money from relatives without any guarantee and fee to cover up emergencies;
- (7) Mobilisation of assets to smooth out family's needs. Some of them take benefit of the pawnshop services.

The impacts of these strategies are great. Sakerti<sup>3</sup> reported that Indonesian economic development, especially public economy, is increasing with 3-4% per annum, since 2000 to 2002. A part to this report, the fact that Indonesian public economy is emerging is acknowledged by the World Bank, (1999, p.16) in its report as follows:

*The economic crisis has resulted in both negative and positive consequences for the Javanese. It has resulted in a rapid rise in prices of basic items which place them beyond the capacity of many poor people and has reduced employment opportunities in the formal sector. On the other hand, it has resulted in the*

<sup>4</sup> Sakerti is an abbreviation of Survei Aspek Kehidupan Rumah Tangga Indonesia (The Indonesia Family Life Survey) in 13 provinces in Indonesia, 10,000 family with 43,000 members were interviewed. They are four Sakertis UGM - RAND cooperation surveys: Sakerti 1 (1993), Sakerti 2 (1997), Sakerti 2+ (1998) that was designed to investigate the impact of 1997 crisis, and Sakerti 3 (2001).

<sup>5</sup> Summarised from Mubyarto (2002)

<sup>6</sup> This attitude reflects an acknowledgement of God's power over human life, based on which people sacrifice themselves for their beloved country through work hard and pray.

*emergence of many new small enterprises which had previously been destroyed by the economic monopolies and import of mass-produced commodities under the New Order.*

The above evaluation indicates that values held within Pancasila (divinity, humanity, unity, communality and justness) reveal from the real life of Indonesians. Its general terminology provides flexibilities of the term for accommodating the dynamic characteristic of the value that might change with time. This is relevant with the subjective view of Pancasila. Based on which the detail of Pancasila methodology may change based on subjective investigation on spiritual, cultural, political, social and economic aspects, in order to realise the harmonic relationships between these aspects.

The above reflection indicates relevancies with the result of this survey, especially that suggests the formation of natural morphological unit (see appendix 3), based on which the creation and maintenance of food sustainable supply should be managed. It appears that this research also concerns with the potencies of communality characteristic of the Indonesian for the creation and maintenance of economic productivity of natural morphological unit, which will become the initial power for the creation and maintenance of economic productivity of the country. Although this may become a signal of a contradictory situation to the approach used in this research, that believes on the whole is more than the collection of its part, however integration of natural unit morphologies that are economically developing will result in better situation than a collection of the similar elements. This kind of holistic may become the characteristic for Sipesmik a large project that does not only a large population (more than 225 millions) but also large territory (more than 17.000 islands) involve.

#### **9.4 The use of systems approach in the context of Pancasila**

Both systems approach and Pancasila provides investigator of a situation a framework of thought. For systems approach intervention on the investigated situation is to improve the situation into determined objectives (hard systems approach) or based on the views of the parties involved (soft systems approach). While Pancasila has a determined aim is for the creation and maintenance of the harmonic relationships

between supernatural, human and natural elements of the investigated world. This means that Pancasila methodology is comparable to hard systems approach, such as the system analysis and MBO, however the subjective characteristic of Pancasila that accepts transcendental and empirical knowledge to further detail the Pancasila methodology, indicate it is comparable with soft systems approach such as the SSM and CSH. This situation indicates that there are possibilities to use both hard and soft systems approaches in the context of Pancasila. The hard systems approach has been used to develop the Indonesia National Concept in Space (INCS) and its implementations. The soft systems approach has also been used to develop Sipesmik conceptual models. The following are evaluations on both the two applications of system approaches.

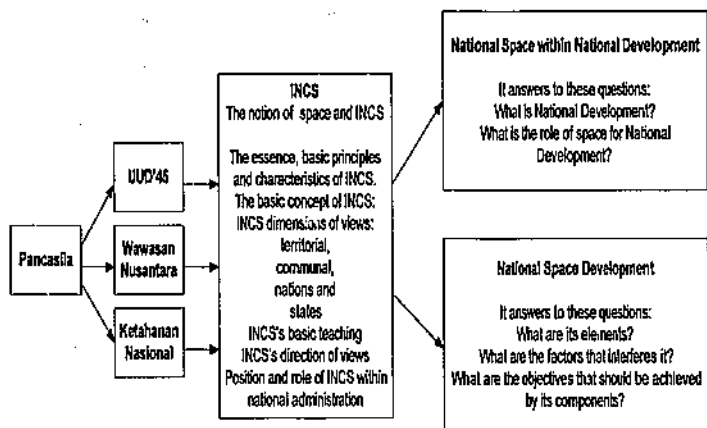
#### **9.4.1 Evaluation on the use of hard systems approach in Indonesia**

The hard systems approach has been used in Indonesia for establishing the INCS (see section 2.1) and its implementations including:

- The General Policies of Space Development, for 1999-2024.
- The International Cooperation Policies in Space
- The Basic Position of the Republic Indonesia Regarding the Geostationary Satellite Orbit.
- An Identification of Space Development Policies for 1999-2004

The use of this approach participated by 305 participants representing the involved parties on space activities in Indonesia, during the sessions of a two days Indonesia National Congress in Space, Jakarta 3-4 November 1998. A part to the participants of the congress there were two committees, the steering committee (27 members) and the operational committee (53 members) that worked in a marathon way for three months, using the hard system approach preparing the manuscripts of the above congress. Figure 3.1 illustrates the basic scheme of the hard systems approach used to develop the INCS and its derivative products. The contents of the manuscripts are high lighted in figure 9.2 and 9.3. The first figure shows the relationships between the Pancasila, INCS, National Development and National Space Development, where Pancasila becomes the sources of the INCS that illustrates the position of Space

National Development within the National Development as a whole. The latter figure illustrates that *Pancasila*, *UUD'45*, *Wawasan Nusantara* and *Ketahanan Nasional* become the foundation of the policies established for international cooperation in space and for geostationary satellite orbit. These schemes exemplify the deterministic character of the approach used.



**Note:**

*Pancasila*: the state philosophy of Indonesia that consist of five principles:

- (1) The belief in the one and only God
- (2) Just and civilized humanity
- (3) The unity of Indonesia
- (4) Democracy guided by the inner wisdom in the unanimity deliberations amongst representatives.
- (5) Social justice for the whole people of Indonesia

*UUD'45*: the Indonesia constitution established in the year 1945

*Wawasan Nusantara*: Indonesians' outlook on a country named Indonesia

*Ketahanan Nasional*: A doctrine regarding the national resilience of Indonesia

*INCS*: Indonesia National Concept on Space

**Figure 9.2 Links of Pancasila, INCS and the National Space Development**

(Source: Depanri, 1998a)

The following are some critiques regarding the use of hard systems approach in Indonesia based experiences gathered by the author, as the secretary of the executive committee, of the Indonesia National Congress in Space 1998 (Depanri, 1998a). Seen from the framework, the whole process of convening the congress can be judged as an implementation of hard system approach (see section 3.3) however the practice shows some characters of soft system approach. This combine situation can be seen from two stages as follows:

- a. During the assessment, the committee invited thirteen speakers to present views from various aspect of space i.e.

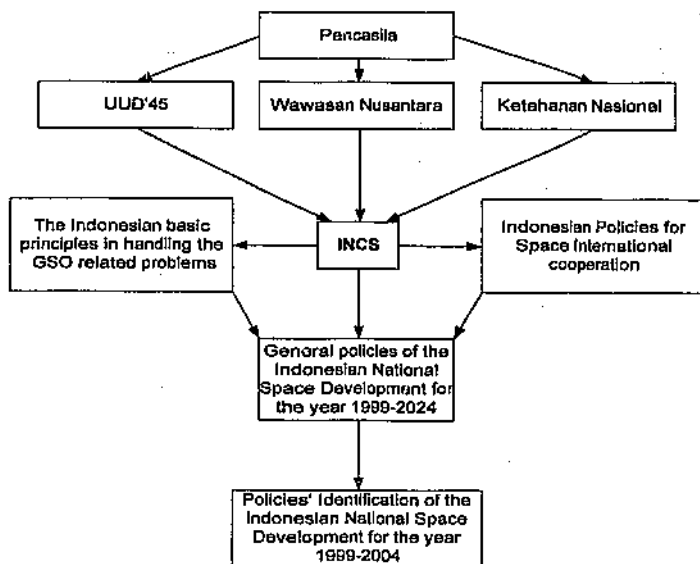
- (1) National space development in the context of *Wawasan Nusantara* and *Ketahanan Nasional*.
- (2) Political and juridical aspects of maritime continent of Indonesia
- (3) National development strategy for long term development in Indonesia (1999 – 2024).
- (4) Space application for global communication
- (5) Dominant factors within the international in twenty first century
- (6) The use of geostationary satellite orbit (GSO)<sup>7</sup> based on the International Telecommunication Union (ITU) Convention, for future national telecommunication of Indonesia.
- (7) Historical, legal and political aspects of GSO as a limited natural resource.
- (8) Centre of excellence for a space technology high education.
- (9) The role of strategic industry in support to space development within the second five years development plan of Indonesia.
- (10) National and regional (Asia and the Pacific) air transportation development, for the Second Five Years Development plan of Indonesia.
- (11) The role of Cakrawarta satellite for the success of technology and information development.
- (12) Cooperation of the government and private, in remote sensing service industry.
- (13) Being ready to enter the era of high resolution remote sensing satellite.

These presentations were designed to collect input to complete the necessary information for SWOT analysis (see figure 3.2). Discussions to detail the material presented and express views were arranged. These were free discussions that resemble to that of soft systems discussions when identifying the rich picture of an investigated situation.

- b. After the collection of input and SWOT analysis were completed, although most of the decisions were taken based on rational assessment, but some

<sup>7</sup> GSO is a geosynchronous orbit overlying the equator of the Earth at an altitude of around 36.000 km above the sea surface (Depanri, 1968b), where geostationary satellites appear to hang motionless over a fixed point at the equator plain (Davidoff, 2000).

points were compromised. An example of the compromised parts is the inclusion of natural resource as one of the components of the national space development (see section 2.1). Even though theoretically a component of system teleology should be a co-producer of the system's performance (Churchman, 1971, p.43), the natural resource was accepted as one of the component of the national space development.



Note:

UUD'45 is the constitution of the Republic of Indonesia established in the year 1945  
 Wawasan Nusantara is a worldview of Indonesians regarding a country named Indonesia  
 Ketahanan Nasional is a doctrine regarding the Indonesian national resilience.  
 INCS is the Indonesia National Concept on Space

**Figure 9.3 Indonesian Space Policies Derivation Lines from Pancasila**  
 (Source: Depanri, 1998b)

The above evaluation indicates that the hard systems approach is accepted in Indonesia to be used in handling large projects that have impacts on a large population and territory such as national space development projects. However it appears that



due to the large variety of views involved some compromise solutions soften the characteristic of the approach used.

#### **9.4.2 Evaluation on the use of the MMA**

##### **Theory**

Theoretically the MMA is a combination of systems thinking and action research. As an action research the MMA should complete the seven character of action research: social process, participatory, practical and collaborative, emancipatory, critical, recursive (reflective and dialectical) and having the aim of resulting both theoretical and practical knowledge (Kemmis and Taggart, 2003). To practice it in a large project, it was forced to select representations. This makes the social process, participatory and collaborative characters becoming less than perfect. Also the recursive character may not involve the whole population as ideally requested by an action research.

From the systems thinking context the TSI is chosen. According to Flood and Jackson (1991) TSI can be blamed as being a human centre investigation and pursue mainly the human well being interests. This is due to the assumption that human is superior over other orders of life and over all inanimate things. However, theoretically environment should become one of the stakeholders in the analysis. This makes TSI is judged as inappropriate for environmental issues. This theoretical matter is found in this research where nature is treated as one of a number of clients of Sipesmik. However, the presence of some respondents who are experts and lovers of environment aspects, some major strategies in environmental management are identified by this research. The warning given by Flood and Jackson (1991) concerning to theoretical negligence on gender aspect of TSI was also notified by one respondent of this research (510).

##### **Methodology**

Flood and Jackson (1991) indicate that methodologically TSI may be accused as having a whiff of contingency that insisted the creation of an assorted or eclectic

methodology that leads to the collection of incoherent, unorganized and even confusing of subjective data. Although there were certain points of views that can not be convoluted and included in the models such as that the viability of a model is already well represented by effectiveness and efficiency, and there is no need to regard the spirituality of the models. However most of the respondents agree that the viability of a model should be investigated from material, vital and spiritual values (as also inferentially requested by Pancasila) that are represented by effectiveness, efficiency, efficacy, equity, ethicality and elegancy. A part to some extreme views as such, generally the above accusation is irrelevant with the situation of this research.

### **Ideology**

It is ideal for critical systems thinking, a position that is chosen by the MMA (Hutchinson, 1997), that the system idea should be built based on:

- Human well being and emancipation
- Political consciousness, and
- Self reflective approach.

Therefore an openly declared emancipatory interest should become the starting point for the creation and maintenance of equal power and chances to satisfy personal needs within the system boundary. In this way the people will be liberated from dominance of other people and or forces that they do not currently control.

However the author believes that there is always something more powerful than people's power and other physical power, which interfere people's life and is unavoidable to them. This power causes that liberation will not the final way of solving a problematic situation. In that situation communality live of people such as that Pancasila suggests for the Indonesian, may help to consolidate peoples power to struggle within dynamic situation of the world. Operating a system's rule that the whole is more than the collection of the parts, the communality is the actualisation of the holistic power of the people that is believed to be more than the collection of the individual power of the people.

## Utility

Although some system thinkers may accused TSI as more philosophical than practical (Flood and Jackson, 1991), however its combination with action research in the framework of MMA, has made this combination philosophically comprehensive and practically trustworthy.

However, problem may arise when the project is a contractual job. The investigators do not belong to the stakeholders, however they should be involved in the investigated situation, some thinkers may suggest that the investigators should position themselves as facilitators or mediators that are value free. But the author thinks that it is impossible for them to be free from values of their own, when they are involved in the investigation and developing solutions. It happened in this research that the researcher involved in the situation, and has to judge for the modification of a question (question 3) during the interview (see section 8.1.2). The answers resulted from the original question were infertile that contrasts to that resulted from the altered one. Judging answers as fertile (fruitful) or infertile is not value free. It involved the investigator's expectation and or imagination that are full of values.

## 9.5 Summary

Some reflections regarding systematic philosophy of Pancasila provides theoretical evidence towards the affirmative results as presented in the previous chapters. Such as metaphysical evaluation of Pancasila provide theoretical evidence why human centred methods (such as SSM, CSH, IP, SAST and SODA) are acceptable in the context of Pancasila. The anthropological evaluation confirms that Pancasila is concerned with human as a subject as well as an object of intervention. This characteristic is relevant with action research, and provides the reason why the MMA, which is a combination of system thinking and action research, is likely to be acceptable in the context of Pancasila. The ontological evaluation provides further evidences that the affirmative results of this research is a signals that divinity, humanity, unity, communality and justness, are values that are respected by the respondents. The axiology evaluation provides evidence for the viability of the models can be accepted in the context of Pancasila.

The evaluation on the practice of Pancasila shows that Pancasila is deep rooted in Indonesians' lives. Regarding the use of Pancasila some parties are suspicious that Pancasila values and goals are in some cases manipulated. Also, they were not appropriately transformed into the Constitution, therefore the affirmative result of this research promises possible success for the use of systemic approaches to develop models as the basis for an integral and comprehensive amendment of the Constitution.

The evaluation presented above is concerned with the research result suggested to implement natural morphological unit as the basis to improve sustainable food supply in Indonesia. This can be seen as signals of a contradictory situation to the approach used in this research that believes on the whole is more than the collection of its part. It was expected that the integration of natural morphological units that are economically developing will result in better situation than a collection of the similar elements.

## Chapter 10

### CONCLUSIONS AND FUTURE RESEARCH

#### 10.0 General Overview

This chapter was designed to present some assessments, reflections and conclusions on the results of the research. Section 10.1 demonstrates some assessments that practice self dialectical processes to examine the survivability of problematic solutions resulting by this research. Section 10.2 illustrates some reflections regarding what this research gives to systems approach and to Sipesmik and what are the impacts to their futures.

Based on the research results, self dialectical processes, and reflections some conclusions were drawn and are presented in section 10.3. All of these provide foundations for the idea of future research topics that are indicated in section 10.4. This chapter ends with section 10.5 that presents some concluding remarks.

#### 10.1 Assessment

This section explains some (self) dialectical processes (Churchman, 1979) and examines the results of the research by identifying some possible counter views to the result and establishing some rational argumentations to see the survivability of the idea of research result. Based on this framework, there are at least seven arguments against this result.

##### 10.1.1 The models are social system models

Based on the autopoietic theory (Maturana and Varela, 1992), a human being is a self producing (autopoietic) system that acts to maintain its internal organization when it interacts with its (both social and physical) environment. The structure of a system is continuously changing, although within its organization accepted condition. Including

to the structure of a human autopoietic system (Maturana, 1981) is the emotion based on which conversation (interaction with the human factors of the environment) with other human remains engaged or ended. In this context, a **shared common emotion among people or mutual respect for 'other' as an equally valid human being is defined as 'love'** by Maturana (1988a, b). Unfortunately, love is not generally held out to all people at all times (Cordoba et al, 2000), it is therefore interaction may remain engaged or ended, depend on the validity of the shared common emotion or mutual respect.

Sipesmik conceptual models are models of a social system. Based on the above theory of Maturana (1988a, b) a social system works if there is love among the members of the system. It is love that makes the interactions within a system to happen. However the presence of love among all Sipesmik's members is arguable. This absence means that Sipesmik is not a social system hence the models will never work as it was designed.

However, this research indicates that all respondents inferentially accept the values and goals held within Pancasila as theirs (see section 7.3), which shows there are common values and goals among them. These reasonably become initial assets for love, since love involves emotion and reason, in interactions the braiding of them (Cordoba et al, 2000) helps specify 'who is the other' as an equally valid human being. In this context, the common values and goals can be used as the foundation for reasoning, but still questionable about emotion. As the models are a result of a combination of systems thinking and action research they should become a part of an improvement process, including that of the realisation of 'love' among the member of Sipesmik.

The autopoiesis theory (Maturana, 1988a) describes that environment may generate perturbations that may or may not be inward as meaningful information by a human being. It will become meaningful if the personal internal structure allows it to be received as such, and based on which the person react the perturbation. However, as a social being, human does not only act but also strive to coordinate his or her actions with others where language helps in this interaction process. Although language is still at rational domains, but it interplays with emotion that makes individuals may

switch from one 'rationality' to another (Cordoba et al, 2000). It is therefore appeals (language usages, including models) to peoples' emotion can have powerful effects in changing their way of thinking (Bilson, 1997).

The Sipesmik conceptual models are not only concerned with the people's way of thinking but social change as a whole, therefore they are also concerned with peoples' emotion. To better understand this concern, the author borrows from the work of Bolton (2003) regarding emotion management, who introduces a typology of workplace emotion that was developed based on a multidimensional approach. He distinguishes four types of emotion management as follows:

- Pecuniary emotion management is concerned with the use of commercial use of emotion in an organization;
- Presentational emotion management recognizes that social actors bring the necessary skills into the organization through a lifetime's training in the presentation of self;
- Prescriptive emotion management stipulates all detail of an employee should emotionally behave, but not necessarily for commercial gain, and
- Philanthropic emotion management put on view that an organizational actor in the workplace, as a social being should give more than that of organizational prescription.

The distinction between these types is illustrated by Bolton (2003, p.19) in a table as presented in Table 10.1. Seen from this typology, Sipesmik conceptual models in general can be categorised as implementing the philanthropic emotion management which focus on spiritual and social (professional) satisfaction, however they are also concerned in material satisfaction. This can be seen from indicators of success that should be monitored within Sipesmik process of development. The summary of these indicators can be seen in table 10.2. This table shows that all Sipesmik tasks (subsystems 1 to 8) are designed to result in spiritual, material, social satisfaction that triggers peoples' emotion to interact with others.

**Table 10.1 A Typology of Emotion Management**

(Source: Bolton, 2003, p.19)

	<b>Pecuniary</b>	<b>Presentational</b>	<b>Prescriptive</b>	<b>Philanthropic</b>
<b>Feeling rules</b>	Commercial	Professional Organizational	Social	Social
<b>Associated motivations</b>	Materialist	Altruism Status Materialist	Ontological security	Gift
<b>Performance</b>	Cynical Compliance	Cynical/sincere Consent/ commitment	Sincere/cynical Commitment/ consent	Sincere Commitment
<b>Identity</b>	Self imposed	Professional/ self	Self	Self
<b>Consequences</b>	Alienation Contradiction Conflict Resistance	Professional identity Contradiction	Stability	Stability Satisfaction

**Table 10.2 Summary of Indicators of Success of Sipesmik Tasks**

<b>Sipesmik Tasks</b>	<b>Indicators of success</b>	<b>Comment</b>
<b>Subsystem 1:</b> Manage space science and technology development	Number of patent and copy right Number of interim report Number and types of space product produced and sold	Material and professional satisfaction
<b>Subsystem 2:</b> Increase and Maintain Sustainable Foods Supply	Food demand fulfilment level High definition level of healthy foods demand Availability of healthy food products National and local capability level of producing healthy foods Accuracy level of natural resources data bases	Material and professional satisfaction



<b>Subsystem 3</b> Manage Natural Environment	Ground and sea fertility Waste production Flora and fauna diversity Groundwater quality Stream and river health Preserved habitat Vegetation regrowth Orbital material, spacecraft, natural and manmade space debris	Material and professional satisfaction
<b>Subsystem 4</b> Increase and Maintain Economic Productivity	Economic productivity level	Material and professional satisfaction
<b>Subsystem 5</b> Change Socio Cultural Practice	Number of suggestion and complaints Sipesmik acceptance level Level of community support Community participation level Level of changing habit (farming fishing, menu) Level of procedural, distributive and interactional justice	Material and professional satisfaction
<b>Subsystem 6</b> Regulate the Sipesmik	Number of legal document done and assessed Number of legal case solved (disputes and enforcements) Level of legal understanding of Sipesmik participants Number of international laws and regulations ratified and accessed Number of laws and regulations to be respected in running the Sipesmik Number of laws and regulations implementations guidance established	Material and professional satisfaction

	Level of procedural, distributive and interactional justice.	
Subsystem 7 Change Institutional Practice	Level of funding and resource sharing Participation level Sipesmik knowledge levels of participants	Material and professional satisfaction
Subsystem 8 Local Government Participation	Number of Project supported by Local Governments The impact of Sipesmik on PAD (Growth Local Product) Local Sustainable Development Indicators	Material, and professional satisfaction

### 10.1.2 Sipesmik conceptual models are an intuitive product

As Checkland (1981) corroborates that the stage between root-definition to conceptual models is the most difficult part and is an 'artistic' piece within SSM. In line with this idea, Patching (1990) confirms that this stage is practically undertaken intuitively. Due to its intuitive characteristic, it is arguable that based on a root-definition, two system designers who works independently one to another, may result in two similar high accurate conceptual models. Due to this, Sipesmik conceptual models may also be judged as an intuitive product, whose accuracy is questionable.

To evaluate this, the author borrows the work of Cross and Turk (1996) who have created a method for establishing high accuracy conceptual models for SSM by using a taxonomy for cognitive work analysis created by Rasmussen *et al* (1990). The basic framework of this method is that system development should include development of the process and the structure of the system's organization, which each of them should be based on consideration of the abilities and personal desires of people within the organisation. The process development should focus on:

- Means-ends process that considers values, goals and constraints,
- Tasks situation, a set of problem that should be solved,

- Cognitive tasks, information processing jobs,
- Strategies, a consistent reasoning approach

The structure development should includes

- Role allocation that defines organization of work tasks
- Social structure that defines management organization with reference to social values
- Works preferences that identifies individual levels of expertise and desire

Also Cross and Turk (1996) adopt Rasmussen and Pejtersen's (1993, p. 6) criterion of a work system that should consist of:

*.....elements in cause effect chains according to their individual output and input characteristics so as to have the intended overall effect.....*

Assuming that the above method proved results in high accuracy conceptual models, if the models are in accord with this method they also have high accuracy level. Based on this assumption an inquiry can be started from Rasmussen and Pejtersen's criterion above. The Root Definition (figure 5.1) and the Overall Tasks Model (figure 6.3) demonstrate that all components within the Sipesmik are integrated to perform an overall effect: 'the creation and maintenance of sustainable food supply with the use of space technology and community involvement'. The Root Definition displays the structure and general process of achieving the objective. The general structure is shown by owners, executors and clients, including allocation of roles for each of them. The general process is shown by establishing tasks, monitoring and control of the tasks using an agreed performance standard. Further detail regarding the tasks is displayed by the Overall Tasks Model, where means-ends are detailed through tasks situation and cognitive tasks. Both of them are interconnected, and become a network run by the executors to implement the strategy that is creating and maintaining sustainable food supply by the use of space technology and community involvement. A part to the conceptual models, figure 9 of appendix 5 displays the causality relationship between system components that fulfil the criteria for an organization as a work system.

### 10.1.3 Knowledge imposition and validity problems

According to Mejia (2001) TSI and CSH theoretically have problems of knowledge imposition and validity of argument. He blames that the use of CSH often results in social system designs that are unjustified, since it combines views of experts and laypersons, which theoretically will result in a discursive imbalance that according to Kantian philosophy involves synthetic *a priori* judgments. Even though they are indispensable for reasoning, they can not be justified, as opposed to synthetic *a posteriori* judgments that are empirically justifiable. He also judges that the TSI is responsible for similar failures within designed social systems, due to different rationales as sources of critical questioning and reflection. However, after having investigated some possible solutions, Mejia (2001) concluded that there is no convincing problems' solving key yet found incorporating the CSH and TSI failure cases. Even though some strategies are suggested to prevent the occurrence of the knowledge imposition such as illustrated in the citation as follows (*Ibid*, p.24):

*.....in general, the more open, and therefore less imposing the requirements set by critical approach--- in term of claims to be held, questions to be asked, comparisons to be made, etc--- for judging someone critical, the lesser the extent to which that approach will impose a reading of reality; but also at the same time the larger the extent to which other particular reading of reality --- e.g. espoused by oppressors--- may be imposed or their imposition will be perpetuated. When put against the requirements set by the problem of pedagogy, then anything dealing with validity will potentially be a source of imposition; but it is only by dealing with validity that the imposition of other forms of knowledge can be prevented.*

Aware of possible knowledge imposition faced by the respondents in comprehending the twelve categories of CSH, this research is completed by a strategy that is implemented according to respondents' understanding of those categories (see section 4.3). This strategy is encapsulated in the form of 'engagement process' that indicates a contradictory position to Ulrich's (1983, p.306) statements as follows:

*...no expertise or theoretical knowledge is required to comprehend and to demonstrate that this is so. The necessity of boundary judgments can be intuitively grasped by every layman ...*

However this research was also designed to repudiate Mejia (2001, p 26) statement cited as follows:

*.... even if the prevention of knowledge imposition is successful, a good practical solution may not actually be achieved, and the affected may not even be consulted...*

The researcher does not claim that the Sipesmik conceptual models are good practical solution but the respondents did (see chapter 7).

#### **10.1.4 The models are not perfect**

The models are systemic thinking models, which resulted from the understanding of the designer about respondents' views on the investigated situation. They were designed as perfect as possible, however it is the nature of a model that epistemologically it will never be as perfect as the reality it represents. Since a model is finite, whilst reality is infinite. Due to this characteristic, therefore the models are completed with a mechanism that makes the designed system is able of self improved.

The root definition indicates that the client has the right to improve the measurement's standard, and the executor has the right to submit proposal for improvement of such standard. However, the qualification of such improvement may still be in the framework for retaining and maintaining the models (Bustard et al, 1999). This situation can be seen as retaining the status quo by practicing subjective regulation (SSM). However, within the framework of MMA, this research should also be critical, where subjective idealistic changes should have the opportunity to be in action. At the establishment stage, the emancipatory and critical aspects are summarised within the use of CSH's list of questions. At the implementation stage, it can be seen from the establishment of a link for algedonic signals, from lower structures to decision makers (see Appendix 3). A part to this improvement mechanism, the models them selves is adaptive to emancipatory and critical aspect, since there is an overlap membership between owners, executors and clients. One may use his or her right as a client, an excutor or owner to practice emancipatory or critical action.

### **10.2.5 Inconsistent with the established practice**

The established practice is a top down approach. This is shown by the structure of law and regulation manuscripts that a decision is made after having considered the Pancasila and UUD'45. The people's representation is arranged through a national election (see figure 8.1). The existing mechanism indicates that the people's representatives are representation of political parties. Their candidacies and selections are based on their participations to political party. This makes them as representatives of political parties. Therefore in the context of the representation, whether they deliver people's views and want is arguable.

The inclusion of systemic approach within the national representation framework insists provide representatives with people's views and wants. In this situation, a representative has no liberty to act that is conflict with the wills and wants of the people she or he represents. This situation may be unfavourable to political elites.

### **10.1.6 The population is not geographically well represented by the samples**

All samples lives in Java, therefore they are not perfect geographica representations of the population of Sipsamk stakeholders and non stakeholders. That number may achieve 225 millions of people whose domiciles may spread over the whole country. Also, the samples do not appropriately represent those who are in the first, second and third waves of development that scatter within the Indonesian territory<sup>1</sup>.

These conditions become acceptable risks for the researcher by selecting the dynamic theory of stakeholders as the basis for choosing samples. However the main purpose of selecting samples is to collect holistic views that are achieved when each of the possible philosophical stances is represented. This research shows that all possible philosophical stances are represented by the samples. Therefore this situation fulfils the criteria used for a systemic approach.

<sup>1</sup> Those who are classified as in the 'first wave' can be represented by the settled shifting cultivators who spread over 20 among 26 provinces (FPA, 2001) especially in Sumatra, Kalimantan and Irian Jaya that the shifting cultivation area in 1990 reached almost 27 million Ha (Sunderlin, 1998). Those who are in the 'second and third waves' are scattered over Jawa and Bali and in some cities in other islands.

## 10.2 Reflection

This reflection uncovers three experiences gathered by this research, which are considered by the author as specific. The first is experiences relating to overcoming knowledge imposition and invalid argument. The second is concerned with contradiction of interest between systems thinking and action research. The third overcomes the worry of being failed.

### 10.2.1 Experience with knowledge imposition and invalid argument

This research provides indications that systemic approaches can be used not only in western developed countries where they were developed, but they can also be used in eastern developing countries. In their state of origine, their usage may be hindered by the involvement of laymen that cause interactions' tension due to knowledge imposition and validity of argument (Mejia, 2001). A similar situation is occur in eastern world, but is convoluted with some cultural factors such as language, tradition and history.

For illustration, an example can be the concept of a viable system. A respondent said that the key criterion for a system to be viable is *'Manunggaling kawulo lawan gustine'*. *Manunggaling* which means unification, *kawulo* means servant, common people, *lawan* is with, and *gustine* means lord, master or who holds the power over common people or servant. Therefore the above expression can be translated as 'unification between common people and his master or the elites'. But actually this is not the case this respondent would like to say that a system is viable when *'everyone behaves like God, such as practices equity since God treats equally everyone'*. Regarding this, a rationalist may say: *'How an earth did he gets that'*. While the respondent by stating the above he merely would like to stress that a viable system is an ideal situation that will never be in real live, however *'we have to go there, although what is achievable is not perfect'*.

Concerning *Manunggaling kawulo lawan gustine*, it can be read in Negoro (2003, p.17) who writes them as *Manunggaling Kawulo Gusti* and translates them as *'the*

*spiritual unity of the man and God, the creature and the creator*', also in Handoyo (1991) who deliberates 'Javanese Mystical Union & A Christian Response' that demonstrates that *Kawulo-Gusti paradigm* has a large socio cultural implication in Javanese life within family, community and social relation. In social relation, the latter writer came to a point that this paradigm leads the Javanese practices '*musyawarah*' (consultation deliberation) and '*mufakat*' (consensus) in decision making process. He reasons that a leader in Javanese community is accepted as the representation of God, therefore a leader has the responsibility to maintain the harmonious relationship within the community. When a consensus fails, a leader who does not have the authority to decide based on the majority, because it violates the '*mufakat*', should announce a recess for the disagreement parties can arrange a compromise before the leader publicly announce the agreement. Details about *Manunggaling Kawulo Gusti* can also be read in Soeseno (1984) and Zoetmulder (1990).

The above reflection implies that practicing systemic approaches should consider socio cultural and local conditions. When there is an indication of the presence of knowledge imposition and or problem of validity of argument, it is the role of facilitator or mediator to make the interaction run with full of comprehension. If it is necessary invite resource person to clarify the conflictive situation.

The above reflection also indicates that basically mutual respect among people within the investigated situation is not necessarily doubted. But trigger action such as an engagement process is indispensable. It should be noted that at the opening of the interview, this respondent said that he did not know the answer to the interview questions, and asked to select other respondent to substitute him. However, an engagement process lead the interview becoming a free discussion and based on which his answers can be formulated. This situation indicates that an appropriate engagement process may be used to diminish tension that may occur during interview. Beside an engagement process may also be used to identify the presence of knowledge imposition between interview and interviewee. If an interviewer finds a strange argument that might be invalid, the reflection above suggests to consult valid references or resource person to better understand the argument.



### **10.2.2 Contradiction of interest between systems thinking and action research**

This research indicates that the validity of the solutions developed by the use of a systemic approach should be tested based on theoretical and knowledge judgments. The theoretical judgment should be done by the researcher (investigator) and the other should be executed by the participants of the system.

As a consequence of practicing action research, the respondents of this research have the right to know everything about the research, including that of theoretical evaluation of the models. At the models validation interview, after having heard a presentation on theoretical viability of the models, the respondents give their judgment on the models. This situation may be judged as imposing the investigator's view to the respondents, which is irrelevant with holistic characteristic of the method used. However, it is compulsory for action research that takes important on knowledge generation and distribution to all members.

### **10.2.3 Worry of failure**

According to Watson and Smith (1996) sometimes systems studies fail because for example there is:

- a mismatch in the expectations of clients and problem solvers;
- an overemphasis on product (report) and less attention on the study process; and
- ignorance about the development of a learning organization.

Indications of a mismatch in expectations of the beneficiaries of this research and the researcher can be seen from respondents' comment as follows:

- The Sipesmik conceptual models do not yet give the more structured picture of Sipesmik, its time scheduling, resources needed and other details (101)
- Sipesmik conceptual models must be valuable for implementation in the real world not just a concept (304)
- This is very theoretical for me as practical person and too difficult for implementation (504)

- Sipesmik conceptual models should not be limited to sustainable food supply, but sustainable development at large ..... and should also consider gender aspect (510)

In action research, participants are the problem solvers, therefore the above comments should be seen as inputs for further improvements. In general, the response for the above comments will automatically be generated at the implementation stage. Regarding the need to implement different scoping, not 'sustainable food supply' but 'sustainable development at large' and to consider gender aspects, these can be input for further process of the establishment of Sipesmik.

Since it is Doctoral research, it can be seen as having an overemphasis on the product (thesis), and having less concern on the process of developing interactions between participants. The latter is reasonably beyond the scope of this research, since it will become the concern of the beneficiaries of this research, who implement the concept and consider inputs collected by this research. Also, this research is concerned with developing a framework that Sipesmik should be a learning organization, based on which self improvement will happen during the life of the organization. It is therefore within the organization of Sipesmik there is a recursive mechanism that allows the organization to improve itself (see Appendix 3).

### 10.3 Conclusion

Although it was thought that cultural background might prohibit this investigation it, appears in general that at the philosophical level the Indonesian cultural background is similar to those of the West. This might be a possible reason of the acceptance of both mechanical and mutual causality (see section 2. 4) so that systemic approaches can be seen as a partner of Pancasila at the praxis level, as part of a continuous flux (Caceres, 1998) in Indonesians' live.

There were indications that the refurbished Multi Methodological Approach (MMA) was reasonably appropriate to handle the problematic situation of a large project such as the Sipesmik. The process of engaging the socio cultural life of the investigated situation provided the investigator a better understanding some of the interviewee's

'unique' arguments (see section 9.4) and the use of some local proverbs in the engagement process of the respondents helped them better participate in the research. This process successfully eliminated the possible occurrence of tension caused by knowledge imposition and invalid arguments.

The selection of respondents can also be considered appropriate as it resulted in a systemic representation. Apart from the completeness of all types of stakeholder and non stakeholder (see table 4.2), they also included the four possible philosophical stance of a person (see Appendix 1). Moreover each of the three waves of Toffler's economic developments had some manifestations. Those who were involved in space industry services (remote sensing and telecommunication) can be seen as the third wave representation, those who were involved in industry of mass production, might represent those who were at the second wave, and the fishers and farmers can be expected to represent those who were at the first wave stage (see table 4.1).

As compared to the work of Hutchinson (1997), there are differences in the desired viability measurement, the previous used five categories effectiveness, efficiency, efficacy, ethicality and elegance. This research used all of these five categories plus one category equity that was derived from Pancasila's values. It still needs further investigation whether this difference caused the inclusion of 'interactional justice' into the indicator of success in the Sipesmik. It should be noted that this indicator was absent in Hutchinson (1997). However, the approach taken is similar to that of Hutchinson (*ibid*), which is at the 'hard-end' of SSM. This can be seen from the establishment of models as the suggested solutions of the investigated problems (see Chapter 5 and 6).

The models evaluation or testing using system's theory and Pancasila helped achieve the investigator's high confidence on the models, and completed the necessary information commonly required by the respondents before the knowledge judgment was taken.

The results indicated that the models produced were largely accepted by the respondents as the proper representation of their views. There were also indications showing that systemic approaches can be used to transform Pancasila values and goals

into realistic and acceptable actions. Therefore it appeared to be fruitful to use systemic approaches to develop models that can be used as the basis for an integral and comprehensive amendment of the Indonesian constitution that now is on public debate. This is illuminating, as intuitively it would appear to be prone to failure to use inclusive, non-power dependent methodologies in a hierarchically conscious society, especially when the survey sample included participants as diverse as an army general and a local fisherman.

#### 10.4 Future research

This research demonstrates that systemic approaches can be used to define solutions of a problematic situation in a project that involves large number of stakeholders and large territory in Indonesia. Evidence shows that the solutions that are compatible to Pancasila and are acceptable to the stakeholders. This research also indicates that systemic approaches can be used to synthesise the high levels goals and translate Pancasila's values and goals into realistic and acceptable actions. However a theoretical negligence of the methodology used, concerning the gender aspect, was warned by a respondent (510). This warning is in line with Flood and Jackson's, (1991, p.242) notification on the TSI that it does not yet considered feminist aspects. Therefore this may become a challenge for future research to improve the MMA, a combination of TSI and action research, with a concern on feminist aspect of a problematic situation.

This research has affirmed that a systemic approach can be used to transform Pancasila values and goals into realistic and acceptable actions. While UUD'45 should be a transformation of Pancasila principles into a constitution that is a basic legal framework in running a country, based on which laws, regulations and policies can be established. Then the questions are:

- Can systemic approaches be used to develop Pancasila's transformation models that can be used as the basis for an integral and comprehensive amendment of the Indonesian constitution (UUD'45)?
- Will the models resulted in this context be acceptable for the public?

When the 'models' resulted in this context is acceptable for the public, thus it can be used as the basis for an integral and comprehensive amendment of the UUD 45.

### **10.5 Concluding remarks**

This research accepts the fact that systems thinking has relied on the concept of emergence to prop up its concept of wholes (Hutchinson and Warren, 2003). This can be seen in this research by accepting a traditional parable 'the elephant and the blind men' (see section 3.3). The wholeness characteristic of the investigated situation is still 'reductionist' as it is only the sum of 'the blind men' caress reports. Although 'the blind men' were selected from those who come from various stakeholders' types and non stakeholders, as this research accepts the dynamic theory of stakeholders (Mitchell, 1997). However the reductionist characteristic is still present. The change of status of stakeholder roles that cause the change of person's view, confirms this reductionist characteristic among 50 respondents (see section 8.3).

Also this research practices a theory that can only be justified by a belief in something higher than the physical and observable world (Hutchinson and Warren, 2003). This can be seen from the guarantee of the effectiveness and efficiency of the designed system, which are wisdom and hope. Wisdom is defined as thought combined with a concern for ethics (Churchman, 1982). Hope is the spiritual belief in an ethical future (Churchman, 1997), which is certainly higher than the physical and observable world. Practicing this theory, the researcher is aware of the danger of lost credibility of this research when one does not accept the spirituality of the argument.

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## **APPENDIX 1**

**Sample of Letter of Request for Interview,  
p. 307 - 308**

**Interview Data: 50 respondents,  
p. 309 - 460**

**Sample of Letter of Request for Interview**

Ref:

For

**Micro Satellite survey**

Date:

Dear Sir/Madam,

Herewith I would like to inform you that for science and technology development I have been given the honor to design and execute a research project entitled: *(Compatibility of a Western Systemic Approach for handling Complex, Pluralist and Coercive Problems in Developing Countries - A case study of Micro Satellite Development in Indonesia)*.

This research requires your participation and support that consist of two phases: **Interview** and **models validation**. At the interview you will be questioned regarding your understanding and expectation concerning micro satellite development in Indonesia. Together with other respondents', your perceptions and views will be processed as the basis for developing a purposive system models that will be identified as Sipesmik Conceptual Models. After having completed these models will be introduced to all respondents, and ask for validation. For this purpose I would like to get your approval for an interview at your premise on

Day:

Date:

Hour:

Address:

For your information a list of questions is attached to this request. I do hope that the above schedule will be expedient for you. However, please feel free to reschedule for your convenience. The following information may of benefit for such rearrangement:

Office: 021-327982

House: 021-7972858

Mobile phone: 0816-914341

Email: [asudibyo@student.ecu.edu.au](mailto:asudibyo@student.ecu.edu.au)

I look forward to seeing you at your premise. In the meantime, if you have any queries regarding this research project, please contact me at the above addresses.

Yours sincerely

Alexander Sudibyo  
Researcher of LAPAN



## THE LIST OF QUESTIONS FOR SIPESMIK INVESTIGATION

Sipesmik is the Indonesia system for developing micro satellite  
Sipesmik = Sistem Indonesia Pengembangan Satelit Mikro

### Question 1.

What is your underlying **philosophical stance** for investigating the Sipesmik, for example:

- a. Cost benefit analysis is capable to show the economic value of an action program, therefore each action program of Sipesmik shall accomplish an economically acceptable cost benefit ratio.
- b. Although Sipesmik is a research activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security.
- c. Cooperative way of managing Sipesmik could guarantee the practice of open management and the use of micro satellite system, which is limited for peaceful purposes especially for preserving the nature.
- d. Why develop our own satellite, global space market provide choices so that we can choose based on our own criteria that include especially preserving our nature through minimum release of manmade debris in space.

### Question 2

- a. Who is / ought to be :
  - i) The beneficiaries of the Sipesmik process?
  - ii) The decision makers in the Sipesmik process?
  - iii) The planner in the Sipesmik process?
  - iv) The experts used in the Sipesmik process?
  - v) The representative of those affected by Sipesmik?
- b. What conditions are/ are not controlled by the decision maker?
- c. What are/ought to be the constraints on the decision maker?
- d. Who has the power to ensure success of Sipesmik?
- e. Are those affected by Sipesmik allowed to take their fate into their own hands despite the experts? Should they be allowed to?

### Question 3

Based on your (life) experience, would you mind telling me what criteria / formula do you use to measure **efficiency, effectiveness, efficacy** (case of use and implementation), **equity, ethicality and elegance** of a Sipesmik plan?

## INTERVIEW DATA (ID)

ID101

**Answer of question 1:** *"Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security".*

**Answer of question 2:**

- a.i** The beneficiaries are: *satellite scientists,*  
The 'ought to be' beneficiaries are: *governaent agencies, general population especially farmers and fishermen, present and future generation. General population especially fishermen and farmers, Present & future generation,*
- a.ii** The decision makers are: *government (executive and legislative)*  
The 'ought to be' decision makers are: *President, Minister for research and technology, Lapa:, government agencies, local governments, investors/ shareholders, professional associations and business associations.*
- a.iii** The planners are: *executive (Lapan, Bappenas and Dept. of Finance)*  
The 'ought to be' planners are: *Depanri/Lapan, agencies (government & private), industries (government & private), local government, researchers, Depanri/Lapan, Agencies (government & private), Industries (government & private), Local government, Researcher,*
- a.iv** The experts used are: *space science and technology experts*  
The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.vi** The representatives of the effected parties are: *local governments*  
The 'ought to be' representatives of the effected parties are: *Consumer Institute of Indonesia, Local Governments, qualified advocacy organization*
- b.** Conditions that are controlled by decision makers are: *policies*  
Conditions that are not controlled by decision makers: *public participations*
- c.** The constraints on the decision makers are: *laws and regulations*  
The 'ought to be' constraints on the decision makers are: *national and international laws and regulations, international community behavior, mega trends (global market, free trade, GATT), budget limitation,*
- d.** The power to ensure success of Sipesmik is held by: *the Government (executive and legislative)*

- e. Yes those who are affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes they should be allowed to.

### Question 3

- Efficiency: *Has the character of an effective plan with an appropriate monitoring and control system with continuously improved performance standards*
- Effectiveness: *Has (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s)*
- Efficacy: *Open to resource sharing and out sourcing*
- Equity: *Provides all parties equal access to: information, science and technology, resources, market and decision making*
- Ethicality: *Conforms to general principle of ethics*
- Elegancy: *Aesthetical, attractive and challenging to increase/maintain security and prosperity of the general population*

### Comments and suggestions

1. *Why micro satellite, why not just satellite, so there will be open choices?*
2. *It should fulfill the need of general population especially farmers and fishermen*
3. *Its investment should be generated mainly from the government*
4. *It should optimally include the existing facilities*
5. *Due to its limited of in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation,*
6. *Please consider Pancasila as a 'genetivus-subyektivus' in the investigation of Sipesmik.*
7. *Sipesmik should be consistent, coherent and in correspondence with Pancasila.*
8. *Please consider to include in its tasks: 'increase and maintain the dynamics of regulating the system'*

**Answer of question 1:** *"Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security".*

**Answer of question 2:**

- a.i The beneficiaries are: *satellite scientists*,  
The 'ought to be' beneficiaries are: *government agencies, general population especially farmers and fishermen, present and future generation. Industry Science and technology community, General population especially fishermen and farmers, Present & future generation,*
- a.ii The decision makers are: *government (executive and legislative)*  
The 'ought to be' decision makers are: *President, Minister for research and technology, Lapan, government agencies, local governments, government central and local (legislative & executive) professional associations and business associations.*
- a.iii The planners are: *executive (Lapan, Bappenas and Dept. of Finance)*  
The 'ought to be' planners are: *Depanri/Lapan, agencies (government & private), industries (government & private), local government, researchers, Depanri/Lapan, Agencies (government & private), Industries (government & private), Local government, Researcher,*
- a.iv The experts used are: *space science and technology experts*  
The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.vi The representatives of the effected parties are: *local governments*  
The 'ought to be' representatives of the effected parties are: *Consumer Institute of Indonesia, Local Governments, qualified advocacy organization*
- b. Conditions that are controlled by decision makers are: *policies*  
Conditions that are not controlled by decision makers: *public participations, national commitment on Sipesmik,*
- c. The constraints on the decision makers are: *laws and regulations*  
The 'ought to be' constraints on the decision makers are: *national and international laws and regulations, international community behavior, mega*

*trends (global market, free trade, GATT), budget limitation, the lack of national commitment*

- d. *The power to ensure success of Sipesmik is held by: the Government (executive and legislative)*
- e. *Yes those who are affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes they should be allowed to.*

### **Question 3**

- Efficiency:** *Has the character of an effective plan with an appropriate monitoring and control system with continuously improved performance standards*
- Effectiveness:** *Has (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s)*
- Efficacy:** *Simple, unitary (no conflictive points), open to resource sharing.*
- Equity:** *Provides all parties equal access to: information, science and technology, resources, market and decision making. Acknowledges the existence of external power: science and technology, economy, social and culture, legal, political and the nature*
- Ethicality:** *Conforms to general principle of ethics*
- Elegancy:** *Aesthetical, attractive and challenging to increase/maintain security and prosperity of the general population*

### **Comments and suggestions**

- 9. *Why micro satellite, why not just satellite, so there will be open choices?*
- 10. *Sipesmik should fulfil the need of general population especially farmers and fishermen.*
- 11. *Sipesmik investment should be generated mainly from the government.*
- 12. *The Sipesmik shall have the necessary national commitment*
- 13. *Sipesmik should have in its organization a self improvement mechanism*
- 14. *Creation of the necessary conducive states for space science and technology development is strategically needed for Sipesmik*

15. *Due to its limited of in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation*
16. *Please consider the following tasks of Sipesmik*
- a. *Increase and maintain local government participation*
  - b. *Increase and maintain economic productivity*
  - c. *Change institutional practice*
  - d. *Change socio cultural practice*
  - e. *Increase and maintain the dynamic of managing the natural environment*
  - f. *Increase and maintain the dynamics of regulating the system'*
17. *Please consider of using Pancasila as a subject rather than an object, in this research. For its compatibility evaluation could be in term of its correspondence, consistency and coherency.*

**Answer question 1:** *Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security'*

**Answer question 2**

- a.i The beneficiaries are: *scientific community*  
The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation Government agencies, General population especially fishermen and farmers, Present & future generation,*
- a.ii The decision makers are: *government (executive and legislative)*  
The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*
- a.iii The planners are: *executive (Lapan, Bappenas and Dept. of Finance)*  
The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Depanri/Lapan, Agencies (government & private), Industries (government & private), Local government, Researcher,*
- a.iv The experts used are: *space science and technology experts*  
The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.v The representatives are: *local governments*  
The 'ought to be' representatives are: *ASSI and Local Governments.*
- b. The conditions controlled by the decision makers: *allocated resources*  
The conditions controlled by beneficiaries: *approved resource sharing*  
The not controlled conditions: *power concerned (science and technology, economy, socio cultural, legal- political, nature)*
- c. The constraints on the decision maker: *national capacity on space science and technology*  
The 'ought to be constraints' on the decision maker: *sustainable food*
- d. The power to ensure success of Sipesmik is held by: *The Government*
- e. Yes those who are affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes they should be allowed to

### Question 3

1. Efficiency *An effective plan with an appropriate monitoring and control system that the performance standard is continuously improved.*
2. Effectiveness *Achievable objectives with measurable indicator of successes, rational steps of action to realize the objectives, and clearly stated the fix constraint(s).*
3. Efficacy *Open to resource sharing and out sourcing*
4. Equity *Equal access to: information, science and technology, resources, market and decision making.*
5. Ethicality *Conforming to general principle of ethics with focus to stakeholders.*
6. Elegancy *Aesthetic, attractive, challenging to increase/maintain security and prosperity of general population.*

### Comments and suggestions

- 1) *Sipesmik should fulfil the need of general population especially farmers and fishermen*
- 2) *Its investment must be mainly generated from the government.*
- 3) *It shall have the necessary national commitment*
- 4) *It should increase and maintain economic productivity*
- 5) *Change institutional practices should be considered*
- 6) *Its tasks should include 'Increase and maintain the dynamics of regulating the system'*
- 7) *The creation of the necessary conducive states for space science and technology development is strategically needed for Sipesmik*
- 8) *Ensure interdepartmental and international cooperation to create and maintain the sustainable food with the help space technology.*
- 9) *Learned from Technology Innovation Development Model (Manley, 2001) please be advised that Sipesmik should have two basic tasks:*
  - a. *develop space science and technology innovation and*
  - b. *create conducive states for space science and technology innovation development.*

*The latter should include increase and maintain: local government participation, economic productivity, dynamics of regulating the Sipesmik, and of managing the physical environment, and change of institutional practice and of socio cultural practice.*



**Question 1:** *'Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security'*

**Question 2**

- a.i The beneficiaries are: *scientific community*  
 The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation Government agencies, General population especially fishermen and farmers, Present & future generation,*
- a.ii The decision makers are: *government (executive and legislative)*  
 The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*
- a.iii The planners are: *executive (Lapan, Bappenas and Dept. of Finance)*  
 The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Depanri/Lapan, Agencies (government & private), Industries (government & private), Local government, Researcher,*
- a.iv The experts used are: *space science and technology experts*  
 The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.v The representatives of those affected are: *local governments*  
 The 'ought to be' representatives of those affected are: *ASSI and Local Governments.*
- b. The conditions that are controlled by the decision makers are (Executive): *allocated resources (Beneficiaries): approved resource sharing*  
 The conditions that are not controlled by the decision makers are: *power concerned (science and technology, economy, socio cultural, legal- political, nature)*
- c. The constraints on the decision maker are *national capacity on space science and technology.* The 'ought to be' constraints of the decision makers are: *sustainable food*
- d. The power to ensure success of Sipesmik held by *The Government*

- c. Yes, those are affected by Sipesmik allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to

### Question 3

1. Efficiency *Appropriate monitoring and control system with continuously improved standard performance*
2. Effectiveness *Achievable objectives with measurable indicator of successes, and rational steps of action to realize the objectives*
3. Efficacy *Open to resource sharing and out sourcing*
4. Equity *Equal access to: information, science and technology, resources, market and decision making*
5. Ethicality *Conforming to general principle of ethics with focus to stakeholders*
6. Elegancy *Aesthetic, attractive, challenging to increase/maintain security and prosperity of general population.*

### Comments and suggestions

- 1) *Learned from the engagement process to system science, please be advised that Sipesmik should have two basic tasks: (1) develop space science and technology innovation and (2) create conducive states for space science and technology innovation development.*
- 2) *The first should include (a) basic science or demand (b) research and development (c) production or construction (d) operation and (e) Marketing or Sales.*
- 3) *The second should include increase and maintain: local government participation, economic productivity, dynamics of regulating the Sipesmik, and of managing the physical environment, and change of institutional practice and of socio cultural practice.*
- 4) *Sipesmik should fulfil the need of general population especially farmers and fishermen*
- 5) *Its investment must be mainly generated from the government.*
- 6) *It shall have the necessary national commitment.*
- 7) *The executors of Sipesmik should include not only members of Depanri but also the others who are responsible for sea, fisheries, agriculture,*

*environment, trade, industry, social affairs, education, culture and local governments.*

- 8) Due to physical condition, that the capability to produce food varies from one region to another, an appropriate system for transportation and communication is needed for the creation and maintaining a national sustainable food condition.*
- 9) Please ensure interdepartmental and international cooperation to create and maintain the sustainable food with the help space technology.*

**Question 1:** *Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security'*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *scientific community*  
The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation* Government agencies, General population especially fishermen and farmers, Present & future generation,
- a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*  
The 'ought to be' decision makers of the Sipesmik process are *government (executive and legislative), local governments, industry, fishermen and farmers.*
- a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*  
The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Depanri/Lapan, Agencies (government & private), Industries (government & private), Local government, Researcher,*
- a.iv The experts used in the Sipesmik process are: *space science and technology experts*  
The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.v The representative of those affected by Sipesmik are: *local governments.*  
The 'ought to be' representatives are: *ASSI and Local Governments.*
- b. The conditions that are controlled by the decision makers are *allocated resources (Executive) approved resource sharing (Beneficiaries)*  
The conditions that are not controlled by decision makers are: *power concerned (science and technology, economy, socio cultural, legal- political, nature)*
- c. The constraints on the decision makers are *national capacity on space science and technology.* The ought to be constraints: *sustainable food*
- d. The power to ensure success of Sipesmik held by *The Government*
- e. Yes, those are affected by Sipesmik allowed to take their fate into their own hands. *Yes, they should be allowed to*

### Question 3

1. Efficiency *An effective plan with an appropriate monitoring and control system that performance standard is continuously improved*
2. Effectiveness *Achievable objectives with measurable indicator of successes, and rational steps of action to realize the objectives*
3. Efficacy *Simple, unitary (no conflictive points), all resources needed are available internally, when they are not all, it opens to cooperation, resource sharing and or outsourcing*
4. Equity *Equal access to: information, science and technology, resources, market and decision making*
5. Ethicality *Conforming to general principle of ethics with focus to stakeholders*
6. Elegancy *Aesthetic, attractive, challenging to increase/maintain security and prosperity of general population*

### Comments and suggestions

- 1) Please consider that Sipesmik should have two basic tasks:
  - a. develop space science and technology innovation, this should include
    - i. basic science or demand
    - ii. research and development
    - iii. production or construction
    - iv. operation, and
    - v. Marketing or Sales
  - b. create conducive states for space science and technology innovation development. This should include:
    - i. 'increase and maintain': local government participation,
    - ii. economic productivity,
    - iii. dynamics of regulating the Sipesmik, and
    - iv. dynamics of managing the physical environment, also
    - v. change of institutional practice and of socio cultural practice.
- 2) In support to the idea of second task, please consider the following: 'We are now in the era of decentralization, the power of local governments, especially the district governments, is legally increasing. They willingly participate, when they trust on the economic productivity of Sipesmik. To increase and

*maintain this trust, it is necessary to change the institutional practice, where horizontal link among institutions become actively interrelated. In support to all of this, socio – cultural practice must be change into sustainable habits and the necessary regulation must be developed, including the law enforcement and environment management.'*

- 3) *Due to it's limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation, it should also optimize the use the existing facilities.*
- 4) *Sipesmik should fulfil the need of general population especially farmers and fishermen. Its investment must be mainly generated from the government therefore it shall have the necessary national commitment. There should be changes both in institutional practice and socio cultural practice for the success of Sipesmik. For this regulation should be developed. All of these should be considered as for the creation of the necessary conducive states for space science and technology development which is strategically needed for Sipesmik.*
- 5) *Due to it's limited of in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation.*
- 6) *The executor of Sipesmik should include not only members of Depanri but also the others who are responsible for sea, fisheries, agriculture, environment, trade, industry, social affairs, education, culture and local governments.*
- 7) *There is a need for a national commitment: government (legislative & executive) and public for Sipesmik so that continuance of the program be guaranteed*
- 8) *Public participation on achieving and maintaining sustainable food with the help of space technology should be considered.*
- 9) *Community trust on the capability of the system to create and maintain the sustainable food with the help of space technology should be developed.*
- 10) *Change menu, farming and fishing practice towards sustainable habits*
- 11) *There is a need on qualified knowledge/ understanding of participants especially local governments, on how help support space technology development and its use to create and maintain sustainable food. Also it should be developed, the belief and trust of participant especially local government, on the need of an appropriate:*

- a. *socio-cultural state for sustainable food*
  - b. *institutional practice for sustainable food*
  - c. *state of natural environment for sustainable food*
  - d. *on the capability of the system to create and maintain sustainable food with the help of space technology*
  - e. *on space technology capability to support increase economic productivity*
  - f. *on space technology capability to support sustainable nature management*
- 12) *Ensure interdepartmental and international cooperation to create and maintain the sustainable food with the help space technology.*
- 13) *It should be included in the tasks of Sipesmik; 'gather community support for the system to create and maintain the sustainable food with the help of space technology'. Also the important of social, equity & justice empowerment should be considered.*

**Good Luck**

### Question 1

*'Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security'*

### Question 2

a.i The beneficiaries of the Sipesmik process are: *scientific community*

The 'ought to be' beneficiaries are: *the nature, present and future generation, especially fishermen, farmers, fisheries industry, agriculture industry, and Republic of Indonesia as a whole. Scientists/researchers Science and technology community, General population especially fishermen and farmers, Present & future generation,*

a.ii The decision makers of the Sipesmik process are *government (executive and legislative)*

The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*

a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*

The 'ought to be' planners are: *executive (responsible for space science and technology, national- planning, finance, sea and fishing, agriculture, environment, social, trade, industry and local governments) and the representatives of beneficiaries (including: trade, industry, fishermen and farmer), Depanri/Lapan, Agencies (government & private), Industries (government & private), Local government, Fishermen & farmers, Researcher,*

a.iv The experts used in the Sipesmik process are: *space science and technology experts*

The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*

a.v The representatives of those affected by Sipesmik are: *local governments*

The 'ought to be' representatives are: *ASSI and Local Governments.*



- b. The conditions that are controlled by the decision makers are *allocated resources (executives) approved resource sharing (beneficiaries)*  
The conditions that are not controlled by the decision makers are *power concerned (science and technology, economy, socio cultural, legal- political, nature)*
- c. The constraints on the decision makers are *national capacity on space science and technology*. The 'ought to be' constraints: *sustainable food*
- d. The power to ensure success of Sipesmik held by *the Government*
- e. Yes those are affected by Sipesmik allowed to take their fate into their own hands despite the expert. *Yes, they should be allowed to*

### Question 3

1. Efficiency *Appropriate monitoring and control system with continuously improved standards performance*
2. Effectiveness *Achievable objectives with measurable indicator of successes, and rational steps of action to realize the objectives*
3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
4. Equity *Equal access to: information, science and technology, resources, market and decision making*
5. Ethicality *Conforming to general principle of ethics with focus to stakeholders*
6. Elegancy *Aesthetic, attractive, challenging to increase/maintain security and prosperity of general population*

### Comments and suggestions

- 1) *Please consider of assessing Pancasila as the genetivus- subjectivus in developing the Sipesmik models (See "Pancasila Sebagai Metode", Slamet Sutrisno, [ed], 1986, Liberty), especially: Pancasila as the 'postulat' in developing science and technology.*
- 2) *Due to it's limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation*
- 3) *Universities should participate in the Sipesmik especially focusing on education, research and development*

- 4) *Sipesmik should fulfil the need of general population especially farmers and fishermen. It should practice open management and shall only develop space science and technology for peaceful purposes. Its investment should be mainly generated from the government. Therefore it should have the necessary national commitment to develop it.*
- 5) *Some tasks should be included in the Sipesmik such as:*
  - a. *Increase and maintain local government participation*
  - b. *Change institutional practice*
  - c. *Change socio cultural practice and*
  - d. *Increase and maintain the dynamic of managing the natural environment*
- 6) *Sipesmik holds high level goals: micro satellite for sustainable food, this give lawyers a challenge on how laws can and should be used to achieve such political and social goals.*
- 7) *Recently the law governing science and technology has been promulgated; therefore Sipesmik should be regulated in accordance with this law.*
- 8) *Creation of the necessary conducive states for space science and technology development is strategically needed for Sipesmik*
- 9) *Qualified knowledge/ understanding of participants especially local governments, on how help support space technology development and its use to create and maintain sustainable food*
- 10) *The belief of participants, especially local government, on the need of an appropriate socio-cultural state for sustainable food*
- 11) *The belief of participants, especially local government, on the need of an appropriate institutional practice for sustainable food*
- 12) *The belief of participants, especially local government, on the need for an appropriate state of natural environment for sustainable food*
- 13) *Participants', especially local governments', trust on the capability of the system to create and maintain sustainable food with the help of space technology*
- 14) *Financial support & resource sharing to the system in creating the sustainable food with the help of space technology*
- 15) *Sipesmik organization should be a network, include existing facilities that have the capability to support Sipesmik and have self improvement mechanism*

*16) Sipesmik should ensure interdepartmental and international cooperation to create and maintain the sustainable food with the help space technology.*

*17) Some indicators that should be monitored within Sipesmik are:*

- a. The belief of participants on space technology capability to support increase economic productivity*
- b. The belief of participants on space technology capability to support sustainable nature management*
- c. Acceptance of the system by government agencies (especially local governments) privates and foreign partners*
- d. Well trained and educated system participants (actors)*
- e. Active horizontal management links*
- f. Local government participation*

**Good Luck**

## Question 1

*'Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security'*

## Question 2

- a.i The beneficiaries of the Sipesmik process are: *scientific community*  
 The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation Scientists/researchers Science and technology community, General population especially fishermen and farmers, Present & future generation,*
- a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*  
 The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*
- a.iii The planners in the Sipesmik process are *executive (Lapan, Bappenas and Dept. of Finance)*  
 The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Depanri/Lapan, Agencies (government & private), Industries (government & private), Local government, Fishermen & farmers, Researcher,*
- a.iv The experts used in the Sipesmik process are: *space science and technology experts*  
 The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.v The representatives of those affected by Sipesmik are: *local governments*  
 The 'ought to be' representatives are: *Indonesia Consumer Institute, and Local Governments.*
- b. The conditions that are controlled by the decision maker are *allocated resources (executives) approved resource sharing (beneficiaries)*

Not controlled conditions: *power concerned (science and technology, economy, socio cultural, legal- political, nature)*

- c. The constraints on the decision maker are *national capacity on space science and technology*. The ought to be constraints: *sustainable food*
- d. The power to ensure success of Sipesmik held by *The Government*
- e. Yes those are affected by Sipesmik allowed to take their fate into their own hands despite the expert. Yes, they are allowed to

### Question 3

- 1. Efficiency *Appropriate monitoring and control system with continuously improved standards performance*
- 2. Effectiveness *Clearly stated: the fix constraint(s), achievable objectives with measurable indicator of successes, and rational steps of action to realize the objectives*
- 3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
- 4. Equity *Equal access to: information, science and technology, resources, market and decision making*
- 5. Ethicality *Conforming to general principle of ethics with focus to stakeholders*
- 6. Elegancy *Aesthetical and challenging to increase/maintain security and prosperity of general population*

### Comments and suggestions

- 1) Please consult Pancasila as the Indonesian weltanschauung in Tamburaka: 'Pendidikan Pancasila', Pustaka Jaya, 1995. Pancasila and values in Lasiyo & Yuwono: Pancasila (a philosophical approach), Liberty, 1985.
- 2) Sipesmik should be open to international cooperation and or outsourcing operation.
- 3) Universities should participate in the Sipesmik especially focusing on education, research and development.

- 4) *Sipesmik should fulfil the need of general population especially farmers and fishermen*
- 5) *It should practice open management, its organization should be a network that includes existing facilities and have a self improvement mechanism.*
- 6) *It shall only develop space science and technology for peaceful purposes, and its investment should be mainly generated from the government. Also please consider include the following into Sipesmik tasks:*
  - a. *Increase and maintain local government participation*
  - b. *Increase and maintain economic productivity*
  - c. *Increase and maintain the dynamics of regulating the system*
  - d. *Increase and maintain the dynamic of managing the natural environment*
- 7) *It is a challenge for lawyers to innovate a framework regarding how laws and regulation can and should be used to create and maintain sustainable food supply with the help of space technology.*
- 8) *Recently the law governing science and technology has been promulgated; therefore Sipesmik should be regulated in accordance with this law. Also it should be in correspondence, consistent, and coherence with Pancasila.*
- 9) *To measure the success of Sipesmik it should be monitored some indicators such as:*
  - a. *Qualified knowledge/ understanding of participants especially local governments, on how help support space technology development and its use to create and maintain sustainable food*
  - b. *The belief of participants, especially local government, on the need of an appropriate socio-cultural state for sustainable food*
  - c. *The belief of participants, especially local government, on the need of an appropriate institutional practice for sustainable food*
  - d. *The belief of participants, especially local government, on the need for an appropriate state of natural environment for sustainable food*
  - e. *Participants', especially local governments', trust on the capability of the system to create and maintain sustainable food with the help of space technology*
  - f. *Financial support & resource sharing to the system in creating the sustainable food with the help of space technology*

- g. Ensured interdepartmental and international cooperation to create and maintain the sustainable food with the help space technology.*
- h. Supportive natural environment with regard to food production*
- i. The belief of participants on space technology capability to support increase economic productivity*
- j. The belief of participants on space technology capability to support sustainable nature management*
- k. Well trained and educated system participants (actors)*
- l. Protected and supported legally the system*
- m. Reduced waste*
- n. Qualified water health and effective drainage*
- o. Qualified ground water*
- p. Preserved natural habitat*
- q. Preserved flora and fauna diversity*
- r. Vegetation re-growth*

**Good Luck**

**Question 1**

*'Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security'*

**Question 2**

- a.i *The beneficiaries of the Sipesmik process are: scientific community*  
*The 'ought to be' beneficiaries are: the Republic of Indonesia as a whole, the nature, present and future generation, Science and technology community, General population especially fishermen and farmers, Present & future generation,*
- a.ii *The decision makers of the Sipesmik process are: government (executive and legislative)*  
*The 'ought to be' decision makers are government (executive and legislative), local governments, industry, fishermen and farmers*
- a.iii *The planner in the Sipesmik process are: executive (Lapan, Bappenas and Dept. of Finance)*  
*The 'ought to be' planners are: executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Agencies (government & private), Industries (government & private), Local government, Researcher,*
- a.iv *The experts used in the Sipesmik process are: space science and technology experts*  
*The 'ought to be' experts used in the Sipesmik process are: space science and technology experts and beneficiaries*
- a.v *The representatives of those affected by Sipesmik are: local governments*  
*The 'ought to be' representatives are: Indonesia Consumer Institute, and Local Governments and NGO's.*
- b. *The conditions that are controlled by the decision makers are resources allocation (executive) approved resource sharing (beneficiaries)*  
*The conditions that are not controlled by the decision makers are: power concerned (science and technology, economy, socio cultural, legal- political, nature)*



- c. *The constraints on the decision makers are national capacity on space science and technology. The 'ought to be' constraints are sustainable food.*
- d. *The power to ensure success of Sipesmik held by the Government*
- e. *Yes those are affected by Sipesmik allowed to take their fate into their own hands despite the expert. Yes, they are allowed to*

### **Question 3**

- 1. *Efficiency*      *Appropriate monitoring and control system with continuously improved standards performance.*
- 2. *Effectiveness*      *Achievable objectives with measurable indicator of successes, and rational steps of action to realize the objectives.*
- 3. *Efficacy*      *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing.*
- 4. *Equity*      *Equal access to: information, science and technology, resources, market and decision making. Acknowledge the existence of external power: science and technology, economy, social and culture, legal and political, and the nature*
- 5. *Ethicality*      *conforming to general principle of ethics with focus to stakeholders.*
- 6. *Elegancy*      *Aesthetical, attractive, challenging to increase/maintain security and prosperity of general population.*

### **Comments and suggestions**

- 1) *It should be noted the important of creating the necessary conducive states for space science and technology development through increase/maintain the dynamics of managing the natural environment that includes tasks as follows:*
  - a. *move towards sustainable nature*
  - b. *reduce waste*
  - c. *increase/maintain water health*
  - d. *increase/maintain ecological health, and*
  - e. *increase/maintain natural environment support on food production*
- 2) *Sipesmik should fulfil the need of general population especially farmers and fishermen. It shall only develop space science and technology for peaceful purposes. Its investment should be generated mainly from the government.*

*Therefore it should have the necessary national commitment and it should practice open management. Some tasks suggested to be included in the Sipesmik are:*

- a. Increase and maintain local government participation*
  - b. Change institutional practice*
  - c. Increase and maintain the dynamics of regulating the system*
  - d. Creation of the necessary conducive states for space science and technology development is strategically needed for Sipesmik*
- 3) To create and maintain a national sustainable food condition, an up to date natural resources data base is fundamentally needed, while space remote sensing can help provide real time natural resources data, therefore Sipesmik shall have an appropriate mechanism that realizes that logic relation in real lives. A part to food supply, some indicators that should be monitored within Sipesmik are:*
- a. Financial support & resource sharing to the system in creating the sustainable food with the help of space technology*
  - b. Ensured interdepartmental and international cooperation to create and maintain the sustainable food with the help space technology.*
  - c. Supportive natural environment with regard to food production*
  - d. Acceptance of the system by government agencies (especially local governments) privates and foreign partners*
  - e. Well trained and educated system participants (actors)*
  - f. Active horizontal management links*
  - g. Protected and supported legally the system*
  - h. Reduced waste*
  - i. Qualified water health and effective drainage*
  - j. Qualified ground water*
  - k. Preserved natural habitat*
  - l. Preserved flora and fauna diversity*
  - m. Vegetation re-growth*
  - n. Local government participation*
  - o. National commitment on Sipesmik*

**Good Luck**

## Question 1

*'Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security'.*

## Question 2

- a.i The beneficiaries of the Sipesmik process are: *scientific community*  
 The 'ought to be' beneficiaries are: *present and future generation, the nature, Republic of Indonesia as a whole, and the world Industry Science and technology community, General population especially fishermen and farmers, Present & future generation,*
- a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*  
 The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers. Industries (government & private),*
- a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*  
 The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Depanri/Lapan, Agencies (government & private), Local government, Researcher,*
- a.iv The experts used in the Sipesmik process are: *space science and technology experts*  
 The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.v The representatives of those affected by Sipesmik are: *local governments*  
 The 'ought to be' representatives are: *Indonesia Consumer Institute, and Local Governments, Qualified NGO especially those who have life experiences.*
- b. The conditions that are controlled by the decision makers resources allocation (executives) *approval of resource sharing (beneficiaries)*  
 The conditions that not controlled conditions: *power concerned (science and technology, economy, socio cultural, legal- political, nature)*

- c. The constraints on the decision makers are *national capacity on space science and technology*. The ought to be constraints: *sustainable food*
- d. The power to ensure success of Sipesmik held by *The Government*
- e. Yes those are affected<sup>4</sup> by Sipesmik allowed to take their fate into their own hands despite the expert. *Yes, they should be allowed to.*

### Question 3

- 1. Efficiency     *Appropriate monitoring and control system with continuously improved standards performance*
- 2. Effectiveness *Clearly stated: the six constraint(s), achievable objectives with measurable indicator of successes, and rational steps of action to realize the objectives*
- 3. Efficacy     *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing.*
- 4. Equity        *Acknowledge the role of external power that includes the nature, science and technology, economy, social and culture, legal and political. It provides all parties equal access to: information, science and technology, resources, market and decision making*
- 5. Ethicality    *conforming to general principle of ethics with focus to stakeholders.*
- 6. Elegancy     *Aesthetical, attractive and challenging to increase/maintain security and prosperity of general population.*

### Comments and suggestions

- 1) *Learned from the engagement process to system science using the Manley model, please be advised that Sipesmik should have two basic tasks: (1) develop space science and technology innovation and (2) create conducive states for space science and technology innovation development.*
- 2) *Due to it's limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation*

- 3) *Sipesmik should fulfil the need of general population especially farmers and fishermen. Its investment must be mainly generated from the government therefore it shall have the necessary national commitment. A part to the development of space science and technology, the suggested tasks to create the necessary conducive states are as follows:*
- a. Increase and maintain economic productivity of food*
  - b. Change institutional practice*
  - c. Change socio cultural practice*
  - d. Increase and maintain the dynamics of regulating the system*
  - e. Increase and maintain the dynamic of managing the natural environment*
  - f. Increase and maintain local government participation*
- 4) *Due to it's limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation*
- 5) *Additional Indicators to food supply and space technology indicators, that should be monitor within Sipesmik, are among others*
- a. Financial support & resource sharing to the system in creating the sustainable food with the help of space technology*
  - b. Ensured interdepartmental and international cooperation to create and maintain the sustainable food with the help space technology.*
  - c. Well trained and educated system participants (actors)*
  - d. National commitment on Sipesmik*

**Good luck**

**Question 1**

*Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security.*

**Question 2**

a.i The beneficiaries of the Sipesmik process are: *scientific community*

The 'ought to be' beneficiaries are: *the present and future generation, the nature, the Republic of Indonesia as a whole. Government agencies, Science and technology community, General population especially fishermen and farmers, Present & future generation,*

a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*

The 'ought to be' decision makers are *government (executive and legislative, local governments) industry (fisheries, & agriculture), fishermen and farmers.*

a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*

The 'ought to be' planners are: *executive (Lapan, Bappenas, Dept. of Finance, Agriculture, Sea and Fisheries) and the representatives of beneficiaries: local governments, Dept. Social, Dept. Education and Culture, industry (fisheries & agriculture) fishermen and farmer. Depanri/Lapan, Agencies (government & private), Industries (government & private), Local government, Researcher,*

a.iv The experts used in the Sipesmik process are: *space science and technology experts.*

The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries.*

a.v The representative of those affected by Sipesmik are: *local governments.*

The 'ought to be' representatives are: *Indonesia Consumer Institute, and Local Governments.*

b. The conditions that are controlled by the decision makers: *resources allocation (executives) resources sharing approvals (beneficiaries). The conditions that are*

not controlled by decision makers are: power concerned (science and technology, economy, socio cultural, legal- political, nature).

- c. The constraints on the decision maker are: national capacity on space science and technology. The 'ought to be' constraints are sustainable food.
- d. The power to ensure success of Sipesmik held by: the Government
- e. Yes those are affected by Sipesmik allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

- 1. Efficiency *Has the character of an effective plan with an appropriate monitoring and control system that the performance standard is continuously improved*
- 2. Effectiveness *Clearly stated the fix constraint(s), and the achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s)*
- 3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
- 4. Equity *Conforms to human dignity which could be translated into equal access to information, science and technology, resources, market and decision making*
- 5. Ethicality *Conforms to professional ethics*
- 6. Elegancy *Aesthetical and increase/maintain security and prosperity of general population.*

### Comments and suggestions

- 1) *Sipesmik should fulfil the need of general population especially farmers and fishermen. Its investment must be mainly generated from the government therefore it should have the necessary national commitment.*
- 2) *Due to it's limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation*
- 3) *Universities should participate in the Sipesmik especially focusing on education, research and development.*

- 4) *Sipesmik should be managed in such a way that increases and maintains economic productivity.*
- 5) *Change institutional practice*
- 6) *Creation of the necessary conducive states for space science and technology development is strategically needed for Sipesmik*
- 7) *In addition to indicators of space science and technology development and of production, distribution and consumption of foods, some indicators that should also be monitored are among other:*
  - a. *Financial support & resource sharing to the system in creating the sustainable food with the help of space technology*
  - b. *Acceptance of the system by government agencies (especially local governments) privates and foreign partners*
  - c. *Well trained and educated system participants (actors)*
  - d. *Local government participation*

**Good luck**



**Question 1**

*'Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security'.*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *no information*  
The 'ought to be' beneficiaries are: *present and future generation, the nature, the world as a whole.* Science and technology community, General population especially fishermen and farmers, Present & future generation,
- a.ii The decision makers of the Sipesmik process are: *the government*  
The 'ought to be' decision makers are *government, local governments, fishermen and farmers.*
- a.iii The planner in the Sipesmik process are: *no information*  
The 'ought to be' planners are: *government together with local governments, fishermen and farmer, Depanti/Lapan, Agencies (government & private), Industries (government & private), Local government, Researcher,*
- a.iv The experts used in the Sipesmik process are: *no information*  
The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.v The representative of those affected by Sipesmik are: *no information*  
The 'ought to be' representatives are: *local governments, organizations of fishermen and farmers*
- b. The conditions that are controlled by the decision makers are resources allocation (executives), resources sharing approval (beneficiaries)  
The conditions that are not controlled are *power concerned (legal- political, nature)*
- c. The constraints on the decision makers are *no information.* The 'ought to be' constraints are *sustainable foods.*
- d. The power to ensure success of Sipesmik held by *the Government.*
- e. Yes those are affected by Sipesmik allowed to take their fate into their own hands despite the expert. *Yes they should be allowed to.*

### Question 3

1. Efficiency *Has an appropriate monitoring and control system with continuously improved performance standards*
2. Effectiveness *Has (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s)*
3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing.*
4. Equity *Conforms to general principles of right and justice, due process, both internally and externally.*
5. Ethicality *Conforms to general principle of ethics.*
6. Elegancy *Aesthetical, attractive, and challenging to increase/maintain security and prosperity of the general population.*

### Comments and suggestions

- 1) *Sipesmik should fulfil the need of general population especially farmers and fishermen. It shall only develop space science and technology for peaceful purposes, therefore it should practice open management, so that its peaceful purposes can be secured.*
- 2) *Its investment should mainly be generated from the government. Hence, it should increase the economic productivity of the country.*
- 3) *Sipesmik should have two basic tasks:*
  - a. *develop space science and technology innovation, and*
  - b. *create conducive states for space science and technology innovation development*

*The first should include operation that could be split into 'mission operation' and 'house keeping operation'. The second should include increase and maintain: local government participation, economic productivity, dynamics of regulating the Sipesmik, and of managing the physical environment, and change of institutional practice and of socio cultural practice.*

- 4) *Sipesmik is a social process that achieving the goals needs a long period of time. As a social process Sipesmik should be managed in an appropriate manner such as comprising cycles where improvement mechanism from one to*

*another cycle is well established. Also it is an educational process where the actors are object of its educational programs to facilitate the intended social process. Its education program for researchers should be transformable into formal education credit, so that from their activities the researchers can write up thesis for their master or doctor degrees.*

- 5) *Sipesmik should be correspondence, consistence, and coherence with Pancasila.*

**Good Luck**

**Question 1**

*'Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security'.*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *scientific community*  
 The 'ought to be' beneficiaries are: *the present and future generation, the nature, the Republic of Indonesia as a whole. Government agencies, Industry Scientists/researchers, Science and technology community, General population especially fishermen and farmers, Present & future generation,*
- a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*  
 The 'ought to be' decision makers are *government (executive and legislative, local governments) industry (fisheries, & agriculture), fishermen and farmers.*
- a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*  
 The 'ought to be' planners are: *executive (Lapan, Bappenas, Dept. of Finance, Agriculture, Sea and Fisheries) and the representatives of beneficiaries: local governments, Dept. Social, Dept. Education and Culture, industry (fisheries & agriculture) fishermen and farmer. Depanri/Lapan, Agencies (government & private), Industries (government & private), Local government, Researcher,*
- a.iv The experts used in the Sipesmik process are: *space science and technology experts*  
 The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.v The representative of those affected by Sipesmik are: *local governments*  
 The 'ought to be' representatives are: *Indonesia Consumer Institute, and Local Governments.*
- b. The conditions that are controlled by the decision maker are resource allocation (executive) and resources sharing approval (beneficiaries). The conditions that

- are not controlled conditions: power concerned (science and technology, economy, socio cultural, legal- political, nature).
- c. The constraints on the decision makers are national capacity on space science and technology. The 'ought to be' constraints: sustainable foods
  - d. The power to ensure success of Sipesmik held by the Government
  - e. Yes those affected by Sipesmik are allowed to take their fate into their own hands despite the expert Yes. They should be allowed to.

### Question 3

1. Efficiency *Hold the character of an effective plan and has an appropriate monitoring and control system that the performance standards are continuously improved*
2. Effectiveness *Achievable objectives with measurable indicator of successes, and rational steps of action to realize the objectives.*
3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
4. Equity *Equal access to: information, science and technology, resources, market and decision making*
5. Ethicality *Conforms to general principle of ethics*
6. Elegancy *Aesthetical, attractive, challenging to increase/maintain security and prosperity of general population*

### Comments and suggestions

- 1) *Sipesmik should fulfil the need of general population especially farmers and fishermen. Therefore the necessary investment should mainly be generated from the government. For this it shall have the necessary national commitment. Hence it should practice open management. Also due to it's limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation*
- 2) *Sipesmik should have two basic tasks: (1) develop space science and technology innovation and (2) create conducive states for space science and technology innovation development. The first should include (a) basic science*

or demand (b) research and development (c) production or construction (d) operation and (e) Marketing or Sales. The second should include: increase /maintain local government participation, increase/maintain economic productivity, change of institutional practice, change the socio cultural practice, increase/maintain dynamics of regulating the Sipesmik and increase/maintain the dynamics of managing the physical environment.

- 3) Sipesmik is a social process that achieving the goals needs a long period of time. As a social process Sipesmik should be managed in an appropriate manner such as comprising cycles where improvement mechanism from one to another cycle is well established.
- 4) Sipesmik is an educational process where the actors are object of its educational programs to facilitate the intended social process. Its education program for researchers should be transformable into formal education credit, so that from their activities the researchers can write up theses for their master or doctor degrees.
- 5) There is a need for a national commitment: government (legislative & executive) and public for Sipesmik so that continuance of the program be guaranteed

**Good Luck**

**Question 1**

*'Cost benefit analysis is capable to show the economic value of an action program, therefore each action program of Sipesmik shall accomplish an economically acceptably cost benefit ratio'*

*Note: the benefits include both the tangible and intangible benefits.*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *Lapan satellite scientists and partners.*

The 'ought to be' beneficiaries of the Sipesmik are: *users of remote sensing data and telecommunication system* Government agencies, Industry, Scientists/researchers, Science and technology community, General population especially fishermen and farmers,

- a.ii The decision makers of the Sipesmik process are: *Lapan satellite scientists and partners*

The ought to be decision makers are: *Lapan and beneficiaries (users of remote sensing data and telecommunication system)*

- a.iii The planners in the Sipesmik process are: *Lapan (satellite scientists & partners)*

The 'ought to be' planners in the Sipesmik process are: *Lapan satellite scientists & partners and beneficiaries, Depanri/Lapan, Agencies (government & private), Scientist/ academician,*

- a.iv The experts used in the Sipesmik process are: *Lapan satellite scientists and partners*

The 'ought to be' experts used in the Sipesmik process are: *Lapan satellite scientists, partners and beneficiaries*

- a.v The representatives of those affected by Sipesmik are: *Lapan research partners (such as: DLR, NASDA, CNES, NASA, ISRO, Great Wall)*

The 'ought to be' representatives of those who are affected by the Sipesmik process is: *representative of administrators, regulators, suppliers, contractors, consultants, research partners, advocacy org. and local government.*

- b. The conditions that are controlled by the decision makers are resources allocation (*Lapan*) *resources (hardware, software, finance and human resources) sharing approval (beneficiaries)*

The conditions that are not controlled conditions by the decision makers: *global market, free trade*

- c. The constraints on the decision makers are *technological and financial feasibility of Sipesmik*  
The 'ought to be' constraints on the decision makers are: *social, economy, political, legal, environment and cultural conditions*
- d. The power to ensure success of Sipesmik held by the investors: *Government (main)*
- e. Yes those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. *Yes, they should be allowed to*

### Question 3

1. Efficiency *Ratio between output and input*
2. Effectiveness *Ratio between the achieved and the total objective*
3. Efficacy *Ratio between the resources available and the resources needed to execute the plan*
4. Equity *Note: included in effectiveness*
5. Ethicality *Note: included in effectiveness*
6. Elegancy *Note: included in effectiveness*

### Comments and comments

- 1) *Sipesmik education program for researchers should be transformable into formal education credit, so that from their activities the researchers can write up thesis for their master or doctor degrees.*
- 2) *Although Sipesmik is heavy science and technology characteristic, however it should also concern with increasing and maintaining economic productivity and changing socio cultural practice.*



**Question 1**

*'Why develop our own satellite, global space market provides choices so that we can choose based on our own criteria that include especially preserving our nature through minimum release of manmade debris in space'*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *no information*,  
The 'ought to be' beneficiaries of the Sipesmik are: *farmers and companies: hydropower generator and water supply Nature (living and non living things),*
- a.ii The decision makers of the Sipesmik process are: *no information*  
The 'ought to be' decision makers of Sipesmik process are: *Lapan satellite scientist and weather modification scientists and the 'ought to be' beneficiaries.*
- a.iii The planners in the Sipesmik process are: *no information*  
The 'ought to be' planners in the Sipesmik process are: *satellite scientist & weather modification scientists and the 'ought to be' beneficiaries, Depanri/Lapan, Agencies (government & private), Scientist/ academician,*
- a.iv The experts used in the Sipesmik process are: *no information.*  
The 'ought to be' experts used in the Sipesmik process are: *satellite & weather modification scientists and the 'ought to be' beneficiaries*
- a.v The representative of those affected by Sipesmik are: *no information*  
The 'ought to be' representatives of who are affected by the Sipesmik process are: *University of Indonesia, professional organizations, investor, suppliers, contractors, consultants, consumers and the not-involved but affected parties.*
- b. The conditions that are controlled by the decision makers are resources allocations (Lapan), resources sharing approvals (beneficiaries)  
The conditions that are not controlled by decision makers: *political and cultural factors*
- c. The constraints on the decision makers are *technological and financial feasibility Sipesmik*  
The 'ought to be' constraints: *ethical and cultural conditions*
- d. The power to ensure success of Sipesmik held by *the investors*

- c. *Yes those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.*

### **Question 3**

1. **Efficiency** *Ratio between output and input*
2. **Effectiveness** *Ratio between the achieved and the total objective.*
3. **Efficacy** *Ratio between the resources available and the resources needed to execute the plan.*
4. **Equity** *Conforms to the general principle of right and justice, due process.*
5. **Ethicality** *Conforms to general principle of ethics with focus to stakeholders.*
6. **Elegancy** *Public opinion of usefulness of the project to raise their quality of life.*

### **Comments and suggestions**

- 1) *Sipesmik should concern with environmental health (minimum space debris), economic productivity, institutional and socio cultural practices.*
- 2) *It shall have the necessary national commitment*
- 3) *It should create the necessary conducive states for space science and technology development.*

## Question 1

*'Cooperative way of managing Sipesmik could guarantee the practice of open management and the use of micro satellite system, which is limited for peaceful purposes especially for preserving the nature'*

## Question 2

a.i The beneficiaries of the Sipesmik process are: *satellite interested parties*

The 'ought to be' beneficiaries of the Sipesmik are: *remote sensing data users and store forward data users* Science and technology community, General population especially fishermen and farmers, Present & future generation,

a.ii The decision makers of the Sipesmik process are *Lapan, research partners and investor*

The 'ought to be' decision makers in the Sipesmik process are: *Lapan, research partners, investor and 'ought to be' Sipesmik beneficiaries.*

a.iii The planners in the Sipesmik process are: *Lapan, research partners and investor.*

The 'ought to be' planners in the Sipesmik process are: *Lapan, research partners, investor and the 'ought to be' beneficiaries.* Agencies (government & private), Industries (government & private), Local government, Researcher,

a.iv The experts used in the Sipesmik process are *Lapan, research partners and investor experts.*

The 'ought to be' experts used in the Sipesmik process are: *Lapan, research partners, investor and the 'ought to be' beneficiary experts.*

a.v The representative of those affected by Sipesmik process are: *Lapan, research partners, investor (involved), Local government (not involved)*

The 'ought to be' representatives of who are affected by the Sipesmik process are: *Lapan, research partners, investor and the 'ought to be' beneficiaries (involved); local government and professional association and industry association (not involved)*

b. The conditions that are controlled by the decision makers are *resources allocation*

The conditions that are not controlled by decision makers are: *natural, political, economical, socio cultural and legal factors*

- c. The constraints on the decision makers are *limited resources*  
The 'ought to be' constraints: *legal, social, economical and political conditions*
- d. The power to ensure success of Sipesmik held by Investor: The Government of the Republic of Indonesia.
- e. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. *Yes, they should be allowed to.*

### Question 3

- 1. Efficiency *Focusing on the use of resources*
- 2. Effectiveness *Ratio between the achieved and the total objective.*
- 3. Efficacy *Non bureaucratic environment*
- 4. Equity *Accountability of work achievement and rewards*
- 5. Ethicality *Conform to professional ethics*
- 6. Elegancy *Usefulness of a project to people's quality of life.*

### Comments and suggestions

- 1) *Sipesmik is a social process that achieving the goals needs a long period of time. As a social process Sipesmik should be managed in an appropriate manner such as comprising cycles where improvement mechanism from one to another cycle is well established. It is also an educational process where the actors are object of its educational programs to facilitate the intended social process. Therefore in addition to space science and technology indicators, it should also be monitored social and economic indicators such as:*
  - a. *Food production, distribution and consumption*
  - b. *Public participation on achieving and maintaining sustainable food with the help of space technology.*
  - c. *Community trust on the capability of the system to create and maintain the sustainable food with the help of space technology*
  - d. *Changed menu, farming and fishing practice towards sustainable habits*

- e. *Community support for the system to create and maintain the sustainable food with the help of space technology*
  - f. *Community understanding and attitudes on the system*
  - g. *Social, equity & justice empowerment*
- 2) *Due to the vast impact to national live as described above, Sipesmik shall have the necessary national commitment and the major investment should be generated from the government.*
- 3) *For it success, it should be concerned with:*
- a. *international cooperation and or outsourcing operation*
  - b. *fulfil the need of general population especially farmers and fishermen*
  - c. *open management practice*
  - d. *changing institutional practice.*
  - e. *changing socio cultural practice*
  - f. *creating of the necessary conducive states for space science and technology development*
  - g. *the correspondence, consistence, and coherence of its tasks with Pancasila*

**Good Luck**

**Question 1**

*'Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security'*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are *scientific community*  
 The 'ought to be' beneficiaries are: *present and future generation, the nature, the Republic of Indonesia as a whole, and the world.* Government agencies, Industry, Science and technology community, General population especially fishermen and farmers, Present & future generation,
- a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*  
 The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*
- a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*  
 The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer)* Agencies (government & private), Industries (government & private), Local government, Researcher,
- a.iv The experts used in the Sipesmik process are: *space science and technology experts*  
 The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.v The representative of those affected by Sipesmik are: *local governments*  
 The 'ought to be' representatives are: *Indonesia Consumer Institute, Local Governments and NGOs.*
- b. The conditions that are controlled by the decision maker are resources allocation (executive) resources sharing approval (Beneficiaries)

- The conditions that are not controlled by decision makers: *power concerned (science and technology, economy, socio cultural, legal- political, nature)*
- c. The constraints on the decision makers are *national capacity on space science and technology*
- The 'ought to be' constraints on the decision makers are: *sustainable food*
- d. The power to ensure success of Sipesmik held by The Government
- e. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to

### Question 3

1. Efficiency *Holds an appropriate monitoring and control system with continuously improved performance standard*
2. Effectiveness *Holds (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s)*
3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
4. Equity *Provide all parties equal access to: information, science and technology, resources, market and decision making*
5. Ethicality *Conforms to general principle of ethics*
6. Elegancy *Aesthetical, attractive and challenging to increase/maintain security and prosperity of general population*

### Comments and suggestions

- 1) *Learned from the Interactive Model of Innovation Process (Manley, 2001), please be advised that Sipesmik should have two basic tasks:*
- a. *develop space science and technology innovation, which include (a) basic science or demand (b) research and development (c) production or construction (d) mission and house keeping operation and (e) Marketing or Sales.*
  - b. *create conducive states for space science and technology innovation development, which consider (1) local government participation, (2) economic productivity, (3) regulating the Sipesmik, (4) managing the*

*physical environment, (5) changing institutional practice and (6) changing socio cultural practice.*

- 2) Sipesmik is an educational process where the actors are object of its educational programs to facilitate the intended social process. Its education program for researchers should be transformable into formal education credit, so that from their activities the researchers can write up theses for their master or doctor degrees. Therefore its indicator of success should include 'Well trained and educated system participants (actors). In support to this, universities should participate in the Sipesmik especially focusing on education, research and development.*
- 3) Due to its limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation.*
- 4) Sipesmik should fulfil the need of general population especially farmers and fishermen. Its organization should be a network that includes all supporter facilities, and it should have an improvement mechanism.*
- 5) The necessary investment for Sipesmik should be generated from the government.*

**Good Luck**



**Question 1**

*'Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security'*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *scientific community*

The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation, Science and technology community, General population especially fishermen and farmers, Present & future generation,*

- a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*

The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*

- a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*

The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Agencies (government & private), Industries (government & private), Local government, Researcher,*

- a.iv The experts used in the Sipesmik process are: *space science and technology experts*

The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*

- a.v The representative of those affected by Sipesmik are: *local governments*

The 'ought to be' representatives are: *Indonesia Consumer Institute, and Local Governments and NGO's.*

- b. The conditions that are controlled by the decision makers are resources allocation (executive) and resource sharing approval (beneficiaries)

The condition that are not controlled by the decision makers are *power concerned (science and technology, economy, socio cultural, legal- political, nature)*

- c. The constraints on the decision makers are *national capacity on space science and technology*  
The 'ought to be' constraints: *sustainable food*
- d. The power to ensure success of Sipesmik held by: the Government
- e. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

1. Efficiency *Has the character of an effective plan and has an appropriate monitoring and control system with continuously improved performance standards*
2. Effectiveness *Has (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s), guided by fix constraint(s)*
3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
4. Equity *Conforms to human dignity by providing equal access to: information, science and technology, resources, market and decision making. Acknowledges the existence of power of the nature, science and technology, economy, social and culture, legal and political*
5. Ethicality *Conforms to professional ethics*
6. Elegancy *Aesthetical and capable of increasing the quality of life of the general population*

### Comments and suggestions

- 1) *Learned from Technology Innovation Development Model (Manley, 2001), please be advised that there are two main tasks of Sipesmik: (1) develop space science and technology, (2) create the necessary conducive states for developing space science and technology. As a lawyer, I would rather focus on the latter especially regarding the important of regulating the Sipesmik. Focus of this task should be (a) 'protect and support legally the Sipesmik'. In*

*support to point (a) four integrated tasks should be included: (b) provide consultation and aid to solve legal case and to prepare legal documents (c) increase Sipesmik participants understanding on laws and regulations, (d) establish guidance for implementation of laws and regulation for Sipesmik, (e) initiate creation of new laws and regulations including ratification or accession of international laws/regulations.*

- 2) *Sipesmik should fulfill the need of general population especially farmers and fishermen*
- 3) Sipesmik should practice open management
- 4) The Sipesmik investment must be mainly generated from the government.
- 5) The Sipesmik shall have the necessary national commitment
- 6) Increase and maintain local government participation
- 7) Increase and maintain economic productivity
- 8) Change institutional practice
- 9) Increase and maintain the dynamics of regulating the system
- 10) Increase and maintain the dynamic of managing the natural environment
- 11) Sipesmik holds cross-sector tasks from research and development, up to sustainable food which indicator of success consists of science and technology, socio cultural, economical, institutional and physical indicators therefore Depanri, as the national space council, should take the initiative to regulate Sipesmik.
- 12) Sipesmik holds high level goals: micro satellite for sustainable food, this give lawyers a challenge on how laws can and should be used to achieve such political and social goals.
- 13) Is there any jurisprudence on how laws can and should be used to achieve sustainable food?
- 14) There are international laws and regulations that should be taken into consideration in managing the Sipesmik such as: Space Treaty, 1967; Registration convention, 1972, and Liability Convention 1973.
- 15) Adhere MTCR provides possibility to get access to high technology market.
- 16) Joint / access to MTCR means ready to accept international inspection of all facilities including those belong to arm forces

- 17) There is no national blue print for space science and technology development, therefore decision on projects are often based on short term political expediency
- 18) A number of cooperation agreements between institutions were signed but discontinuance of program often happens in accordance with tour of duty events
- 19) We have to follow up with actions program the Indonesia National Concept on Space that has been promulgated by the President as Chairman of Depanri in 1998.
- 20) Creation of the necessary conducive states for space science and technology development is strategically needed for Sipesmik
- 21) There is a need for a national commitment: government (legislative & executive) and public for Sipesmik so that continuance of the program be guaranteed
- 22) Sipesmik should be correspondence, consistence, and coherence with Pancasila.
- 23) Space activity develops and varies at almost all efforts of fulfilling human needs, therefore Depanri as the national space council should be more active so that people are at the position to grasp all possible space benefits.
- 24) New laws and regulations including ratification or accession of international laws/regulations
- 25) Participants understanding on laws and regulations
- 26) Consultation and aid to solve legal cases and to prepare and assess legal documents
- 27) Protected and supported legally the system
- 28) Regulatory supported and protected the space activities
- 29) National commitment on Sipesmik

**Good Luck**

## Question 1

*'Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security'*

## Question 2

a.i The beneficiaries of the Sipesmik process are: *scientific community*

The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation, Science and technology community, General population especially fishermen and farmers, Present & future generation,*

a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*

The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*

a.iii The planner in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*

The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Agencies (government & private), Industries (government & private), Local government, Researcher,*

a.iv The experts used in the Sipesmik process are: *space science and technology experts*

The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*

a.v The representative of those affected by Sipesmik are: *local governments*

The 'ought to be' representatives are: *ASSI and Local Governments.*

b. The conditions that are controlled by the decision makers are resources allocations

The conditions that are not controlled by decision makers are: *power concerned (science and technology, economy, socio cultural, legal-political, nature)*

- c. The constraints on the decision makers are *national capacity on space science and technology*  
The 'ought to be' constraints: *sustainable foods*
- d. The power to ensure success of Sipesmik held by the Government
- e. Yes those are affected by Sipesmik allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

1. Efficiency *Holds an appropriate monitoring and control system with continuously improved standards performance*
2. Effectiveness *Hold (an) achievable objective(s) with measurable indicator of successes, and rational steps of action to realize the objectives*
3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
4. Equity *Provide all parties equal access to: information, science and technology, resources, market and decision making*
5. Ethicality *Conforms to general principle of ethics with focus to stakeholders*
6. Elegancy *Aesthetical and increases/maintains the security and prosperity of general population*

### Comments and suggestions

- 1) *In addition to space science and technology aspects, Sipesmik should fulfil the need of general population especially farmers and fishermen, therefore the major investment should be generated from the government, since it is a long term investment where direct economic benefit is not easy to monitored.*
- 2) *Due to the above situation, a national commitment should be established for Sipesmik.*
- 3) *It should also be noted the important of creating the necessary conducive states for space science and technology development through increase/maintain the dynamics of managing the natural environment that includes tasks as follows:*
  - a. *move towards sustainable nature*
  - b. *reduce waste*

- c. *increase/maintain water health*
  - d. *increase/maintain ecological health, and*
  - e. *increase/maintain natural environment support on food production*
- 4) *A part to space science and technology and food supply aspects, the indicators of success, should include:*
- a. *Preserved flora fauna diversity*
  - b. *Reduced waste*
  - c. *Qualified water health and drainage*
  - d. *Preserved natural habitat*
  - e. *Vegetation re-growth*
- 5) *A part to natural environment management, other aspects that should also be considered by Sipesmik among others are:*
- a. *economic productivity*
  - b. *changing institutional practice*
  - c. *changing socio cultural practice*

**Good Luck**

## Question 1

*'Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security'*

## Question 2

- a.i The beneficiaries of the Sipesmik process are: *scientific community*  
 The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation Government agencies, Industry, Scientists/researchers, Science and technology community, General population especially fishermen and farmers, Present & future generation,*
- a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*  
 The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*
- a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*  
 The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Agencies (government & private), Industries (government & private), Local government, Researcher,*
- a.iv The experts used in the Sipesmik process are: *space science and technology experts*  
 The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.v The representative of those affected by Sipesmik are: *local governments*  
 The 'ought to be' representatives are: *ASSI and Local Governments*
- b. The conditions that are controlled by the decision makers are *resources allocation*  
 The condition that are not controlled by decision makers: *power concerned (science and technology, economy, socio cultural, legal-political, nature)*
- c. The constraints on the decision makers are *national capacity on space science and technology*



Ought to be constraints: *sustainable foods*

- d. The power to ensure success of Sipesmik held by the Government
- c. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

- 1. Efficiency *Hold an appropriate monitoring and control system with continuously improved standards performance*
- 2. Effectiveness *Hold (an) achievable objective(s) with measurable indicators of successes, and rational steps of action to realize the objective(s)*
- 3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
- 4. Equity *Provide all parties equal access to: information, science and technology, resources, market and decision making.*
- 5. Ethicality *Conforms to general principle of ethics with focus to stakeholders*
- 6. Elegancy *Aesthetical, attractive and challenging to increase/maintain security and prosperity of general population*

### Comments and suggestions

1) From Manley model it can be derived suggestions as follows: Sipesmik should have two basic tasks:

- a. *develop space science and technology innovation that include:*
  - i. *basic science or demand*
  - ii. *research and development*
  - iii. *production or construction*
  - iv. *operation and*
  - v. *Marketing or Sales.*
- b. *create conducive states for space science and technology innovation development that should include*
  - i. *local government participation,*
  - ii. *economic productivity,*
  - iii. *regulation*

- iv. *physical environment management*
- v. *changing of institutional practice, and*
- vi. *changing socio cultural practice.*

- 2) *Due to the vast aspects to be covered by Sipesmik, it needs a large investment that its intangible benefits might be greater than the tangibles, therefore to secure the continuance of the project, the major investment for it, should be generated from the government. For this a national commitment should be established.*
- 3) *Sipesmik should fulfil the need of general population especially farmers and fishermen.*
- 4) *Executor of Sipesmik should include not only members of Depanri but also the others who are responsible for sea, fisheries, agriculture, environment, trade, industry, social affairs, education, culture and local governments.*
- 5) *For the success of Sipesmik, well trained and educated system participants (actors) are essential. Its education program for researchers should be transformable into formal education credit, so that from their activities the researchers can write up thesis for their master or doctor degrees.*
- 6) *Creation of sustainable food is closely related with morphological unit such as catchment area, therefore integration of catchment area management program with Sipesmik is advised (Bengawan Solo catchment area project)*
- 7) *Due to the vast area and to its maritime circumstances, the Sipesmik management structure is suggested as a network that consist seven nodes that spread out in the main and group of islands: Sumatra, Kalimantan, Sulawesi, Maluku, Irian Jaya, Nusa Tenggara and Jawa - Bali*
- 8) *The management of structure of Sipesmik is suggested to be a network with two clusters that regionally separated by the Wallace line, an imaginary line postulated by A.R. Wallace, as dividing line between Asian and Australian fauna, which passes between Bali and Lombok islands and between Kalimantan and Sulawesi*
- 9) *Due to the important role of Local Governments, but sustainable food is closely related to physical condition therefore the Sipesmik system management should accommodate both administrative and physical boundaries.*

*10) Due to physical condition, that the capability to produce food varies from one region to another, an appropriate system for transportation and communication is needed for the creation and maintaining a national sustainable food condition.*

*11) To create and maintain a national sustainable food condition, an up to date natural resources data base is fundamentally needed, while space remote sensing can help provide real time natural resources data, therefore Sipesmik shall have an appropriate mechanism that realizes that logic relation in real lives.*

**Good Luck**

## Question 1

*'Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security'.*

## Question 2

a.i The beneficiaries of the Sipesmik process are: *scientific community*

The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation* Government agencies, Industry, Science and technology community, General population especially fishermen and farmers, Present & future generation.

a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*

The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*

a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*

The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Agencies (government & private), Industries (government & private), Local government, Researcher,*

a.iv The experts used in the Sipesmik process are: *space science and technology experts*

The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*

a.v The representative of those affected by Sipesmik are: *local governments*

The 'ought to be' representatives are: *ASSI and Local Governments.*

b. The conditions that are controlled by the decision makers are *resources allocation (executive) and resource sharing approvals (beneficiaries)*

The conditions that are not controlled by decision makers are: *power concerned (science and technology, economy, socio cultural, legal- political, nature)*

- c. The constraints on the decision makers are *national capacity on space science and technology*  
The 'ought to be' constraints are: *sustainable food*
- d. The power to ensure success of Sipesmik held by: the Government
- e. Yes those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to

### Question 3

- 1. Efficiency *Hold the character of an effective plan and an appropriate monitoring and control system with continuously improved standards performance*
- 2. Effectiveness *Hold an achievable objective with measurable indicators of success, and rational steps of action to realize the objective*
- 3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
- 4. Equity *Provide all parties equal access to: information, science and technology, resources, market and decision making*
- 5. Ethicality *Conforms to general principle of ethics*
- 6. Elegancy *Aesthetical, attractive and challenging to increase/maintain the security and prosperity of general population*

### Comments and suggestions

- 1) *Please inform me the end result of this research.*
- 2) *Sipesmik is an educational process where the actors are object of its educational programs to facilitate the intended social process.*
- 3) *Due to it's limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation.*
- 4) *Sipesmik should fulfil the need of general population especially farmers and fishermen*
- 5) *Sipesmik should practice open management*
- 6) *Major investment for Sipesmik should be generated from the government.*
- 7) *The Sipesmik shall have the necessary national commitment*
- 8) *Increase and maintain economic productivity*
- 9) *Change institutional practice*

- 10) *Sipesmik is an educational process where the actors are object of its educational programs to facilitate the intended social process.*
- 11) *Due to it's limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation*
- 12) *Qualified space science and technology human resources spread out in a number of institutions both government and private but networking is still very limited among them*
- 13) *Creation of the necessary conducive states for space science and technology development is strategically needed for Sipesmik*
- 14) *There is a need for a national commitment: government (legislative & executive) and public for Sipesmik so that continuance of the program be guaranteed*
- 15) *Well trained and educated system participants (actors)*

**Good Luck**

**Question 1**

*'Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security'*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *scientific community*  
 The 'ought to be' beneficiaries are: *the R-public of Indonesia as a whole, the nature, present and future generation* Government agencies, Industry, Scientists/researchers, Science and technology community, General population especially fishermen and farmers, Present & future generation,
- a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*  
 The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*
- a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*  
 The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Depanri/Lapan, Agencies (government & private), Industries (government & private), Local government, Fishermen & farmers, Researcher,*
- a.iv The experts used in the Sipesmik process are: *space science and technology experts*  
 The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.v The representative of those affected by Sipesmik are: *local governments*  
 The 'ought to be' representatives are: *ASSI and Local Governments*
- b. The conditions that are controlled by the decision makers are resources allocation (executive), resources sharing approval (beneficiaries).  
 The conditions that are not controlled by the decision makers are *power concerned (science and technology, economy, socio cultural, legal- political, nature)*

- c. The constraints on the decision makers are *national capacity on space science and technology*  
The 'ought to be' constraints on the decision makers are: *sustainable food*
- d. The power to ensure success of Sipesmik held by The Government
- e. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to?

### Question 3

- 1. Efficiency *Hold an appropriate monitoring and control system with continuously improved standards performance*
- 2. Effectiveness *Hold (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s)*
- 3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
- 4. Equity *Provide all parties equal access to: information, science and technology, resources, market and decision making*
- 5. Ethicality *Conforms to general principle of ethics with focus to stakeholders*
- 6. Elegancy *Aesthetical, attractive and challenging to increase/maintain security and prosperity of general population*

### Comments and suggestions

- 1) *Some suggestions for Sipesmik can be derived from Manley model. Sipesmik should have two basic tasks:*
  - a. *develop space science and technology innovation that include*
    - i. *develop basic science or demand*
    - ii. *research and development*
    - iii. *production or construction*
    - iv. *operation that include mission operation and house keeping operation and*
    - v. *Marketing or Sales.*
  - b. *create conducive states for space science and technology innovation development, that should include:*
    - i. *increase/maintain local government participation,*
    - ii. *increase/maintain economic productivity,*



- iii. *change of institutional practice,*
  - iv. *change the socio cultural practice,*
  - v. *increase/maintain dynamics of regulating the Sipesmik and*
  - vi. *increase/maintain the dynamics of managing the physical environment.*
- 2) *Sipesmik should fulfil the need of general population especially farmers and fishermen*
  - 3) *The Sipesmik investment must be mainly generated from the government.*
  - 4) *The Sipesmik shall have the necessary national commitment*
  - 5) *Due to it's limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation*
  - 6) *As a non adherent country to several international laws and regulation such as MTCR Indonesia gets difficulties in getting the necessary parts, instruments and materials for space science and technology developments.*
  - 7) *Creation of the necessary conducive states for space science and technology development is strategically needed for Sipesmik*
  - 8) *There is a need for a national commitment: government (legislative & executive) and public for Sipesmik so that continuance of the program be guaranteed*
  - 9) *Some indicators that should be monitored within Sipesmik are as follows:*
    - a. *Determined the basic sciences to be implemented in space products*
    - b. *Determined the space product demands to be fulfilled*
    - c. *Determined the space product engineering designs based on the determined basic science to be implemented in space products demands to be fulfilled*
    - d. *Produced the space goods based on the determined space product basic engineering designs.*
    - e. *Constructed & commissioned the space systems based on the determined basic engineering designs*
    - f. *Operated the commissioned space systems to fulfil the space services demands*
    - g. *The system output sold: space systems, space goods and services, also copy rights and patents*
    - h. *Well trained and educated system participants (actors)*
    - i. *National commitment on Sipesmik*

**Good Luck**

**Question 1**

*'Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security'*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *scientific community*  
 The 'ought to be' beneficiaries are: *remote sensing data users and store and forward communication data users especially farmers and fishermen*  
 Government agencies, Industry, Scientists/researchers, Science and technology community, General population especially fishermen and farmers, Present & future generation,
- a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*  
 The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*
- a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*  
 The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer) Depanri/Lapan, Agencies (government & private), Industries (government & private), Local government, Scientist/ academician,*
- a.iv The experts used in the Sipesmik process are: *space science and technology experts*  
 The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.v The representative of those affected by Sipesmik are: *local governments*  
 The 'ought to be' representatives are: *ASSI and Local Governments.*

- b. The conditions that are controlled by the decision makers are resources allocation (executive), resources sharing approval (beneficiaries). The conditions that are not controlled by decision makers are *power concerned (science and technology, economy, socio cultural, legal- political, nature)*
- c. The constraints on the decision makers are *national capacity on space science and technology*.  
The 'ought to be' constraints are: *sustainable food*
- d. The power to ensure success of Sipesmik held by the Government
- e. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to

### Question 3

- 1. Efficiency *Hold an appropriate monitoring and control system with continuously improved performance standards*
- 2. Effectiveness *Hold (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s)*
- 3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
- 4. Equity *Conform to general principles of fairness, right and justice*
- 5. Ethicality *Conform to professional ethics*
- 6. Elegancy *Capable to develop the life quality of the people*

### Comments and suggestions

1) Sipesmik should have two basic tasks:

- a. *develop space science and technology innovation that include:*
  - i. *develop basic science or demand*
  - ii. *research and development*
  - iii. *production or construction*
  - iv. *operation that include 'mission operation' and 'house keeping operation', and*
  - v. *Marketing or Sales.*
- b. *create conducive states for space science and technology innovation development that should include:*
  - i. *increase /maintain local government participation,*

- ii. *increase/maintain economic productivity,*
  - iii. *change of institutional practice,*
  - iv. *change the socio cultural practice,*
  - v. *increase/maintain dynamics of regulating the Sipesmik and*
  - vi. *increase/maintain the dynamics of managing the physical environment*
- 2) *Sipesmik should fulfil the need of general population especially farmers and fishermen*
  - 3) *The major investment for Sipesmik should be mainly generated from the government.*
  - 4) *Sipesmik should take advantages of DLR offer to LAPAN in using its space research facilities*
  - 5) *As a non adherent country to several international laws and regulation such as MTCR Indonesia gets difficulties in getting the necessary parts, instruments and materials for space science and technology developments.*
  - 6) *Some indicators that should be monitored within Sipesmik, should include*
    - a. *Determined the basic sciences to be implemented in space products*
    - b. *Determined the space product demands to be fulfilled*
    - c. *Determined the space product engineering designs based on the determined basic science to be implemented in space products demands to be fulfilled*
    - d. *Produced the space goods based on the determined space product basic engineering designs.*
    - e. *Constructed & commissioned the space systems based on the determined basic engineering designs*
    - f. *Operated the commissioned space systems to fulfil the space services demands*
    - g. *The system output sold: space systems, space goods and services, also copy rights and patents*
    - h. *Well trained and educated system participants (actors)*

**Good Luck**

## Question 1

*'Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security'*

## Question 2

- a.i The beneficiaries of the Sipesmik process are: *satellite interested parties*  
The 'ought to be' beneficiaries are: *remote sensing data users and store and forward sea surface data user observation data users*. Scientists/researchers, Science and technology community, General population especially fishermen and farmers, Present & future generation,
- a.ii The decision maker of the Sipesmik process is: *Lapan (government)*  
The 'ought to be' decision makers are *Lapan and the 'ought to be' beneficiaries*
- a.iii The planner in the Sipesmik process is: *Lapan*,  
The 'ought to be' planners are: *Lapan and the 'ought to be' beneficiaries*, Depanri/Lapan, Agencies (government & private), Industries (government & private), Local government, Fishermen & farmers, Researcher,
- a.iv The experts used in the Sipesmik process are: *Lapan scientist and research partners*  
The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.v The representatives of those affected by Sipesmik are: *local governments*  
The 'ought to be' representatives are: *ASSI and Local Governments*.
- b. The conditions that are controlled by the decision makers are *resources allocation (Lapan), resources sharing approval*  
The conditions that are not controlled by decision makers are *power of science and technology, economy, socio cultural, legal-political, and the nature*
- c. The constraints on the decision makers are *national capacity on space science and technology*  
The 'ought to be' constraints are *sustainable food*
- d. The power to ensure success of Sipesmik held by: *the Government*

- c. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

1. Efficiency *Hold an appropriate monitoring and control system with continuously improved standards performance*
2. Effectiveness *Hold (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s)*
3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
4. Equity *Provide all parties equal access to: information, science and technology, resources, market and decision making*
5. Ethicality *Conforms to professional ethics*
6. Elegancy *Aesthetical and increases/maintains security and prosperity of the general population*

### Comments and suggestions

- 1) *It is necessary for creating conducive states for space science technology development to increase/maintain the local government participation in the Sipesmik through:*
  - a. *develop local government trust on Sipesmik*
  - b. *develop the belief of local government that space technology is capable:*
    - i. *to increase economic productivity of fishing and agriculture*
    - ii. *to support sustainable nature*
  - c. *develop the belief on the need of:*
    - i. *on the need of an appropriate socio-cultural state for sustainable food supply*
    - ii. *on the need of an appropriate institutional practice for sustainable food supply*
    - iii. *on the need of natural environment for sustainable food supply*
  - d. *develop knowledge/ understanding on how help support space technology development and use*

- 2) *Sipesmik should fulfil the need of general population especially farmers and fishermen*
- 3) *The major investment for Sipesmik should be mainly generated from the government.*
- 4) *The Sipesmik shall have the necessary national commitment*
- 5) *Sipesmik should take advantages of Lapan cooperation with ISRO whose TT&C station is operated by LAPAH crews in Biak, Irian Jaya, Indonesia.*
- 6) *Sipesmik should take advantages of what Lapan cooperation with Malaysian Space Agency in developing micro satellite*
- 7) *As a non adherent country to several international laws and regulation such as MTCR Indonesia gets difficulties in getting the necessary parts, instruments and materials for space science and technology developments.*
- 8) *Some indicators that should be monitored within Sipesmik among others:*
  - a. *determined basic sciences to be implemented in space products*
  - b. *determined space product demands to be fulfilled*
  - c. *determined space product engineering designs based on the determined basic science to be implemented in space products demands to be fulfilled*
  - d. *produced space goods based on the determined space product basic engineering designs.*
  - e. *constructed & commissioned space systems based on the determined basic engineering designs*
  - f. *operated the commissioned space systems to fulfil the space services demands*
  - g. *system output sold: space systems, space goods and services, also copy rights and patents*
  - h. *well trained and educated system participants (actors)*

**Good Luck**

## Question 1

*'Why develop our own satellite, global space market provides choices so that we can choose based on our own criteria that include especially preserving our nature through minimum release of manmade debris in space'*

## Question 2

- a.i The beneficiaries of the Sipesmik process are: *satellite scientists*,  
The 'ought to be' beneficiaries of the Sipesmik are: *satellite operators, satellite users and national industry, Scientists/researchers, Science and technology community, Nature (living and non living things)*.
- a.ii The decision makers of the Sipesmik process are: *Lapan satellite scientists*  
The 'ought to be' decision makers of the Sipesmik process are: *Lapan satellite scientist and the 'ought to be' beneficiaries*.
- a.iii The planners in the Sipesmik process are: *Lapan satellite scientists*  
The 'ought to be' planners in the Sipesmik process are: *satellite scientists and the 'ought to be' beneficiaries, Depanri/Lapan, Agencies (government & private), Industries (government & private), Scientist/ academician*,
- a.iv The experts used in the Sipesmik process are: *Lapan satellite scientists*  
The 'ought to be' experts used in the Sipesmik process are: *Lapan satellite scientists and the 'ought to be' beneficiaries*
- a.v The representative of those affected by Sipesmik process are: *local government, advocacy organization*.  
The 'ought to be' representatives of who are affected by the Sipesmik process are: *PTDI and other representatives of suppliers, contractors, consultant and consumers*.
- b. The conditions that are controlled by the decision makers are resources allocation (Lapan) *resources sharing approval (beneficiaries)*  
The conditions that are not controlled by the decision makers are *global market and free trade*
- c. The constraints on the decision makers are *technological and financial feasibility of Sipesmik*



The 'ought to be' constraints: *legal, economy, social and cultural conditions*

- d. The power to ensure success of Sipesmik held by the investor: government
- c. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to

### Question 3

- 1. Efficiency      *Ratio between structure to total weights*
- 2. Effectiveness      *The mountable of the whole satellite components*
- 3. Efficacy      *Integration easiness of the whole components*
- 4. Equity      *The mountable components as planned*
- 5. Ethicality      *No need*
- 6. Elegancy      *No need*

### Comments and suggestions

- 1) *Sipesmik should be concerned with environmental health.*
- 2) *It should also be concerned with minimum space debris.*
- 3) *Sipesmik should result in well trained and educated system participants (actors)*

**Question 1**

*'Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security'*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *scientific community*

The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation Scientists/researchers, Science and technology community, General population especially fishermen and farmers, Present & future generation,*

- a.ii The decision makers of the Sipesmik process are *government (executive and legislative)*

The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*

- a.iii The planner in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*

The 'ought to be' planners are: *executive (Lapan, d. agriculture, d. sea & fisheries d. trade & industry, d. social, d. education & culture), and the representatives of beneficiaries (local governments, fishermen and farmer), Depanti/Lapan, Agencies (government & private), Industries (government & private), Local government, Researcher,*

- a.iv The experts used in the Sipesmik process are: *space science and technology experts*

The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*

- a.v The representative of those affected by Sipesmik are: *local governments*

The 'ought to be' representatives are: *ASSI and Local Governments.*

- b. The conditions that are controlled by the decision makers resources *allocation (executive) resources sharing (beneficiaries)* The condition that are not

controlled by the decision makers: *power concerned (science and technology, economy, socio cultural, legal- political, the nature)*

- c. The constraints on the decision makers are *national capacity on space science and technology*

The 'ought to be' constraints are: *sustainable food*

- d. The power to ensure success of Sipesmik is held by: *the Government*
- e. Yes those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

1. Efficiency *Holds the character of an effective plan and has an appropriate monitoring and control system with continuously improved performance standard*
2. Effectiveness *Holds (an) achievable objective(s) with measurable indicator of successes, and rational steps of action to realize the objectives*
3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
4. Equity *Provides all parties equal access to: information, science and technology, resources, market and decision making*
5. Ethicality *Conforms to professional ethics*
6. Elegancy *Aesthetical, and capable to increase/maintain security and prosperity of the general population*

### Comments and suggestions

- 1) *Based on our discussion during the interview, please be advised the important of creating conducive states for space science and technology development, through increase/ maintain the economic productivity of sea fishing and agricultural activities. This task should include:*
- a. *establish sustainable energy/material flows*
  - b. *determine inputs/outputs for activities & and their impacts*
  - c. *establish policies which maximize production efficiencies*
  - d. *establish waste minimization policies*
  - e. *promote policies which encourage efficiency & minimize harms*

- f. ensure policies encourage sustainable high level of economic activity*
- 2) *Sipesmik should fulfill the need of general population especially farmers and fishermen*
- 3) *The major investment needed for Sipesmik should be mainly generated from the government.*
- 4) *Some indicators that should be monitored within Sipesmik are as follows:*
  - a. Determined the basic sciences to be implemented in space products*
  - b. Determined the space product demands to be fulfilled*
  - c. Determined the space product engineering designs based on the determined basic science to be implemented in space products demands to be fulfilled*
  - d. Produced the space goods based on the determined space product basic engineering designs.*
  - e. Constructed & commissioned the space systems based on the determined basic engineering designs*
  - f. Operated the commissioned space systems to fulfill the space services demands*
  - g. The system output sold: space systems, space goods and services, also copy rights and patents*
  - h. Well trained and educated system participants (actors)*

**Good Luck**

**Question 1**

*'Cooperative way of managing the Sipesmik could guarantee the practice of open management and the use of satellite, which is limited for peaceful purposes'*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are *satellite scientists*,  
The 'ought to be' beneficiaries of the Sipesmik are: users of *satellite services: remote sensing, telecommunication, etc.* Scientists/researchers, Science and technology community, Nature (living and non living things),
- a.ii The decision makers of the Sipesmik process are Lapan (*satellite scientists*)  
The ought to be decision makers are Lapan and beneficiaries (*users of satellites services*)
- a.iii The planners in the Sipesmik process are *satellite scientists*  
The 'ought to be' planners in the Sipesmik process are: *satellite scientists and beneficiaries, Depanri/Lapan, Agencies (government & private), Industries (government & private), Scientist/ academician,*
- a.iv The experts used in the Sipesmik process are *satellite scientists*  
The 'ought to be' experts used in the Sipesmik process are: *satellite scientists and beneficiaries*
- a.v The representative of those affected by Sipesmik *local governments*  
The 'ought to be' representatives of who are affected by the Sipesmik process is: *ASSI (Indonesia Association of Satellite Systems), MAPIN (Remote Sensing Community of Indonesia) to represent suppliers, contractors, and consumers*
- b. The conditions that are controlled by the decision makers are resources allocation including *technology and finance*.  
The conditions that are not controlled by decision makers are *global market, free trade*
- c. The constraints on the decision makers are *technological and financial feasibility of Sipesmik*  
The ought to be constraints on decision makers are *social and cultural conditions*
- d. The power to ensure success of Sipesmik held by the investor

- c. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to

### Question 3

1. Efficiency *Ratio between output and input*
2. Effectiveness *Ratio between the achieved and the total objective*
3. Efficacy *Ratio between the resources available and the resources needed to execute the plan*
4. Equity *Conforms to the general principle of right and justice, due process, both internally and externally*
5. Ethicality *Conforms to general principle of ethics with focus to stakeholders*
6. Elegancy *Public opinion of usefulness of the project to raise their quality of life*

### Comments and suggestions

- 1) *The major investment for Sipesmik should be mainly generated from the government.*
- 2) *Change institutional practice*
- 3) *Creation of the necessary conducive states for space science and technology development is strategically needed for Sipesmik*
- 4) *There is a need for a national commitment: government (legislative & executive) and public for Sipesmik so that continuance of the program be guaranteed*
- 5) *Well trained and educated system participants (actors)*
- 6) *Open management*
- 7) *Cooperative works with open decision making*

Good luck

**Question 1**

*'Cooperative way of managing the Sipesmik could guarantee the practice of open management and the use of satellite, which is limited for peaceful purposes'*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *satellite scientists*,  
The 'ought to be' beneficiaries of the Sipesmik are: users of *satellite services: remote sensing, telecommunication, etc.* Scientists/researchers, Science and technology community, Nature (living and non living things),
- a.ii The decision makers of the Sipesmik process are Lapan (*satellite scientists*)  
The 'ought to be' decision makers are *Lapan and beneficiaries (users of satellites services)*
- a.iii The planners in the Sipesmik process are *satellite scientists*  
The 'ought to be' planners in the Sipesmik process are: *satellite scientists and beneficiaries, Depanri/Lapan, Agencies (government & private), Scientist/academician,*
- a.iv The experts used in the Sipesmik process are: *satellite scientists*  
The 'ought to be' experts used in the Sipesmik process are: *satellite scientists and beneficiaries*
- a.v The representative of those affected by Sipesmik are: *local governments*  
The 'ought to be' representatives of who are affected by the Sipesmik process is: *ASSI (Indonesia Association of Satellite Systems), MAPIN (Remote Sensing Community of Indonesia) to represent suppliers, contractors, and consumers*
- b. The conditions that are controlled by the decision maker resources allocation including technology and finance.  
The condition that are not controlled by the decision makers are: *global market, free trade*
- c. The constraints on the decision makers are *technological and financial feasibility of Sipesmik*  
The 'ought to be' constraints are *social and cultural conditions*
- d. The power to ensure success of Sipesmik held by: the investor

- e. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

- |                  |  |
|------------------|--|
| 1. Efficiency    | <i>Focus on the appropriate use of resources</i>           |
| 2. Effectiveness | <i>Ratio between the achieved and the total objective</i>  |
| 3. Efficacy      | <i>Non bureaucratic environment</i>                        |
| 4. Equity        | <i>Accountability of work achievement and rewards</i>      |
| 5. Ethicality    | <i>Conforms to professional ethics</i>                     |
| 6. Elegancy      | <i>Usefulness of a project to people's quality of life</i> |

### Comments and suggestions

- 1) *Sipesmik should practice open management*
- 2) *The major investment for Sipesmik should be mainly generated from the government.*
- 3) *The Sipesmik shall have the necessary national commitment*
- 4) *Change institutional practice*
- 5) *Creation of the necessary conducive states for space science and technology development is strategically needed for Sipesmik*
- 6) *Well trained and educated system participants (actors)*
- 7) *Cooperative works with open decision making (Open management)*

**Good luck**



**Question 1**

*Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *scientific community*  
 The 'ought to be' beneficiaries are: *present and future generation, the nature and the Republic of Indonesia as a whole, Scientists/researchers, Science and technology community, General population especially fishermen and farmers, Present & future generation,*
- a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*  
 The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*
- a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance*  
 The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Depanri/Lapan, Agencies (government & private), Industries (government & private), Local government, Scientist/ academician,*
- a.iv The experts used in the Sipesmik process are: *space science and technology experts*  
 The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.v The representative of those affected by Sipesmik are: *local governments*  
 The 'ought to be' representatives are: *ASSI, AITEI, and Local Governments.*
- b. The conditions that are controlled by the decision maker: *resources allocation resource sharing approval*

The condition that are not controlled by the decision makers are *power concerned (science and technology, economy, socio cultural, legal- political, nature)*

- c. The constraints on the decision maker are *national capacity on space science and technology*  
The ought to be constraints on the decision makers are *sustainable food*
- d. The power to ensure success of Sipesmik held by: the Government
- e. Yes those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes they should be allowed to.

### Question 3

- 1. Efficiency *Hold an appropriate monitoring and control system with continuously improved standards performance*
- 2. Effectiveness *Hold (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s)*
- 3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
- 4. Equity *Conforms to general principle of fairness and balance of power*
- 5. Ethicality *Conform to professional ethics*
- 6. Elegancy *Usefulness of a project to people's quality of life*

### Comments and suggestions

- 1) *Based on our discussion during the interview, it should be noted the important of creating the necessary conducive states for space science and technology development through changing institutional practice that includes tasks as follows:*
- 2) *increase acceptance of Sipesmik by government agencies, privates and foreign partners,*
- 3) *increase financial support & resource sharing*
- 4) *train & educate Sipesmik actors (owners, executors and clients)*
- 5) *ensure interdepartmental and international cooperation*
- 6) *increase horizontal management links*

- 7) *Sipesmik should fulfill the need of general population especially farmers and fishermen*
- 8) *The Sipesmik investment must be mainly generated from the government.*
- 9) *Sipesmik should take advantages of what Lapan cooperation with Malaysian Space Agency in developing micro satellite*
- 10) *Indicators that should be monitored within Sipesmik should include:*
  - a. *Determined the basic sciences to be implemented in space products*
  - b. *Determined the space product demands to be fulfilled*
  - c. *Determined the space product engineering designs based on the determined basic science to be implemented in space products demands to be fulfilled*
  - d. *Produced the space goods based on the determined space product basic engineering designs.*
  - e. *Constructed & commissioned the space systems based on the determined basic engineering designs*
  - f. *Operated the commissioned space systems to fulfill the space services demands*
  - g. *The system output sold: space systems, space goods and services, also copy rights and patents*
  - h. *Well trained and educated system participants (actors)*

**Good Luck**

**Question 1**

*Why develop our own satellite, global space market provides choices so that we can choose based on our own criteria that include especially preserving our nature through minimum release of manmade debris in space*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *satellite scientists*,  
The 'ought to be' beneficiaries of the Sipesmik are: *satellite operators, satellite users and national industry, Scientists/researchers, Science and technology community, Nature (living and non living things)*,
- a.ii The decision makers of the Sipesmik process are: *Lapan satellite scientists*  
The 'ought to be' decision makers of the Sipesmik process are: *Lapan satellite scientist and the 'ought to be' beneficiaries*.
- a.iii The planners in the Sipesmik process are: *Lapan satellite scientists*  
The 'ought to be' planners in the Sipesmik process are: *satellite scientists and the 'ought to be' beneficiaries, Depanni/Lapan, Agencies (government & private), Scientist/ academician*,
- a.iv The experts used in the Sipesmik process are: *Lapan satellite scientists*  
The 'ought to be' experts used in the Sipesmik process are: *Lapan satellite scientists and the 'ought to be' beneficiaries*
- a.v The representative of those affected by Sipesmik are: *local government, advocacy organization*.  
The 'ought to be' representatives of who are affected by the Sipesmik process are: *PTDI and other representatives of suppliers, contractors, consultant and consumers*.
- b. The conditions that are controlled by the decision maker resources allocation and *resources sharing approval*  
The conditions that are not controlled by decision makers are: *global market and free trade*
- c. The constraints on the decision maker *technological and financial feasibility of Sipesmik*

- The 'ought to be' constraints: *legal, economy, social and cultural conditions*
- d. The power to ensure success of Sipesmik held by: the investor, government
  - e. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

- 1. Efficiency *Ratio between the achieved and the longest time delay when transmitting a message*
- 2. Effectiveness *Number of mission per transfer in one frame*
- 3. Efficacy *User identity is unique*
- 4. Equity *Each user has equal access to the system*
- 5. Ethicality *Conforms to electronic communication ethics*
- 6. Elegancy *The more number of services produced the more elegance a project is*

### Comments and suggestions

- 1) Sipesmik should practice open management
- 2) Sipesmik should be concerned with environmental health
- 3) Well trained and educated system participants (actors)
- 4) Minimum space debris

Good luck

**Question 1**

*Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *scientific community*

The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation Scientists/researchers, Science and technology community, General population especially fishermen and farmers, Present & future generation,*

- a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*

The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*

- a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas, and Dept. of Finance)*

The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Depanri/Lapan, Agencies (government & private), Industries (government & private), Local government, Researcher,*

- a.iv The experts used in the Sipesmik process are: *space science and technology experts*

The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*

- a.v The representative of those affected by Sipesmik are: *local governments*

The 'ought to be' representatives are: *ASSI and Local Governments.*

- b. The conditions that are controlled by the decision makers are resources *allocation, resource sharing approval*

The conditions that are not controlled by the decision makers are: *power concerned (science and technology, economy, socio cultural, legal- political, nature)*

- c. The constraints on the decision makers are *national capacity on space science and technology*

The ought to be constraints on the decision makers are *sustainable food*

- d. The power to ensure success of Sipesmik held by the Government
- e. Yes those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should they be allowed to

### Question 3

1. Efficiency *Hold an appropriate monitoring and control system with continuously improved standards performance*
2. Effectiveness *Holds (an) achievable objectives with measurable indicators of success, and rational steps of action to realize the objective(s)*
3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
4. Equity *Provide all parties equal access to: information, science and technology, resources, market and decision making*
5. Ethicality *Conform to general principle of ethics*
6. Elegancy *Aesthetical, attractive and challenging to increase/maintain security and prosperity of the general population*

### Comments and suggestions

1) *Sipesmik should have two basic tasks:*

- a. *develop space science and technology innovation and*
- i. *basic science or demand*
  - ii. *research and development*
  - iii. *production or construction*
  - iv. *operation that consist of mission and house keeping operations and*
  - v. *Marketing or Sales.*
- b. *create conducive states for space science and technology innovation development that should include*
- i. *the development of: local government participation,*
  - ii. *economic productivity,*

- iii. *dynamics of regulating the Sipesmik, and*
  - iv. *dynamics of managing the physical environment, and*
  - v. *change of institutional practice and of socio cultural practice.*
- 2) *Sipesmik should fulfil the need of general population especially farmers and fishermen*
  - 3) *The Sipesmik investment must be mainly generated from the government.*
  - 4) *There is a need for a national commitment: government (legislative & executive) and public for Sipesmik so that continuance of the program be guaranteed*
  - 5) *Some indicators that should be monitored within Sipesmik are:*
    - a. *Determined the basic sciences to be implemented in space products*
    - b. *Determined the space product demands to be fulfilled*
    - c. *Determined the space product engineering designs based on the determined basic science to be implemented in space products demands to be fulfilled*
    - d. *Produced the space goods based on the determined space product basic engineering designs.*
    - e. *Constructed & commissioned the space systems based on the determined basic engineering designs*
    - f. *Operated the commissioned space systems to fulfil the space services demands*
    - g. *The system output sold: space systems, space goods and services, also copy rights and patents*
    - h. *Well trained and educated system participants (actors)*

**Good Luck**



**Question 1**

*Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *scientific community*

The 'ought to be' beneficiaries are: *the Republik of Indonesia as a whole, the nature, present and future generation, General population especially fishermen and farmers, Present & future generation,*

- a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*

The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*

- a.iii The planners in the Sipesmik process are *executive (Lapan, Bappenas and Dept. of Finance)*

The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer) Agencies (government & private), Industries (government & private), Local government, Researcher,*

- a.iv The experts used in the Sipesmik process are: *space science and technology experts*

The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*

- a.v The representative of those affected by Sipesmik are: *local governments*

The 'ought to be' representatives are: *ASSI and Local Governments.*

- b. The conditions that are controlled by the decision makers are resources allocation and resources sharing approval

The conditiona that are not controlled conditions: *power concerned (science and technology, economy, socio cultural, legal- political, nature)*

- c. The constraints on the decision makers are *national capacity on space science and technology*

The ought to be constraints are *sustainable food supply*

- d. The power to ensure success of Sipesmik held by the Government

- e. Yes those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes they should be allowed to.

### Question 3

1. Efficiency *Hold the character of an effective plan and has an appropriate monitoring and control system with continuously improved performance standard*
2. Effectiveness *Hold (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s)*
3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
4. Equity *Provide all parties equal access to: information, science and technology, resources, market and decision making*
5. Ethicality *Conforms to general principle of ethics with focus to stakeholders*
6. Elegancy *Aesthetical and challenging to increase/maintain security and prosperity of the general population*

### Comments and suggestions

- 1) *Sipesmik should fulfil the need of general population especially farmers and fishermen.*
- 2) *The major investment for Sipesmik should be mainly generated from the government therefore it shall have the necessary national commitment.*
- 3) *There is a need for changing institutional practice.*
- 4) *Creation of the necessary conducive states for space science and technology development is strategically needed for Sipesmik.*
- 5) *Well trained and educated system participants (actors).*

**Good luck**

## Question 1

*Cost benefit analysis is capable to show the economic value of an action program, therefore each action program of Sipesmik shall accomplish an economically acceptable cost benefit ratio*

## Question 2

- a.i The beneficiaries of the Sipesmik process are: *scientific community*

The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation Government agencies, Industry, Scientists/researchers, Science and technology community,*

- a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*

The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*

- a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*

The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Government (executive & legislative including arm forces), Depanri/Lapan, Fishermen & farmers, Scientist/ academician,*

- a.iv The experts used in the Sipesmik process are: *space science and technology experts*

The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*

- a.v The representative of those affected by Sipesmik are: *local governments*

The 'ought to be' representatives are: *ASSI and Local Governments.*

- b. The conditions that are controlled by the decision makers are resources allocations. The condition that not controlled by the decision makers are: *power concerned (science and technology, economy, socio cultural, legal- political, nature)*

- c. The constraints on the decision makers are *national capacity on space science and technology*

The 'ought to be' constraints: *sustainable food*

- d. The power to ensure success of Sipesmik held by: The Government
- e. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should they be allowed to.

### Question 3

- 1. Efficiency *Hold the character of an effective plan and has an appropriate monitoring and control system with continuously improved performance standard*
- 2. Effectiveness *Hold (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s)*
- 3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
- 4. Equity *Provide all parties equal access to: information, science and technology, resources, market and decision making*
- 5. Ethicality *Conforms to general principle of ethics with focus to stakeholders*
- 6. Elegancy *Aesthetical, attractive and challenging to increase/maintain security and prosperity of the general population*

### Comments and suggestions

- 1) *In creating the necessary conducive states for space science and technology development through changing institutional practice that includes tasks as follows:*
  - a. *increase acceptance of Sipesmik by government agencies, privates and foreign partners,*
  - b. *increase financial support & resource sharing*
  - c. *train & educate Sipesmik actors (owners, executors and clients)*
  - d. *ensure interdepartmental and international cooperation*
  - e. *increase horizontal management links*
- 2) *Due to it's limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation*

- 3) *Sipesmik education program for researchers should be transformable into formal education credit, so that from their activities the researchers can write up thesis for their master or doctor degrees.*
- 4) *Sipesmik should practice open management*
- 5) *The Sipesmik shall have the necessary national commitment*
- 6) *Tasks that should be considered in designing Sipesmik:*
  - a. *Increase and maintain local government participation*
  - b. *Increase and maintain economic productivity*
  - c. *Change institutional practice*
  - d. *Change socio cultural practice*
  - e. *Increase and maintain the dynamics of regulating the system*
  - f. *Increase and maintain the dynamic of managing the natural environment*
- 7) *Due to it's limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation*
- 8) *There is a need for a national commitment: government (legislative & executive) and public for Sipesmik so that continuance of the program be guaranteed*
- 9) *Some indicators that should be monitored within Sipesmik are:*
  - a. *Determined the basic sciences to be implemented in space products*
  - b. *Determined the space product demands to be fulfilled*
  - c. *Determined the space product engineering designs based on the determined basic science to be implemented in space products demands to be fulfilled*
  - d. *Produced the space goods based on the determined space product basic engineering designs.*
  - e. *Construct & commissioned the space systems based on the determined basic engineering designs*
  - f. *Operate the commissioned space systems to fulfill the space services demands*
  - g. *The system output sold: space systems, space goods and services, also copy rights and patents*
  - h. *Sustainable energy and material flows especially for fisheries, agricultural and space industry*

- i. The inputs/outputs account for activities & their impacts especially for fisheries, agricultural and space industry*
- j. Policies which maximize production efficiency: especially for fisheries, agricultural and space industry*
- k. Policies which encourage efficiency & minimize harms, especially in fisheries, agricultural and space industries*
- l. Ensured policies encourage sustainable high level of economic activity especially in fisheries, agricultural and space industry*
- m. Waste minimization policies*
- n. Well trained and educated system participants (actors)*

**Good Luck**

**Question 1**

*Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security*

**Question 2**

a.i The beneficiaries of the Sipesmik process are: *scientific community*

The 'ought to be' beneficiaries are: *the Republik of Indonesia as a whole, the nature, present and future generation, General population especially fishermen and farmers, Present & future generation,*

a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*

The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*

a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*

The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Agencies (government & private), Industries (government & private), Local government, Researcher,*

a.iv The experts used in the Sipesmik process are: *space science and technology experts*

The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*

a.v The representative of those affected by Sipesmik are: *local governments*

The 'ought to be' representatives are: *ASSI and Local Governments.*

b. The conditions that are controlled by the decision makers are resources allocation

The conditions that are not controlled by the decision makers are: *power concerned (science and technology, economy, socio cultural, legal- political, nature)*

c. The constraints on the decision makers are *national capacity on space science and technology*

The ought to be constraints are *sustainable food*

- d. The power to ensure success of Sipesmik held by the Government
- e. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

- 1. Efficiency *Hold an appropriate monitoring and control system with continuously improved standards performance*
- 2. Effectiveness *Hold (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s)*
- 3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
- 4. Equity *Provide all parties equal access to: information, science and technology, resources, market and decision making*
- 5. Ethicality *Conforms to general principle of ethics with focus to stakeholders*
- 6. Elegancy *Aesthetical, attractive and challenging to increase/maintain security and prosperity of the general population*

### Comments and suggestions

- 1) *Based on our discussion during the interview, it should be noted the important of creating the necessary conducive states for space science and technology development through changing institutional practice that includes tasks as follows:*
  - a. *increase acceptance of Sipesmik by government agencies, privates and foreign partners,*
  - b. *increase financial support & resource sharing*
  - c. *train & educate Sipesmik actors (owners, executors and clients)*
  - d. *ensure interdepartmental and international cooperation*
  - e. *increase horizontal management links*
- 2) *Sipesmik should fulfil the need of general population especially farmers and fishermen*
- 3) *The major investment needed for Sipesmik should be mainly generated from the government.*



- 4) *Increase and maintain the dynamics of regulating the system*
- 5) *There are international laws and regulations that should be taken into consideration in managing the Sipesmik such as: Space Treaty, 1967; Registration convention, 1972, and Liability Convention 1975.*
- 6) *Executor of Sipesmik should include not only members of Depanri but also the others who are responsible for sea, fisheries, agriculture, environment, trade, industry, social affairs, education, culture and local governments.*
- 7) *Due to physical condition, that the capability to produce food varies from one region to another, an appropriate system for transportation and communication is needed for the creation and maintaining a national sustainable food condition.*
- 8) *Some indicators that should be monitored within Sipesmik are:*
  - a. *Ensured interdepartmental and international cooperation to create and maintain the sustainable food with the help space technology.*
  - b. *Well trained and educated system participants (actors)*
  - c. *New laws and regulations including ratification or accession of international laws/regulations*
  - d. *Participants understanding on laws and regulations*
  - e. *Consultation and aid to solve legal cases and to prepare and assess legal documents*
  - f. *Protected and supported legally the system*

**Good Luck**

**Question 1**

*Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *scientific community*

The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation, General population especially fishermen and farmers, Present & future generation,*

- a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*

The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*

- a.iii The planner in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*

The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Agencies (government & private), Industries (government & private), Local government, Researcher,*

- a.iv The experts used in the Sipesmik process are: *space science and technology experts*

The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*

- a.v The representatives of those affected by Sipesmik are: *local governments*

The 'ought to be' representatives are: *ASSI and Local Governments.*

- b. The conditions that are controlled by the decision makers are *resources allocation.*

The conditions that are not controlled: *power concerned (science and technology, economy, socio cultural, legal-political, nature)*

- c. The constraints on the decision makers are *national capacity on space science and technology*

The 'ought to be' constraints are *sustainable food*

- d. The power to ensure success of Sipesmik held by the Government

- e. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

1. Efficiency *Have an appropriate monitoring and control system with continuously improved standards performance*
2. Effectiveness *Have (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s)*
3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
4. Equity *Provide all parties equal access to: information, science and technology, resources, market and decision making*
5. Ethicality *Conforms to general principle of ethics with focus to stakeholders*
6. Elegancy *Aesthetical and challenging to increase/maintain security and prosperity of the general population*

### Comments and suggestions

- 1) *Based on our discussion during the interview, please be advised the important of creating the necessary conducive states for space science and technology development through changing institutional practice that includes the following tasks:*
  - (a) *increase acceptance of Sipesmik by government agencies, privates and foreign partners,*
  - (b) *increase financial support & resource sharing*
  - (c) *train & educate Sipesmik actors (owners, executors and clients)*
  - (d) *ensure interdepartmental and international cooperation*
  - (e) *increase horizontal management links*
- 2) *Please also consider the important of regulating the Sipesmik with focus on 'protect and support legally the Sipesmik'. In support to this task please include four integrated tasks as follows:*
  - (a) *provide consultation and aid to solve legal case and to prepare legal documents* (b) *increase Sipesmik participants understanding on laws and regulations*
  - (b) *establish guidance for implementation of laws and regulation for Sipesmik*
  - (c) *initiate creation of new laws and regulations including ratification or accession of international laws/regulations*

- 3) *Due to its limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation.*
- 4) *Sipesmik should fulfill the need of general population especially farmers and fishermen.*
- 5) *The major investment for Sipesmik should be mainly generated from the government. Therefore it should have the necessary national commitment.*
- 6) *Change institutional practice.*
- 7) *Sipesmik holds high level goals: micro satellite for sustainable food, this give lawyers a challenge on how laws can and should be used to achieve such political and social goals.*
- 8) *There are international laws and regulations that should be taken into consideration in managing the Sipesmik such as: Space Treaty, 1967; Registration convention, 1972, and Liability Convention 1975.*
- 9) *Creation of the necessary conducive states for space science and technology development is strategically needed for Sipesmik.*
- 10) *Some indicators that should be monitored within Sipesmik are*
  - (a) *Financial support & resource sharing to the system in creating the sustainable food with the help of space technology.*
  - (b) *Ensured interdepartmental and international cooperation to create and maintain the sustainable food with the help space technology.*
  - (c) *Acceptance of the system by government agencies (especially local governments) privates and foreign partners.*
  - (d) *Well trained and educated system participants (actors).*
  - (e) *New laws and regulations including ratification or accession of international laws/regulations.*
  - (f) *Participants understanding on laws and regulations.*
  - (g) *Consultation and aid to solve legal cases and to prepare and assess legal documents.*
  - (h) *Protected and supported legally the system.*
  - (i) *Local government participation.*

**Good Luck**

**Question 1**

*Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security*

**Question 2**

a.i The beneficiaries of the Sipesmik process are: *scientific community*

The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation, Science and technology community, General population especially fishermen and farmers, Present & future generation,*

a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*

The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*

a.iii The planner in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*

The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Agencies (government & private), Industries (government & private), Local government, Researcher,*

a.iv The experts used in the Sipesmik process are: *space science and technology experts*

The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*

a.v The representatives of those affected by Sipesmik are *local governments*

The 'ought to be' representatives are: *ASSI and Local Governments.*

b. The conditions that are controlled by the decision makers are resources allocation. The conditions that are not controlled conditions: *power concerned (science and technology, economy, socio cultural, legal-political, nature)*

c. The constraints on the decision makers are *national capacity on space science and technology*

The 'ought to be' constraints are *sustainable food supply*

d. The power to ensure success of Sipesmik held by the Government

- e. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

1. Efficiency *Have the character of an effective plan and has an appropriate monitoring and control system with continuously improved performance standard*
2. Effectiveness *Have (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s)*
3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
4. Equity *Provide all parties equal access to: information, science and technology, resources, market and decision making*
5. Ethicality *Conforms to general principle of ethics with focus to stakeholders*
6. Elegancy *Aesthetical and challenging to increase/maintain security and prosperity of the general population*

### Comments and suggestions

1) Sipesmik should have two basic tasks:

- a. *develop space science and technology innovation that include:*
  - i. *basic science or demand*
  - ii. *research and development*
  - iii. *production or construction*
  - iv. *operation and*
  - v. *Marketing or Sales*
- b. *create conducive states for space science and technology innovation development that should include:*
  - i. *develop local government participation,*
  - ii. *develop economic productivity,*
  - iii. *increase the dynamics of regulating the Sipesmik and of managing the physical environment*
  - iv. *change of institutional practice and of socio cultural practice*

- 2) *Sipesmik should fulfil the need of general population especially farmers and fishermen*
- 3) *The major investment for Sipesmik should be mainly generated from the government.*
- 4) *Change socio cultural practice*
- 5) *Some indicators that should be monitored within Sipesmik are:*
  - a. *Determined the basic sciences to be implemented in space products*
  - b. *Determined the space product demands to be fulfilled.*
  - c. *Determined the space product engineering designs based on the determined basic science to be implemented in space products demands to be fulfilled.*
  - d. *Produced the space goods based on the determined space product basic engineering designs.*
  - e. *Constructed & commissioned the space systems based on the determined basic engineering designs.*
  - f. *Operated the commissioned space systems to fulfil the space services demands, and*
  - g. *The system output sold: space systems, space goods and services, also copy rights and patents.*

**Good Luck**

**Question 1**

*Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security*

**Question 2**

a.i The beneficiaries of the Sipesmik process are: *scientific community*

The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation, Science and technology community, General population especially fishermen and farmers, Present & future generation,*

a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*

The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*

a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*

The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Agencies (government & private), Industries (government & private), Local government, Fishermen & farmers, Researcher,*

a.iv The experts used in the Sipesmik process are: *space science and technology experts*

The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*

a.v The representative of those affected by Sipesmik are *local governments*

The 'ought to be' representatives are: *ASSI and Local Governments.*

b. The conditions that are controlled by the decision makers are resources allocation

The conditions that are not controlled by the decision makers are : *power concerned (science and technology, economy, socio cultural, legal- political, nature)*



- c. The constraints on the decision makers are *national capacity on space science and technology*  
The 'ought to be' constraints: *sustainable food*
- d. The power to ensure success of Sipesmik held by: the Government
- e. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

- 1. Efficiency *Have an appropriate monitoring and control system with continuously improved performance standards*
- 2. Effectiveness *Have (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s)*
- 3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
- 4. Equity *Provide all parties equal access to: information, science and technology, resources, market and decision making*
- 5. Ethicality *Conform to general principle of ethics with focus to stakeholders*
- 6. Elegancy *Aesthetical and challenging to increase/maintain security and prosperity of the general population*

### Comments and suggestions

- 1) *Sipesmik should have two basic tasks:*
  - a. *develop space science and technology innovation that include*
    - i. *basic science or demand*
    - ii. *research and development*
    - iii. *production or construction*
    - iv. *operation and*
    - v. *Marketing or Sales.*
  - b. *create conducive states for space science and technology innovation development that should include six tasks as follows:*
    - i. *develop local government participation,*
    - ii. *develop economic productivity,*
    - iii. *regulate the Sipesmik*

- iv. *improve the physical environment management*
- v. *change of institutional practice into sustainable development*
- vi. *change socio cultural practice*

- 1) *Sipesmik should fulfil the need of general population especially farmers and fishermen*
- 2) *Due to institutional jealousy, each department /ministry guards their own portfolios, so that no real coordination is actually enforced. Sipesmik should practice open management. Government institution should not work in isolation.*
- 3) *The investment for Sipesmik should mainly generated from the government, therefore it shall have the necessary national commitment. Its tasks should include:*
  - a. *Increase and maintain local government participation*
  - b. *Increase and maintain economic productivity*
  - c. *Change institutional practice*
  - d. *Change socio cultural practice*
  - e. *Increase and maintain the dynamics of regulating the system*
  - f. *Increase and maintain the dynamic of managing the natural environment*
- 4) *Sipesmik is a social process that achieving the goals needs a long period of time. As a social process a long term plan for Sipesmik is a must, this plan should contain several cycles where improvement mechanism from one to another cycles should be established.*
- 5) *Sipesmik is an educational process where the actors are object of its educational programs to facilitate the intended social process. Its education program for researchers should be transformable into formal education credit, so that from their activities the researchers can write up thesis for their master or doctor degrees.*
- 6) *Education program for farmers and fishermen should be an integrated program which is developed by cooperative teams that consist of peers in at least: space remote sensing, fisheries, agriculture, trade and industry, social, education and culture.*

- 7) *Due to its limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation. Outsourcing is a method that could help solve resource limitation that might be faced by Sipesmik.*
- 8) *Peer pressure first than regulation*
- 9) *Qualified space science and technology human resources spread out in a number of institutions both government and private but networking is still very limited among them*
- 10) *Creation of the necessary conducive states for space science and technology development is strategically needed for Sipesmik*
- 11) *Executor of Sipesmik should include not only members of Depanri but also the others who are responsible for sea, fisheries, agriculture, environment, trade, industry, social affairs, education, culture and local governments.*
- 12) *There is a need for a national commitment: government (legislative & executive) and public for Sipesmik so that continuance of the program be guaranteed*
- 13) *Indicator of success that should be monitored within Sipesmik, should include:*
  - a. *Determined the basic sciences to be implemented in space products*
  - b. *Determined the space product demands to be fulfilled*
  - c. *Determined the space product engineering designs based on the determined basic science to be implemented in space products demands to be fulfilled*
  - d. *Produced the space goods based on the determined space product basic engineering designs.*
  - e. *Constructed & commissioned the space systems based on the determined basic engineering designs*
  - f. *Operated the commissioned space systems to fulfill the space services demands*
  - g. *The system output sold: space systems, space goods and services, also copy rights and patents*
  - h. *Sustainable energy and material flows especially for fisheries, agricultural and space industry*
  - i. *The inputs/outputs account for activities & their impacts especially for fisheries, agricultural and space industry*

- j. Policies which maximize production efficiencies especially for fisheries, agricultural and space industry*
- k. Policies which encourage efficiency & minimize harms, especially in fisheries, agricultural and space industries*
- l. Ensured policies encourage sustainable high level of economic activity especially in fisheries, agricultural and space industry*
- m. Financial support & resource sharing to the system in creating the sustainable food with the help of space technology*
- n. Ensured interdepartmental and international cooperation to create and maintain the sustainable food with the help space technology.*
- o. Waste minimization policies*
- p. Acceptance of the system by government agencies (especially local governments) privates and foreign partners*
- q. Well trained and educated system participants (actors)*
- r. Active horizontal management links*
- s. Changed image of government institutions from 'work in isolation' towards 'integrated network'*
- t. Local government participation*

**Good Luck**

**Question 1**

*Cost benefit analysis is capable to show the economic value of an action program, therefore each action program of Sipesmik shall accomplish an economically acceptable cost benefit ratio*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *Lapan satellite scientists*,  
The 'ought to be' beneficiaries of the Sipesmik are: *telecommunication services providers*. Government agencies, Industry, Scientists/researchers, Science and technology community
- a.ii The decision makers of the Sipesmik process are: *Lapan satellite scientists*  
The ought to be decision makers of Sipesmik process are: *Lapan satellite scientists and telecommunication services providers*.
- a.iii The planners in the Sipesmik process are *Lapan satellite scientists*  
The 'ought to be' planners in the Sipesmik process are: *Lapan satellite scientists and the 'ought to be' beneficiaries*, Government (executive & legislative including arm forces), Depanri/Lapan, Scientist/ academician,
- a.iv The experts used in the Sipesmik process are: *Lapan satellite scientists*  
The 'ought to be' experts used in the Sipesmik process are: *Lapan satellite scientists and the 'ought to be' beneficiaries*
- a.v The representative of those affected by Sipesmik are *no information*.  
The 'ought to be' representatives of who are affected by the Sipesmik: *Satelindo and other representatives of suppliers, contractors, consultants and consumers of Sipesmik*.
- b. The conditions that are controlled by the decision makers are resources allocation.  
The conditions that are not controlled by the decision makers are: *global market and free trade*
- c. The constraints on the decision makers are *technological and financial feasibility of Sipesmik*  
The 'ought to be' constraints: *legal, economy, social and cultural conditions*
- f. The power to ensure success of Sipesmik held by *the investor: government*

- g. No, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. No, they should not be allowed to.

### Question 3

1. Efficiency *Ratio between output and input*
2. Effectiveness *Ratio between the achieved and the total objective*
3. Efficacy *Ratio between the resources available and the resources needed to execute the plan*
4. Equity *Conform to general principle of right and justice*
5. Ethicality *Conform to business and professional ethics*
6. Elegancy *Public opinion of the usefulness of a project to raise quality of life*

### Comments and suggestions

- 1) *The Sipesmik shall have the necessary national commitment, and its tasks should include the following:*
  - a. *Increase and maintain local government participation*
  - b. *Increase and maintain economic productivity*
  - c. *Change institutional practice*
  - d. *Change socio cultural practice*
  - e. *Increase and maintain the dynamics of regulating the system*
  - f. *Increase and maintain the dynamic of managing the natural environment*
- 2) *Due to its limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation. It should be noted that qualified space science and technology human resources spread out in a number of institutions both government and private but networking is still very limited among them. Therefore there is a need for a national commitment: government (legislative & executive) and public for Sipesmik so that continuance of the program be guaranteed*
- 3) *Sipesmik should practice open management.*
- 4) *Creation of the necessary conducive states for space science and technology development is strategic for Sipesmik*

5) *Sipesmik's indicator of success should include:*

- a. Sustainable energy and material flows especially for fisheries, agricultural and space industry*
- b. The inputs/outputs account for activities & their impacts especially for fisheries, agricultural and space industry*
- c. Policies which maximize production efficiencies especially for fisheries, agricultural and space industry*
- d. Policies which encourage efficiency & minimize harms, especially in fisheries, agricultural and space industries*
- e. Ensured policies encourage sustainable high level of economic activity especially in fisheries, agricultural and space industry*
- f. Waste minimization policies*
- g. Well trained and educated system participants (actors)*
- h. Active horizontal management links*
- i. National commitment on Sipesmik*

**Good luck**

**Question 1**

*Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security*

**Question 2**

a.i The beneficiaries of the Sipesmik process are: *scientific community*

The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation, General population especially fishermen and farmers, Present & future generation,*

a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*

The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*

a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*

The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Agencies (government & private), Industries (government & private), Local government, Researcher,*

a.iv The experts used in the Sipesmik process are: *space science and technology experts*

The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*

a.v The representative of those affected by Sipesmik are: *local governments*

The 'ought to be' representatives are: *ASSI and Local Governments.*

b. The conditions that are controlled by the decision makers are resources allocation.

*The conditions that are not controlled by decision makers are: power concerned (science and technology, economy, socio cultural, legal- political, nature)*

c. The constraints on the decision makers are *national capacity on space science and technology*

The 'ought to be' constraints: *sustainable food*



- d. The power to ensure success of Sipesmik held by the Government
- e. Yes those affected by Sipesmik allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

- 1. Efficiency *Hold an appropriate monitoring and control system with continuously improved performance standards*
- 2. Effectiveness *Hold (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s)*
- 3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
- 4. Equity *Provides all parties equal access to: information, science and technology, resources, market and decision making*
- 5. Ethicality *Conform to professional ethics*
- 6. Elegancy *Aesthetical and challenging to increase/maintain security and prosperity of the general population*

### Comments and suggestions

- 1) *In creating the necessary conducive states for space science and technology development through changing institutional practice, the tasks should include the following:*
  - a. *increase acceptance of Sipesmik by government agencies, privates and foreign partners,*
  - b. *increase financial support & resource sharing*
  - c. *train & educate Sipesmik actors (owners, executors and clients)*
  - d. *ensure interdepartmental and international cooperation*
  - e. *increase horizontal management links*
- 2) *Sipesmik should fulfil the need of general population especially farmers and fishermen and its organization should consider the morphological situation of the region*
- 3) *The major investment for Sipesmik should be mainly generated from the government.*
- 4) *The Sipesmik should be concerned in*

- a. *increasing and maintaining local government participation*
  - b. *changing institutional practice*
  - c. *changing socio cultural practice, and*
  - d. *increasing and maintaining the dynamics of regulating the system.*
- 5) *It should be noted that Indonesian policies in natural resources administration often cause reluctant feeling of foreign partner in doing research cooperation within Indonesian territory.*
  - 6) *To secure the continuance of Sipesmik program there is a need for a national commitment: government (legislative & executive) and public*
  - 7) *Well trained and educated system participants (actors) are essentials.*

**Good Luck**

## Question 1

*Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security*

## Question 2

a.i The beneficiaries of the Sipesmik process are: *scientific community*

The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation, Science and technology community, General population especially fishermen and farmers, Present & future generation,*

a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*

The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*

a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*

The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Agencies (government & private), Industries (government & private), Local government, Researcher,*

a.iv The experts used in the Sipesmik process are: *space science and technology experts*

The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*

a.v The representatives of those affected by Sipesmik are: *local governments*

The 'ought to be' representatives are: *ASSI and Local Governments.*

b. The conditions that are controlled by the decision makers are resources *allocation, resources sharing approval*

The condition that are not controlled by the decision makers are : *power concerned (science and technology, economy, socio cultural, legal- political, nature)*

- c. The constraints on the decision makers are *national capacity on space science and technology*  
The 'ought to be' constraints on the decision makers are *sustainable food*
- d. The power to ensure success of Sipesmik held by the Government
- e. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

- 1. Efficiency *Hold the character of an effective plan and has an appropriate monitoring and control system with continuously improved its performance standards*
- 2. Effectiveness *Hold (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s).*
- 3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing*
- 4. Equity *Provide all parties equal access to: information, science and technology, resources, market and decision making*
- 5. Ethicality *Conforms to professional ethics*
- 6. Elegancy *Aesthetical, attractive and challenging to increase/maintain security and prosperity of the general population*

### Comments and suggestions

- 1) *For creating the necessary conducive states for space science and technology development through changing institutional practice, it should consider to include the following tasks:*
  - a. *increase acceptance of Sipesmik by government agencies, privates and foreign partners,*
  - b. *increase financial support & resource sharing*
  - c. *train & educate Sipesmik actors (owners, executors and clients)*
  - d. *ensure interdepartmental and international cooperation*
  - e. *increase horizontal management links*

- 2) *Due to its limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation.*
- 3) *Sipesmik should fulfil the need of general population especially farmers and fishermen*
- 4) *The main investment for Sipesmik should be generated from the government.*
- 5) *For the success of Sipesmik please consider the following tasks:*
  - a. *Increase and maintain local government participation*
  - b. *Increase and maintain the dynamics of regulating the system*
- 6) *Well trained and educated system participants (actors) are mandatory for the success of Sipesmik.*

**Good Luck**

**Question 1**

*Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are *scientific community*  
 The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation* General population especially fishermen and farmers, Present & future generation,
- a.ii The decision makers of the Sipesmik process are *government (executive and legislative)*  
 The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*
- a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*  
 The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Agencies (government & private), Industries (government & private), Local government, Researcher,*
- a.iv The experts used in the Sipesmik process are: *space science and technology experts*  
 The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.v The representatives of those affected by Sipesmik are: *local governments*  
 The 'ought to be' representatives are: *ASSI and Local Governments.*
- b. The conditions that are controlled by the decision makers are resources allocations, resources sharing approval.  
 The conditions that are not controlled by decision makers are: *power concerned (science and technology, economy, socio cultural, legal-political, nature).*
- c. The constraints on the decision makers are *national capacity on space science and technology*

The 'ought to be' constraints on the decision makers are: *sustainable food*

- d. The power to ensure success of Sipesmik held by: the Government
- e. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

1. Efficiency *Holds the character of an effective plan and has an appropriate monitoring and control system with continuously improved performance standards.*
2. Effectiveness *Holds (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s).*
3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing.*
4. Equity *Provides all parties equal access to: information, science and technology, resources, market and decision making.*
5. Ethicality *Conforms to professional ethics.*
6. Elegancy *Aesthetical and challenging to increase/maintain security and prosperity of the general population.*

### Comments and suggestions

- 1) *Please be advised the important of creating the necessary conducive states for space science and technology development through changing institutional practice that includes the following tasks:*
  - a. *increase acceptance of Sipesmik by government agencies, privates and foreign partners,*
  - b. *increase financial support & resource sharing*
  - c. *train & educate Sipesmik actors (owners, executors and clients)*
  - d. *ensure interdepartmental and international cooperation*
  - e. *increase horizontal management links*
- 2) *Due to it's limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation*
- 3) *Sipesmik should fulfil the need of general population especially farmers and fishermen*

- 4) *The Sipesmik investment must be mainly generated from the government.*
- 5) *Increase and maintain economic productivity*
- 6) *Change socio cultural practice*
- 7) *Due to it's limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation*
- 8) *Outsourcing is a method that could help solve resource limitation that might be faced by Sipesmik*
- 9) *Executor of Sipesmik should include not only members of Depauri but also the others who are responsible for sea, fisheries, agriculture, environment, trade, industry, social affairs, education, culture and local governments.*
- 10) *Some indicator that should be monitored by Sipesmik are*
  - a. *Sustainable energy and material flows especially for fisheries, agricultural and space industry*
  - b. *The inputs/outputs account for activities & their impacts especially for fisheries, agricultural and space industry*
  - c. *Policies which maximize production efficiencies especially for fisheries, agricultural and space industry*
  - d. *Policies which encourage efficiency & minimize harms, especially in fisheries, agricultural and space industries*
  - e. *Ensured policies encourage sustainable high level of economic activity especially in fisheries, agricultural and space industry*
  - f. *Waste minimization policies*
  - g. *Well trained and educated system participants (actors)*

**Good Luck**



**Question 1**

*Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security.*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *scientific community*  
The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation* General population especially fishermen and farmers, Present & future generation,
- a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*  
The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*
- a.iii The planner in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*  
The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Agencies (government & private), Industries (government & private), Local government, Public figures, Fishermen & farmers, Researcher,*
- a.iv The experts used in the Sipesmik process are: *space science and technology experts*  
The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.v The representatives of those affected by Sipesmik are: *local government*  
The 'ought to be' representatives are: *ASSI and Local Governments.*
- b. The conditions that are controlled by the decision makers are resources allocation, *resource sharing approval*. The conditions that are not controlled by the decision makers are: *power concerned (science and technology, economy, socio cultural, legal-political, nature)*
- c. The constraints on the decision makers are *national capacity on space science and technology*  
The 'ought to be' constraints on the decision makers are: *sustainable food*

- d. The power to ensure success of Sipesmik held by the Government
- e. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

- 1. Efficiency *Has an appropriate monitoring and control system with continuously improved its performance standards.*
- 2. Effectiveness *Has (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s).*
- 3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing.*
- 4. Equity *Provides all parties equal access to: information, science and technology, resources, market and decision making.*
- 5. Ethicality *Conforms to general principle of ethics with focus to stakeholders.*
- 6. Elegancy *Aesthetical, attractive and challenging to increase/maintain security and prosperity of the general population.*

### Comments and suggestions

- 1) *It should be noted the important of creating the necessary conducive states for space science and technology development through changing socio cultural practice that includes tasks as follows:*
  - a. *change community understanding and attitudes on the Sipesmik*
  - b. *increase/maintain support for Sipesmik*
  - c. *increase/maintain social, equity & justice empowerment*
  - d. *increase/maintain community trust on Sipesmik*
  - e. *increase/maintain public participation on Sipesmik*
  - f. *change(menu, farming, fishing) towards sustainable habits*
- 2) *Sipesmik is a social process that achieving the goals needs a long period of time. As a social process Sipesmik should be managed in an appropriate manner such as comprising cycles where improvement mechanism from one to another cycle is well established.*

- 3) *Sipesmik is an educational process where the actors are object of its educational programs to facilitate the intended social process.*
- 4) *Due to it's limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation*
- 5) *Sipesmik should fulfil the need of general population especially farmers and fishermen*
- 6) *The Sipesmik investment must be mainly generated from the government.*
- 7) *Sipesmik holds high level goals: micro satellite for sustainable food, this give lawyers a challenge on how laws can and should be used to achieve such political and social goals.*
- 8) *Executor of Sipesmik should include not only members of Depanri but also the others who are responsible for sea, fisheries, agriculture, environment, trade, industry, social affairs, education, culture and local governments.*
- 9) *We are proud to be the third country in the world having our own satellite for national telecommunication, it will be more pompous if the satellites we operate are our own products*
- 10) *Sipesmik should be changed into SPSAI (Sistem Pengembangan Satelit Ala Indonesia = The Indonesian version of satellite development system). We will be proud when one day another country implements SPSAI.*
- 11) *Please consider the following indicators that should be monitored by Sipesmik:*
  - a. *Determined the basic sciences to be implemented in space products*
  - b. *Determined the space product demands to be fulfilled*
  - c. *Determined the space product engineering designs based on the determined basic science to be implemented in space products demands to be fulfilled*
  - d. *Produced the space goods based on the determined space product basic engineering designs.*
  - e. *Constructed & commissioned the space systems based on the determined basic engineering designs*
  - f. *Operated the commissioned space systems to fulfil the space services demands*
  - g. *The system output sold: space systems, space goods and services, also copy rights and patents*

- h. Public participation on achieving and maintaining sustainable food with the help of space technology.*
- i. Community trust on the capability of the system to create and maintain the sustainable food with the help of space technology*
- j. Changed menu, farming and fishing practice towards sustainable habits*
- k. Ensured interdepartmental and international cooperation to create and maintain the sustainable food with the help space technology.*
- l. Community support for the system to create and maintain the sustainable food with the help of space technology*
- m. Well trained and educated system participants (actors)*
- n. Community understanding and attitudes on the system*
- o. Social, equity & justice empowerment*
- p. Changed image of space activities from 'noble' & 'dangerous' toward 'secure and prosperous'*
- q. Changed image of the country from 'non sustainable food' into 'sustainable food'*

**Good Luck**

**Question 1**

*Cooperative way of managing the Sipesmik could guarantee the practice of open management and the use of satellite, which is limited for peaceful purposes?*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *satellite scientists*,  
The 'ought to be' beneficiaries of the Sipesmik are: users of *satellite services: remote sensing, telecommunication, etc.* Science and technology community, Nature (living and non living things).
- a.ii The decision makers of the Sipesmik process are Lapan (*satellite scientists and users of satellites services*)
- a.iii The planners in the Sipesmik process are *satellite scientists*  
The 'ought to be' planners in the Sipesmik process are: *satellite scientists and beneficiaries, Government (executive & legislative including arm forces), Depanri/Lapan, Scientist/ academician,*
- a.iv The experts used in the Sipesmik process are: *satellite scientists*  
The 'ought to be' experts used in the Sipesmik process are: *satellite scientists and beneficiaries*
- a.v The representatives of those affected by Sipesmik are: *local governments*  
The 'ought to be' representatives of who are affected by the Sipesmik process is: *ASSI (Indonesia Association of Satellite Systems), MAPIN (Remote Sensing Community of Indonesia) to represent suppliers, contractors, and consumers*
- b. The conditions that are controlled by the decision makers are resources allocation, resources sharing approval. The conditions that are not controlled by the decision makers are: *global market, free trade*
- c. The constraints on the decision makers are *technological and financial feasibility of Sipesmik*  
The 'ought to be' constraints on the decision makers are *social and cultural conditions*
- d. The power to ensure success of Sipesmik held by the investor
- e. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

1. Efficiency *Ratio between output and input*
2. Effectiveness *Ratio between the achieved and the total objective*
3. Efficacy *Ratio between the resources available and the resources needed to execute the plan.*
4. Equity *Conforms to the general principle of right and justice, due process, both internally and externally*
5. Ethicality *Conforms to general principle of ethics with focus to stakeholders.*
6. Elegancy *Public opinion of usefulness of the project to raise their quality of life.*

### Comments and suggestions

- 1) *Sipesmik should have two basic tasks:*
  - a. *develop space science and technology innovation that should include*
    - i. *basic science or demand*
    - ii. *research and development*
    - iii. *production or construction*
    - iv. *operation and*
    - v. *Marketing or Sales.*
  - b. *create conducive states for space science and technology innovation development that should include*
    - i. *'increase and maintain': local government participation,*
    - ii. *economic productivity,*
    - iii. *dynamics of regulating the Sipesmik,*
    - iv. *dynamics of managing the physical environment, and*
    - v. *change of institutional practice and of socio cultural practice.*
- 2) *Sipesmik should practice open management, cooperative works with open decision making.*
- 3) *Sipesmik shall only develop space science and technology for peaceful purposes*
- 4) *The Sipesmik shall have the necessary national commitment*
- 5) *Well trained and educated system participants (actors) are essentials*

**Good Luck**

**Question 1**

*Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *scientific community*  
 The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation* General population especially fishermen and farmers, Present & future generation,
- a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*  
 The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*
- a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*  
 The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Agencies (government & private), Industries (government & private), Local government, Researcher,*
- a.iv The experts used in the Sipesmik process are: *space science and technology experts*  
 The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.v The representatives of those affected by Sipesmik are: *local governments*  
 The 'ought to be' representatives are: *ASSI and Local Governments.*
- b. The conditions that are controlled by the decision makers are resources allocations, resources sharing approvals  
 The conditions that are not controlled by the decision makers are: *power concerned (science and technology, economy, socio cultural, legal- political, nature)*
- c. The constraints on the decision makers are *national capacity on space science and technology*  
 The 'ought to be' constraints on the decision makers are *sustainable food*

- d. The power to ensure success of Sipesmik held by the Government
- c. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

1. Efficiency *Has the character of an effective plan and has an appropriate monitoring and control system with continuously improved performance standard.*
2. Effectiveness *Has (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s).*
3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing.*
4. Equity *Provides all parties equal access to: information, science and technology, resources, market and decision making.*
5. Ethicality *Conforms to general principle of ethics.*
6. Elegancy *Aesthetical, attractive and challenging to increase/maintain security and prosperity of the general population.*

### Comments and suggestions

*It should be noted the important of creating the necessary conducive states for space science and technology development through increase/maintain the dynamics of managing the natural environment that includes tasks as follows:*

- (a) move towards sustainable nature*
- (b) reduce waste*
- (c) increase/maintain water health*
- (d) increase/maintain ecological health, and*
- (e) increase/maintain natural environment support on food production*

*Sipesmik should fulfil the need of general population especially farmers and fishermen. The Sipesmik investment must be mainly generated from the government. Well trained and educated system participants (actors) are essentials.*

**Good Luck**



**Question 1**

*Why develop our own satellite, global space market provides choices so that we can choose based on our own criteria that include especially preserving our nature through minimum release of manmade debris in space*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *satellite scientists*,  
The 'ought to be' beneficiaries of the Sipesmik are: *satellite operators, satellite users and national industry, Nature (living and non living things)*,
- a.ii The decision makers of the Sipesmik process are: *Lapan satellite scientists*  
The 'ought to be' decision makers of the Sipesmik process are: *Lapan satellite scientist and the 'ought to be' beneficiaries*.
- a.iii The planners in the Sipesmik process are *Lapan satellite scientists*  
The 'ought to be' planners in the Sipesmik process are: *satellite scientists and the 'ought to be' beneficiaries, Government (executive & legislative including arm forces), Scientist/ academician*,
- a.iv The experts used in the Sipesmik process are *Lapan satellite scientists*  
The 'ought to be' experts used in the Sipesmik process are: *Lapan satellite scientists and the 'ought to be' beneficiaries*
- a.v The representative of those affected by Sipesmik are: *local governments, advocacy organization*.  
The 'ought to be' representatives of who are affected by the Sipesmik process are: *PTRKD and other representatives of suppliers, contractors, consultant and consumers*.
- b. The conditions that are controlled by the decision makers are resources allocation and resources sharing approval  
The conditions that are not controlled by the decision makers are: *global market and free trade*
- c. The constraints on the decision makers are *technological and financial feasibility of Sipesmik*

The 'ought to be' constraints: *legal, economy, social and cultural conditions*

- d. The power to ensure success of Sipesmik held by: the investor (government)
- e. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

- 1. Efficiency *Ratio between output and input*
- 2. Effectiveness *Ratio between the achieved and the total objective.*
- 3. Efficacy *Ratio between the resources available and the resources needed to execute the plan.*
- 4. Equity *Conforms to the general principle of right and justice, due process both internally and externally*
- 5. Ethicality *Conforms to general principle of ethics with focus to stakeholders.*
- 6. Elegancy *Public opinion of usefulness of the project to raise their quality of life.*

### Comments and suggestions

- 1) *Sipesmik should concern with :*
  - a. *Environmental health*
  - b. *Minimum space debris*
  - c. *Increase and maintain local government participation*
  - d. *Increase and maintain economic productivity*
  - e. *Increase and maintain the dynamics of regulating the system*
- 2) *Sipesmik should take advantages of Russian offer to cooperate in establishing a business of air-launch satellite service in Indonesia*
- 3) *Adhere MTCR provides possibility to get access to high technology market.*
- 4) *Joint / access to MTCR means ready to accept international inspection of all facilities including those belong to arm forces*
- 5) *Well trained and educated system participants (actors) are essentials for Sipesmik.*

**Good Luck**

**Question 1**

*Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *scientific community*  
The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation, General population especially fishermen and farmers, Present & future generation,*
- a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*  
The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*
- a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Firance)*  
The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Agencies (government & private), Industries (government & private), Local government, Fishermen & farmers, Researcher,*
- a.iv The experts used in the Sipesmik process are: *space science and technology experts*  
The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.v The representatives of those affected by Sipesmik are: *local governments*  
The 'ought to be' representatives are: *ASSI and Local Governments.*
- b. The conditions that are controlled by the decision makers are resources allocation and resources sharing approval.  
The conditions that are not controlled by the decision makers are : *power concerned (science and technology, economy, socio cultural, legal- political, nature)*
- c. The constraints on the decision makers are *national capacity on space science and technology* The 'ought to be' constraints: *sustainable food*
- d. The power to ensure success of Sipesmik is held by: *the Government*

- c. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should they be allowed to.

### Question 3

1. Efficiency *Holds an appropriate monitoring and control system with continuously improved performance standard.*
2. Effectiveness *Holds (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s).*
3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing.*
4. Equity *Provide all parties equal access to: information, science and technology, resources, market and decision making.*
5. Ethicality *Conforms to general principle of ethics.*
6. Elegancy *Aesthetical, attractive and challenging to increase/maintain security and prosperity of the general population.*

### Comments and suggestions

- 1) *Tasks should be included in gaining the local government trust on Sipesmik, as follows:*
  - a. *increase/ maintain the belief on space technology capability to support increase economic productivity*
  - b. *increase/maintain the belief on space technology capability to support sustainable nature management*
  - c. *increase/maintain the belief on the need of an appropriate socio-cultural state for sustainable food*
  - d. *increase maintain the belief on the need of an appropriate institutional practice for sustainable food*
  - e. *increase/maintain the belief on the need for an appropriate state of natural environment for sustainable food*
  - f. *increase/maintain knowledge/understanding on how help support space technology development and use*
- 2) *Sipesmik is a social process that achieving the goals needs a long period of time. As a social process Sipesmik should be managed in an appropriate*

*manner such as comprising cycles where improvement mechanism from one to another cycle is well established*

- 3) *Sipesmik is an educational process where the actors are object of its educational programs to facilitate the intended social process. Education program for farmers and fishermen should be an integrated program on fisheries, agriculture, trade and industry, social, education and culture.*
- 4) *Due to it's limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation*
- 5) *Sipesmik should fulfil the need of general population especially farmers and fishermen. For this please consider include the following into Sipesmik's tasks:*
  - a. *Increase and maintain local government participation*
  - b. *Increase and maintain economic productivity*
  - c. *Change institutional practice*
  - d. *Change socio cultural practice*
  - e. *Increase and maintain the dynamics of regulating the system*
  - f. *Increase and maintain the dynamic of managing the natural environment*
- 6) *Due to the vast aspect should be covered by Sipesmik, the major investment for Sipesmik should be generated from the government, hence,*
  - a. *It is necessary to get a national commitment for Sipesmik.*
  - b. *Executor of Sipesmik should include not only members of Depanri but also the others who are responsible for sea, fisheries, agriculture, environment, trade, industry, social affairs, education, culture and local governments.*
  - c. *Due to it's limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation*
- 7) *Education program for farmers and fishermen should be an integrated program which is developed by cooperative teams that consist of peers in at least: space remote sensing, fisheries, agriculture, trade and industry, social, education and culture.*
- 8) *Creation of the necessary conducive states for space science and technology development is strategically needed for Sipesmik*
- 9) *Due to the important role of Local Governments, but sustainable food is closely related to physical condition therefore the Sipesmik system*

*management should accommodate both administrative and physical boundaries.*

*10) Some indicators of success that should be monitored within Sipesmik are:*

- a. Public participation on achieving and maintaining sustainable food with the help of space technology.*
- b. Community trust on the capability of the system to create and maintain the sustainable food with the help of space technology*
- c. Changed menu, farming and fishing practice towards sustainable habits*
- d. Qualified knowledge/ understanding of participants especially local governments, on how help support space technology development and its use to create and maintain sustainable food*
- e. The belief of participants, especially local government, on the need of an appropriate socio-cultural state for sustainable food*
- f. The belief of participants, especially local government, on the need of an appropriate institutional practice for sustainable food*
- g. The belief of participants, especially local government, on the need for an appropriate state of natural environment for sustainable food*
- h. Participants', especially local governments', trust on the capability of the system to create and maintain sustainable food with the help of space technology*
- i. Community support for the system to create and maintain the sustainable food with the help of space technology*
- j. The belief of participants on space technology capability to support increase economic productivity*
- k. The belief of participants on space technology capability to support sustainable nature management*
- l. Well trained and educated system participants (actors)*
- m. Active horizontal management links*
- n. Community understanding and attitudes on the system*
- o. Social, equity & justice empowerment*
- p. National commitment on Sipesmik*

**Good Luck**

## Question 1

*Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security*

## Question 2

- a.i The beneficiaries of the Sipesmik process are: *scientific community*  
 The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation* General population especially fishermen and farmers, Present & future generation,
- a.ii The decision makers of the Sipesmik process are: *government (executive and legislative)*  
 The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*
- a.iii The planners in the Sipesmik process are *executive (Lapan, Bappenas and Dept. of Finance)*  
 The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Agencies (government & private), Industries (government & private), Local government, Fishermen & farmers, Researcher,*
- a.iv The experts used in the Sipesmik process are *space science and technology experts*  
 The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.v The representatives of those affected by Sipesmik are: *local governments*  
 The 'ought to be' representatives are: *ASSI and Local Governments.*
- b. The conditions that are controlled by the decision makers are resources allocation and resources sharing approvals.  
 The conditions that are not controlled by the decision makers are : *power concerned (science and technology, economy, socio cultural, legal- political, nature)*

- c. The constraints on the decision makers are *national capacity on space science and technology*  
The 'ought to be' constraints are *sustainable food supply*
- d. The power to ensure success of Sipesmik is held by the Government
- e. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

- 1. Efficiency *Holds an appropriate monitoring and control system with continuously improved performance standards.*
- 2. Effectiveness *Holds (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s).*
- 3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing.*
- 4. Equity *Provides all parties equal access to: information, science and technology, resources, market and decision making.*
- 5. Ethicality *Conforms to general principle of ethics.*
- 6. Elegancy *Aesthetical and challenging to increase/maintain security and prosperity of the general population.*

### Comments and suggestions

- 1) Please note that in gaining the local government trust, the Sipesmik tasks should include the following:
  - a. *develop the belief on space technology capability to support increase economic productivity*
  - b. *develop the belief on space technology capability to support sustainable nature management*
  - c. *develop the belief on the need of an appropriate socio-cultural state for sustainable food*
  - d. *develop the belief on the need of an appropriate institutional practice for sustainable food*
  - e. *develop the belief on the need for an appropriate state of natural environment for sustainable food*



*f. develop knowledge/understanding on how help support space technology development and use*

- 2) Sipesmik should fulfil the need of general population especially farmers and fishermen*
- 3) Due to it's limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation.*
- 4) Education program for farmers and fishermen should be an integrated program on fisheries, agriculture, trade and industry, social, education and culture.*
- 5) The major investment for Sipesmik should be mainly generated from the government.*
- 6) The Sipesmik shall have the necessary national commitment*
- 7) Some tasks that should be considered include by Sipesmik are:*
  - a. Increase and maintain economic productivity*
  - b. Change institutional practice*
  - c. Change socio cultural practice*
  - d. Increase and maintain the dynamic of managing the natural environment*
- 8) Farmers and fishermen's pessimism on government's will to achieve sustainable food, can be a future problem for Sipesmik*
- 9) Creation of the necessary conducive states for space science and technology development is strategically needed for Sipesmik.*
- 10) Executor of Sipesmik should include not only members of Depanri but also the others who are responsible for sea, fisheries, agriculture, environment, trade, industry, social affairs, education, culture and local governments.*
- 11) The indicators of success that should be monitored within Sipesmik are:*
  - a. Public participation on achieving and maintaining sustainable food with the help of space technology.*
  - b. Community trust on the capability of the system to create and maintain the sustainable food with the help of space technology*
  - c. Changed menu, farming and fishing practice towards sustainable habits*

- d. Qualified knowledge/ understanding of participants especially local governments, on how help support space technology development and its use to create and maintain sustainable food*
- e. The belief of participants, especially local government, on the need of an appropriate socio-cultural state for sustainable food*
- f. The belief of participants, especially local government, on the need of an appropriate institutional practice for sustainable food*
- g. The belief of participants, especially local government, on the need for an appropriate state of natural environment for sustainable food*
- h. Participants', especially local governments', trust on the capability of the system to create and maintain sustainable food with the help of space technology*
- i. The belief of participants on space technology capability to support increase economic productivity*
- j. The belief of participants on space technology capability to support sustainable nature management*
- k. Well trained and educated system participants (actors)*
- l. Community understanding and attitudes on the system*
- m. National commitment on Sipesmik*

**Good Luck**

**Question 1**

*Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security*

**Question 2**

- a.i The beneficiaries of the Sipesmik process are: *no information*  
 The 'ought to be' beneficiaries are: *present and future generation, the nature, the world as a whole.* General population especially fishermen and farmers, Present & future generation,
- a.ii The decision makers of the Sipesmik process are *government officials*  
 The 'ought to be' decision makers are *government, local governments, fishermen and farmers.*
- a.iii The planners in the Sipesmik process are: *no information*  
 The 'ought to be' planners are: *government together with local governments, fishermen and farmer, Agencies (government & private), Industries (government & private), Local government, Fishermen & farmers, Researcher,*
- a.iv The experts used in the Sipesmik process are: *no information*  
 The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.v The representatives of those affected by Sipesmik are *local governments*  
 The 'ought to be' representatives are: *local governments, organizations of fishermen and farmers*
- b. The conditions that are controlled by the decision makers are resources allocation  
 The conditions that are not controlled by the decision makers are: *power of the nature*
- c. The constraints on the decision makers are *no information*  
 The 'ought to be' constraints: *sustainable food*
- d. The power to ensure success of Sipesmik is held by: *the Government*

- c. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

1. Efficiency *Has to know exactly the limits of what to do and not to do. Uses resources as needed and this must be strictly controlled.*
2. Effectiveness *Has to know exactly what will be achieved and how to achieve it rationally.*
3. Efficacy *Simple, no conflictive point, open to cooperation, resource sharing and outsourcing if it is necessary.*
4. Equity *Provides all parties equal access to: information, science and technology, resources, market and decision making.*
5. Ethicality *Ideational (be wise: harmony ratio and feelings, self control: avoid greediness and harm, limits sensuality, sense not only what you can see through sharpen the intuition, fortify the belief and sensitive to God says)*
6. Elegancy *Aesthetical and gives the biggest part of the benefit to general population.*

### Comments and suggestions

- 1) *It should be noted the important of creating the necessary conducive states for space science and technology development through changing socio cultural practice that includes tasks as follows:*
  - a. *change community understanding and attitudes on the Sipesmik*
  - b. *increase/maintain support for Sipesmik*
  - c. *increase/maintain social, equity & justice empowerment*
  - d. *increase/maintain community trust on Sipesmik*
  - e. *increase/maintain public participation on Sipesmik*
  - f. *change(menu, farming, fishing) towards sustainable habits*
- 2) *Sipesmik should fulfil the need of general population especially farmers and fishermen. Also it shall only develop space science and technology for peaceful purposes.*

- 3) *The investment for Sipesmik should be mainly generated from the government.*
- 4) *Sipesmik should be concerned with increasing and maintaining economic productivity, changing socio cultural practice and public participation on achieving and maintaining sustainable food with the help of space technology.*
- 5) *Farmers and fishermen's pessimism on government's will to achieve sustainable food supply can be a future problem for Sipesmik.*
- 6) *Community trust on the capability of the system to create and maintain the sustainable food supply with the help of space technology is compulsory for the success of Sipesmik.*
- 7) *Well trained and educated system participants (actors) are essentials for Sipesmik*

**Good Luck**

## Question 1

*Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security*

## Question 2

- a.i The beneficiaries of the Sipesmik process are *scientific community*  
 The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation, Science and technology community, General population especially fishermen and farmers, Present & future generation,*
- a.ii The decision makers of the Sipesmik process are *government (executive and legislative)*  
 The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*
- a.iii The planner in the Sipesmik process are *executive (Lapan, Bappenas and Dept. of Finance)*  
 The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Agencies (government & private), Industries (government & private), Local government, Researcher,*
- a.iv The experts used in the Sipesmik process are *space science and technology experts*  
 The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.v The representatives of those affected by Sipesmik are *local governments*  
 The 'ought to be' representatives are: *ASSI and Local Governments.*
- b. The conditions that are controlled by the decision makers are *resources allocation.*  
 The conditions that are not controlled by the decision makers are : *power concerned (science and technology, economy, socio cultural, legal- political, nature)*

- c. The constraints on the decision makers are *national capacity on space science and technology*  
The 'ought to be' constraints of the decision makers are: *sustainable food*
- d. The power to ensure success of Sipesmik is held by the Government
- e. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

1. Efficiency *Holds the character of an effective plan and has an appropriate monitoring and control system with continuously improved performance standards.*
2. Effectiveness *Holds (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s).*
3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing.*
4. Equity *Provides all parties equal access to: information, science and technology, resources, market and decision making.*
5. Ethicality *Conforms to general principle of ethics.*
6. Elegancy *Aesthetical and capable to increase quality of life of the general population.*

### Comments and suggestions

- 1) *It should be noted the important of creating the necessary conducive states for space science and technology development through changing institutional practice that includes tasks as follows:*
- a. *increase acceptance of Sipesmik by government agencies, privates and foreign partners,*
  - b. *increase financial support & resource sharing*
  - c. *train & educate Sipesmik actors (owners, executors and clients)*
  - d. *ensure interdepartmental and international cooperation*
  - e. *increase horizontal management links*

- 2) *Sipesmik should fulfil the need of general population especially farmers and fishermen*
- 3) *Sipesmik should practice open management*
- 4) *Sipesmik shall only develop space science and technology for peaceful purposes*
- 5) *The Sipesmik investment must be mainly generated from the government.*
- 6) *The Sipesmik shall have the necessary national commitment*
- 7) *It should be considered include the following tasks:*
  - a. *Increase and maintain local government participation*
  - b. *Increase and maintain economic productivity*
  - c. *Change institutional practice*
  - d. *Change socio cultural practice*
- 8) *Creation of the necessary conducive states for space science and technology development is strategically needed for Sipesmik*
- 9) *Some indicators that should be monitored within Sipesmik are:*
  - a. *Public participation on achieving and maintaining sustainable food with the help of space technology.*
  - b. *Community trust on the capability of the system to create and maintain the sustainable food with the help of space technology*
  - c. *Well trained and educated system participants (actors)*
  - d. *National commitment on Sipesmik*

**Good Luck**



## Question 1

*Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security*

## Question 2

- a.i The beneficiaries of the Sipesmik process are *scientific community*  
 The 'ought to be' beneficiaries are: *the Republik of Indonesia as a whole, the nature, present and future generation, Science and technology community, General population especially fishermen and farmers, Present & future generation,*
- a.ii The decision makers of the Sipesmik process are *government (executive and legislative)*  
 The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*
- a.iii The planners in the Sipesmik process are: *executive (Lapan, Bappenas and Dept. of Finance)*  
 The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Agencies (government & private), Industries (government & private), Local government, Fishermen & farmers, Researcher,*
- a.iv The experts used in the Sipesmik process are *space science and technology experts*  
 The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*
- a.v The representatives of those affected by Sipesmik are *local governments*  
 The 'ought to be' representatives are: *ASSI and Local Governments.*
- b. The conditions that are controlled by the decision makers are resources allocation.

The condition that are not controlled by the decision makers are: *power concerned (science and technology, economy, socio cultural, legal- political, nature)*

- c. The constraints on the decision makers are *national capacity on space science and technology*

The ought to be constraints are *sustainable food supply*

- d. The power to ensure success of Sipesmik is held by the Government
- e. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should they be allowed to.

### Question 3

1. Efficiency *Has an appropriate monitoring and control system with continuously improved performance standards.*
2. Effectiveness *Has (an) achievable objective(s) with measurable indicators of success, and rational steps of action to realize the objective(s).*
3. Efficacy *Simple, unitary (no conflictive points), open to cooperation, resource sharing and outsourcing.*
4. Equity *Conforms to human dignity by providing all parties equal access to: information, science and technology, resources, market and decision making.*
5. Ethicality *Conforms to professional ethics.*
6. Elegancy *Aesthetical and capable to increase quality of life of the general population.*

### Comments

1) *It should be noted the important of creating the necessary conducive states for space science and technology development through changing institutional practice that includes tasks as follows:*

- a. increase acceptance of Sipesmik by government agencies, privates and foreign partners,*
- b. increase financial support & resource sharing*
- c. train & educate Sipesmik actors (owners, executors and clients)*
- d. ensure interdepartmental and international cooperation*

*e. increase horizontal management links*

- 2) *Sipesmik is a social process that achieving the goals needs a long period of time. As a social process Sipesmik should be managed in an appropriate manner such as comprising cycles where improvement mechanism from one to another cycle is well established. Sipesmik is also an educational process where the actors are object of its educational programs to facilitate the intended social process. Sipesmik education program for researchers should be transformable into formal education credit, so that from their activities the researchers can write up thesis for their master or doctor degrees. Universities should participate in the Sipesmik especially focusing on education, research and development.*
- 3) *Education program for farmers and fishermen should be an integrated program which is developed by cooperative teams that consist of peers in at least: space remote sensing, fisheries, agriculture, trade and industry, social, education and culture.*
- 4) *Sipesmik should fulfil the need of general population especially farmers and fishermen.*
- 5) *Due to it's limited in house capabilities Sipesmik should be open to international cooperation and or outsourcing operation*
- 6) *Sipesmik should practice open management*
- 7) *Sipesmik shall only develop space science and technology for peaceful purposes*
- 8) *The Sipesmik investment must be mainly generated from the government.*
- 9) *It should be considered include in the Sipesmik tasks:*
  - a. *Increase and maintain local government participation*
  - b. *Increase and maintain economic productivity*
  - c. *Change institutional practice*
  - d. *Change socio cultural practice*
  - e. *Increase and maintain the dynamic of regulating the system*
  - f. *Increase and maintain the dynamic of managing the natural environment*

- 10) Executor of Sipesmik should include not only members of Depanri but also the others who are responsible for sea, fisheries, agriculture, environment, trade, industry, social affairs, education, culture and local governments.
- 11) There is a need for a national commitment: government (legislative & executive) and public for Sipesmik so that continuance of the program be guaranteed
- 12) Government institution should not work in isolation
- 13) Long term plan for Sipesmik is a must, this plan should contain several cycles where improvement mechanism from one to another cycles should be established. Some indicators that should be monitored within Sipesmik are as follows:
- a. Determined the basic sciences to be implemented in space products
  - b. Determined the space product demands to be fulfilled
  - c. Determined the space product engineering designs based on the determined basic science to be implemented in space products demands to be fulfilled
  - d. Produced the space goods based on the determined space product basic engineering designs.
  - e. Constructed & commissioned the space systems based on the determined basic engineering designs
  - f. Operated the commissioned space systems to fulfill the space services demands
  - g. The system output sold: space systems, space goods and services, also copy rights and patents
  - h. Public participation on achieving and maintaining sustainable food with the help of space technology.
  - i. Community trust on the capability of the system to create and maintain the sustainable food with the help of space technology
  - j. Sustainable energy and material flows especially for fisheries, agricultural and space industry
  - k. The inputs/outputs account for activities & their impacts especially for fisheries, agricultural and space industry
  - l. Policies which maximize production efficiencies especially for fisheries, agricultural and space industry

- m. Policies which encourage efficiency & minimize harms, especially in fisheries, agricultural and space industries*
- n. Ensured policies encourage sustainable high level of economic activity especially in fisheries, agricultural and space industry*
- o. Ensured interdepartmental and international cooperation to create and maintain the sustainable food with the help space technology.*
- p. Waste minimization policies*
- q. Well trained and educated system participants (actors)*
- r. Active horizontal management links*
- s. National commitment on Sipesmik*

**Good Luck**

**Question 1**

*Although Sipesmik is a research and development activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security.*

**Question 2**

a.i The beneficiaries of the Sipesmik process are *scientific community*

The 'ought to be' beneficiaries are: *the Republic of Indonesia as a whole, the nature, present and future generation, General population especially fishermen and farmers. Present & future generation.*

a.ii The decision makers of the Sipesmik process are *government (executive and legislative)*

The 'ought to be' decision makers are *government (executive and legislative), local governments, industry, fishermen and farmers.*

a.iii The planners in the Sipesmik process are: *executive (Lapan, Bropenas and Dept. of Finance)*

The 'ought to be' planners are: *executive and the representatives of beneficiaries (local governments, industry, fishermen and farmer), Agencies (government & private), Industries (government & private), Local government, Researcher,*

a.iv The experts used in the Sipesmik process are: *space science and technology experts*

The 'ought to be' experts used in the Sipesmik process are: *space science and technology experts and beneficiaries*

a.v The representatives of those affected by Sipesmik are: *local governments*

The 'ought to be' representatives are: *ASSI and Local Governments.*

b. The conditions are controlled by the decision makers are *resources allocation*

The conditions that are not controlled by the decision makers are: *power concerned (science and technology, economy, socio cultural, legal-political, nature)*

c. The constraints on the decision makers are *national capacity on space science and technology*

The ought to be constraints on the decision makers are *sustainable food*

- d. The power to ensure success of Sipesmik is held by the Government
- e. Yes, those affected by Sipesmik are allowed to take their fate into their own hands despite the expert. Yes, they should be allowed to.

### Question 3

1. Efficiency *Ratio between output and input*
2. Effectiveness *Ratio between the achieved and the total objective.*
3. Efficacy *Ratio between the resources available and the resources needed to execute the plan.*
4. Equity *Conforms to the general principle of right and justice, due process, both internally and externally*
5. Ethicality *Conforms to general principle of ethics with focus to stakeholders.*
6. Elegancy *Public opinion of usefulness of the project to raise their quality of life.*

### Comments and suggestions

- 1) It should be noted the important of creating the necessary conducive states for space science and technology development through increase/maintain the dynamics of managing the natural environment that includes tasks as follows:
  - (a) move towards sustainable nature
  - (b) reduce waste
  - (c) increase/maintain water health
  - (d) increase/maintain ecological health, and
  - (e) increase/maintain natural environment support on food production
- 2) Furthermore, as a lawyer, I suggest you to consider the inclusion of regulating the Sipesmik in creating the necessary conducive state for space science and technology development in Indonesia. For this task, please consider to include the following subtasks:
  - (a) provide consultation and aid to solve legal case and to prepare legal documents
  - (b) increase Sipesmik participant's understanding on laws and regulations

- (c) *establish guidance for implementation of laws and regulation for Sipesmik*
  - (d) *initiate creation of new laws and regulations including ratification or accession of international laws/regulations*
- 3) *Sipesmik should fulfil the need of general population especially farmers and fishermen. And it shall only develop space science and technology for peaceful purposes.*
  - 4) *The major investment for Sipesmik should be mainly generated from the government.*
  - 5) *The Sipesmik shall have the necessary national commitment and it should optimize the use of existing facilities. Please consider the following tasks for Sipesmik:*
    - (a) *Increase and maintain local government participation*
    - (b) *Change institutional practice*
    - (c) *Increase and maintain the dynamics of regulating the system*
    - (d) *Increase and maintain the dynamic of managing the natural environment*
  - 6) *Sipesmik holds cross-sector tasks from research and development, up to sustainable food which indicator of success consists of science and technology, socio cultural, economical, institutional and physical indicators therefore Depanri, as the national space council, should take the initiative to regulate Sipesmik.*
  - 7) *There are international laws and regulations that should be taken into consideration in managing the Sipesmik such as: Space Treaty, 1967; Registration convention, 1972, and Liability Convention 1975.*
  - 8) *Assess and settle all regulatory problem while Sipesmik is on the way of development*
  - 9) *Creation of the necessary conducive states for space science and technology development is strategically needed for Sipesmik*
  - 10) *Why micro satellite for sustainable food, why not micro satellite for sustainable development at large?*
  - 11) *Some indicator of success that should be monitored by Sipesmik are:*
    - (a) *Public participation on achieving and maintaining sustainable food with the help of space technology.*



- (b) Community trust on the capability of the system to create and maintain the sustainable food with the help of space technology
- (c) Well trained and educated system participants (actors)
- (d) New laws and regulations including ratification or accession of international laws/regulations
- (e) Participants understanding on laws and regulations
- (f) Consultation and aid to solve legal cases and to prepare and assess legal documents
- (g) Protected and supported legally the system
- (h) Reduced waste
- (i) Qualified water health and effective drainage
- (j) Qualified ecological health
- (k) Preserved natural habitat
- (l) Preserved flora and fauna diversity
- (m) Vegetation re-growth
- (n) Regulatory supported and protected the space activities
- (o) National commitment on Sipesmik

**Good Luck**

## **APPENDIX 2**

**Sample of Letter of Request for Models Validation,  
p. 462 - 466**

**Models Validation Data: 50 respondents  
p. 467 - 567**

**Validation Result of Sipesmik Conceptual Models  
p. 568 - 583**

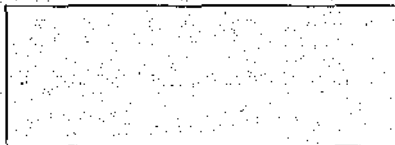
**Sample of Letter of Request for Models Validation**

Ref: -----

For:

Micro Satellite survey

Date: -----



Dear Respondent,

Following up the previous interview on micro satellite development project, herewith I submit you the Sipesmik conceptual models, which were developed, based on data of the previous interview. A brief introduction accompanies those models. Submission of these models asks for your approval to a Sipesmik models validation meeting that I propose to be held in your premise on:

Day:

Date:

Hour:

Address:

I do hope that the above schedule will be expedient for you. However, please feel free to reschedule for your convenience. The following information may of benefit for such rearrangement:

Office: 021-327982

House: 021-7972858

Mobile phone: 0816-914341

Email: [asudiby@student.ecu.edu.au](mailto:asudiby@student.ecu.edu.au)

I look forward to seeing you at your premise. In the meantime, if you have any queries regarding this research project, please contact me at the above addresses.

Yours sincerely

Alexander Sudiby

Researcher of LAPAN

## SIPESMIK CONCEPTUAL MODELS

At the interview, some respondents suggested to complete the Interactive Model of Innovation Process (Manley 2001) into five phases and one creation of a conducive-state, and use it as the embryo of Sipesmik Conceptual Models. They suggested include 'Operational Phase' in the model. Also these five phases should be put in a bigger box that represents a task for creating a conducive-state. These suggestions are actualized within a model identified as 'Model Interactive of Space Technology Innovation Process' (see figure below). These five tasks are

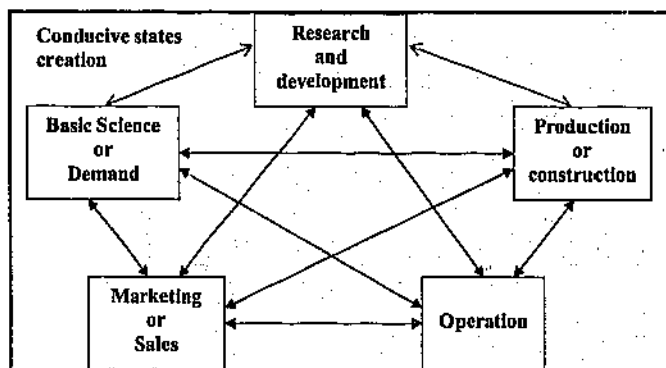
- Space product demand and basic science
- Space research and development that result in basic engineering design
- Produce or construct space product/ system based on the determined basic engineering design
- Operate space system
- Market or sales space products

Some respondents had the views that the Sipesmik should be directed toward improving sustainable food supply, therefore they identified task that should regarded as include in the creation of a conducive-state as follows:

<ul style="list-style-type: none"><li>• Food Sustainable supply</li><li>• Natural environment</li><li>• Economic productivity</li><li>• Socio cultural practice</li></ul>	<ul style="list-style-type: none"><li>• Regulation practice</li><li>• Institutional practice</li><li>• Local Government participation</li></ul>
---	---

Some respondents were convinced that space technology has the capability to result in real time information regarding earth resources and environment at large. Therefore it has a strategic role in natural environment improvement. Due to this some respondents believes that the better space technology innovation stimulates better practices of foods management, of environmental management and of institutional including local government management, of regulation and of socio culture, since it results better communication, data bases, and environmental monitoring that results in higher quality of environmental data, their precision, complete coverage and real time.

Better space technology innovation also stimulates greater economic wealth allow greater fund for environmental improvement. This can be explained through the help of better institutional practice, since it is believed that without better institutional practice this logic will never operate in the real world. Better institutional practice characterized by better openness and better horizontal coordination between institutions.



**Embryo of the Sipesnik Conceptual Models**

(Adapted from Manley, 2001)

Some respondents believe that, lessening environmental stress is a leverage of economic productivity. Tools for lessening the environmental stress are provided by space technology innovation therefore fund allocated for space technology innovation can be seen as part of fund allocated for environmental improvement. This will occur when there is better openness and better horizontal coordination between institutions, which are supported by better communication, data base and monitoring as provided by better space technology innovation.

The primary purposes of these conceptual models are to consolidate the tasks outlined above and to show dependencies between those tasks. The factors needed to be monitored to maintain the system are also outlined, but the details of the control systems are not (these would need further systemic investigations if they were to be required in detail, and would normally be done when designing systems at the operational level).

Jakarta, -----

**Alexander Sudibyo**  
LAPAN Researcher

**Note: The Models can be seen in Chapters 5, 6 and Appendix 4**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

2. In Figure 3, what kind of tasks might your participation focus on?

- |   |                          |
|---|--------------------------|
| a. Science & technology innovation development .....        | <input type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/> |
| c. Manage natural environment .....                         | <input type="checkbox"/> |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/> |
| e. Change socio cultural practice .....                     | <input type="checkbox"/> |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/> |
| g. Change institutional practice .....                      | <input type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/> |

You may choose more than one.

3. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

4. How do you consider the Sipesmik conceptual models in transforming *'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement'* into comprehensive actions:

High  Medium  Low

5. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

- |                | High                          | Medium                          | Low                          |
|----------------|-------------------------------|---------------------------------|------------------------------|
| b. Consistency | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| c. Coherency   | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |

Note: **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

6. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |                               |                                 |                              |
|------------------|-------------------------------|---------------------------------|------------------------------|
| a. Effectiveness | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| b. Efficiency    | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| c. Efficacy      | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| d. Equity        | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| e. Ethicality    | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| f. Elegancy      | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |

Note: **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

7. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

**MANY THANKS FOR YOUR ASSISTANCE**

## Models Validation Data (MVD)

MVD\_101

### SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

2. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input checked="" type="checkbox"/> |
| g. Change institutional practice .....                      | <input type="checkbox"/>            |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

3. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

4. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low



5. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

a. Correspondence

High  Medium  Low

b. Consistency

High  Medium  Low

c. Coherency

High  Medium  Low

Note: Correspondence relates to the agreement or similarity of the idea.  
 Consistency relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
 Coherency relates to the wholeness consistency of the models

6. How do you regard the Sipesmik conceptual models in terms of their:

a. Effectiveness High  Medium  Low

b. Efficiency High  Medium  Low

c. Efficacy High  Medium  Low

d. Equity High  Medium  Low

e. Ethicality High  Medium  Low

f. Elegancy High  Medium  Low

Note: Effectiveness relates to objective achievement,  
 Efficiency relates to the use of resources in achieving their objectives,  
 Efficacy relates to easiness use,  
 Equity relates to equal treatment to parts or parties involved and effected,  
 Ethicality relates to degree of morality in the models,  
 Elegancy relates to aesthetics or public effect of the models.

7. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

- Sipesmik conceptual models figure out only the functional and structural policies.
- The National Air Force contribution is limited to strategic planning development, does not yet include technical operational actions.
- The Sipesmik conceptual models do not yet give the more structured picture of Sipesmik, its time scheduling, resources needed and other details.

MANY THANKS FOR YOUR ASSISTANCE

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

8. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input checked="" type="checkbox"/> |
| c. Manage natural environment .....                         | <input checked="" type="checkbox"/> |
| d. Increase and maintain economic productivity .....        | <input checked="" type="checkbox"/> |
| e. Change socio cultural practice .....                     | <input checked="" type="checkbox"/> |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input checked="" type="checkbox"/> |

You may choose more than one.

9. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

10. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

11. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

High  Medium  Low

b. **Consistency**

High  Medium  Low

c. **Coherency**

High  Medium  Low

Note: **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

12. How do you regard the Sipcsmik conceptual models in terms of their:

- |                         |      |                                     |        |                                     |     |                          |
|-------------------------|------|-------------------------------------|--------|-------------------------------------|-----|--------------------------|
| a. <b>Effectiveness</b> | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| b. <b>Efficiency</b>    | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| c. <b>Efficacy</b>      | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| d. <b>Equity</b>        | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| e. <b>Ethicality</b>    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| f. <b>Elegancy</b>      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |

Note: **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

13. Could you please give any further general comments on the on the Sipcsmik Conceptual Models?

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

14. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input checked="" type="checkbox"/> |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input checked="" type="checkbox"/> |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input checked="" type="checkbox"/> |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

15. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

16. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

17. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

- |                | High                                     | Medium                          | Low                          |
|----------------|--|---------------------------------|------------------------------|
| b. Consistency | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| c. Coherency   | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |

Note: Correspondence relates to the agreement or similarity of the idea.  
 Consistency relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
 Coherency relates to the wholeness consistency of the models

18. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |  |                                 |   |
|------------------|--|---------------------------------|---|
| a. Effectiveness | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/>            |
| b. Efficiency    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/>            |
| c. Efficacy      | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/>            |
| d. Equity        | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/>            |
| e. Ethicality    | High <input type="checkbox"/>            | Medium <input type="checkbox"/> | Low <input checked="" type="checkbox"/> |
| f. Elegancy      | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/>            |

Note: Effectiveness relates to objective achievement,  
 Efficiency relates to the use of resources in achieving their objectives,  
 Efficacy relates to easiness use,  
 Equity relates to equal treatment to parts or parties involved and effected,  
 Ethicality relates to degree of morality in the models,  
 Elegancy relates to aesthetics or public effect of the models.

19. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

MANY THANKS FOR YOUR ASSISTANCE

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

20. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input checked="" type="checkbox"/> |
| c. Manage natural environment .....                         | <input checked="" type="checkbox"/> |
| d. Increase and maintain economic productivity .....        | <input checked="" type="checkbox"/> |
| e. Change socio cultural practice .....                     | <input checked="" type="checkbox"/> |
| f. Regulate the Sipesmik .....                              | <input checked="" type="checkbox"/> |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input checked="" type="checkbox"/> |

You may choose more than one.

21. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

22. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

23. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

High  Medium  Low

**b. Consistency**

High  Medium  Low

**c. Coherency**

High  Medium  Low

Note: **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

**24. How do you regard the Sipcsmik conceptual models in terms of their:**

a. **Effectiveness** High  Medium  Low

b. **Efficiency** High  Medium  Low

c. **Efficacy** High  Medium  Low

d. **Equity** High  Medium  Low

e. **Ethicality** High  Medium  Low

f. **Elegancy** High  Medium  Low

Note: **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

**25. Could you please give any further general comments on the on the Sipcsmik Conceptual Models?**

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

26. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input checked="" type="checkbox"/> |
| f. Regulate the Sipesmik .....                              | <input checked="" type="checkbox"/> |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

27. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

28. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

29. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence



- |                | High                          | Medium                                     | Low                          |
|----------------|-------------------------------|--|------------------------------|
| b. Consistency | High <input type="checkbox"/> | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| c. Coherency   | High <input type="checkbox"/> | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |

Note: **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

30. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |  |  |                              |
|------------------|--|--|------------------------------|
| a. Effectiveness | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| b. Efficiency    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| c. Efficacy      | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| d. Equity        | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| e. Ethicality    | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| f. Elegancy      | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |

Note: **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to casiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

31. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

*We hope that General Sipesmik Concept will be applicable in Indonesia and by this concept could give wide contribution in outer space exploration and also support national security effort.*

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

32. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input type="checkbox"/>            |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input checked="" type="checkbox"/> |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input checked="" type="checkbox"/> |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input checked="" type="checkbox"/> |

You may choose more than one.

33. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

34. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

35. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

a. Correspondence

High  Medium  Low

b. Consistency

High  Medium  Low

c. Coherency

High  Medium  Low

- Note: **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

36. How do you regard the Sipesmik conceptual models in terms of their:

- a. Effectiveness High  Medium  Low
- b. Efficiency High  Medium  Low
- c. Efficacy High  Medium  Low
- d. Equity High  Medium  Low
- e. Ethicality High  Medium  Low
- f. Elegancy High  Medium  Low

- Note: **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

37. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

- a. *Explore roles of owners, pin point owners*
- b. *Be aware about critical and crucial points, especially in formulating the performance standards*
- c. *Explore the classification of critical and crucial process*

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

38. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input checked="" type="checkbox"/> |
| c. Manage natural environment .....                         | <input checked="" type="checkbox"/> |
| d. Increase and maintain economic productivity .....        | <input checked="" type="checkbox"/> |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input checked="" type="checkbox"/> |
| g. Change institutional practice .....                      | <input type="checkbox"/>            |
| h. Increase / maintain local government participation ..... | <input checked="" type="checkbox"/> |

You may choose more than one.

39. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

40. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

41. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

- |                | High                                     | Medium                          | Low                          |
|----------------|--|---------------------------------|------------------------------|
| b. Consistency | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| c. Coherency   | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |

Note: **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

42. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |  |                                 |   |
|------------------|--|---------------------------------|---|
| a. Effectiveness | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/>            |
| b. Efficiency    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/>            |
| c. Efficacy      | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/>            |
| d. Equity        | High <input type="checkbox"/>            | Medium <input type="checkbox"/> | Low <input checked="" type="checkbox"/> |
| e. Ethicality    | High <input type="checkbox"/>            | Medium <input type="checkbox"/> | Low <input checked="" type="checkbox"/> |
| f. Elegancy      | High <input type="checkbox"/>            | Medium <input type="checkbox"/> | Low <input checked="" type="checkbox"/> |

Note: **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

43. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

*I'm very admire the Sipesmik Conceptual Models that the researcher has been designed. It is a new innovaiton. I do hope the the Sipesmik has value added in terms of science and technology development, increase and maintain the dynamics of managing the natural environment etc.*

MANY THANKS FOR YOUR ASSISTANCE

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

g. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

44. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input type="checkbox"/>            |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input checked="" type="checkbox"/> |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input checked="" type="checkbox"/> |

You may choose more than one.

45. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

46. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

47. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

a. Correspondence

- |                       | High                                     | Medium                          | Low                          |
|-----------------------|--|---------------------------------|------------------------------|
| <b>b. Consistency</b> | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| <b>c. Coherency</b>   | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |

**Note:** **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

48. How do you regard the Sipesmik conceptual models in terms of their:

- |                         |  |  |                              |
|-------------------------|--|--|------------------------------|
| <b>a. Effectiveness</b> | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| <b>b. Efficiency</b>    | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| <b>c. Efficacy</b>      | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| <b>d. Equity</b>        | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| <b>e. Ethicality</b>    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| <b>f. Elegancy</b>      | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |

**Note:** **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

49. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

*This will encourage the opening new business activities for the application of remote sensing technology.*

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

50. In Figure 3, what kind of tasks might your participation focus on?

- |  |                                     |
|--|-------------------------------------|
| a. Science & technology innovation development .....       | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                | <input checked="" type="checkbox"/> |
| c. Manage natural environment .....                        | <input checked="" type="checkbox"/> |
| d. Increase and maintain economic productivity .....       | <input checked="" type="checkbox"/> |
| e. Change socio cultural practice .....                    | <input checked="" type="checkbox"/> |
| f. Regulate the Sipesmik .....                             | <input checked="" type="checkbox"/> |
| g. Change institutional practice .....                     | <input checked="" type="checkbox"/> |
| h. Increase/ maintain local government participation ..... | <input checked="" type="checkbox"/> |

You may choose more than one.

51. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

52. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

53. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

a. Correspondence



- |                | High                                     | Medium                          | Low                          |
|----------------|--|---------------------------------|------------------------------|
| b. Consistency | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| c. Coherency   | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |

Note: Correspondence relates to the agreement or similarity of the idea.  
 Consistency relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
 Coherency relates to the wholeness consistency of the models

54. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |  |  |                              |
|------------------|--|--|------------------------------|
| a. Effectiveness | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| b. Efficiency    | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| c. Efficacy      | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| d. Equity        | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| e. Ethicality    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| f. Elegancy      | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |

Note: Effectiveness relates to objective achievement,  
 Efficiency relates to the use of resources in achieving their objectives,  
 Efficacy relates to easiness use,  
 Equity relates to equal treatment to parts or parties involved and effected,  
 Ethicality relates to degree of morality in the models,  
 Elegancy relates to aesthetics or public effect of the models.

55. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

*I find this research interesting and sure that it will become important input for national planning.*

MANY THANKS FOR YOUR ASSISTANCE

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

56. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input checked="" type="checkbox"/> |

You may choose more than one.

57. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

58. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

59. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

- |                | High                                     | Medium                          | Low                          |
|----------------|--|---------------------------------|------------------------------|
| b. Consistency | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| c. Coherency   | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |

Note: **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

60. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |  |  |                              |
|------------------|--|--|------------------------------|
| a. Effectiveness | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| b. Efficiency    | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| c. Efficacy      | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| d. Equity        | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| e. Ethicality    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| f. Elegancy      | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |

Note: **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

61. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

*The truth is not easy to do and even resource consuming, but surely it will achieve the expected result with less (might be no) conflictive actions. This research is quite good as an exercise to function Pancasila as a 'genetivus-subjectivus'.*

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

62. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input type="checkbox"/>            |
| b. Create/ maintain sustainable foods .....                 | <input checked="" type="checkbox"/> |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input checked="" type="checkbox"/> |
| e. Change socio cultural practice .....                     | <input checked="" type="checkbox"/> |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input type="checkbox"/>            |
| h. Increase / maintain local government participation ..... | <input checked="" type="checkbox"/> |

You may choose more than one.

63. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

64. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

65. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

a. Correspondence

High  Medium  Low

b. Consistency

High  Medium  Low

c. Coherency

High  Medium  Low

Note: **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

66. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |      |                                     |        |                                     |     |                          |
|------------------|------|-------------------------------------|--------|-------------------------------------|-----|--------------------------|
| a. Effectiveness | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| b. Efficiency    | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| c. Efficacy      | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| d. Equity        | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| e. Ethicality    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| f. Elegancy      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |

Note: **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

67. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

*By overlapping members of 'owners', 'executors' and 'clients', this model show how equal access for all: to information, to science and technology, to market, to resources and to decision making, is well translated in the model. This also shows how 'self-control' the main character the 'tabiat saleh' of Pancasilaist is well translated in a modeling of 'science and technology development'. Congratulations! This can be seen as an exercise of Pancasila as a 'genetivus subyektivus'.*

MANY THANKS FOR YOUR ASSISTANCE

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

68. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input checked="" type="checkbox"/> |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

69. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

70. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

71. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

High  Medium  Low

**b. Consistency**

High  Medium  Low

**c. Coherency**

High  Medium  Low

**Note:** **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

**72. How do you regard the Sipesmik conceptual models in terms of their:**

- |                  |      |                                     |        |                                     |     |                          |
|------------------|------|-------------------------------------|--------|-------------------------------------|-----|--------------------------|
| a. Effectiveness | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| b. Efficiency    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| c. Efficacy      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| d. Equity        | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| e. Ethicality    | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| f. Elegancy      | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |

**Note:** **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to casiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

**73. Could you please give any further general comments on the on the Sipesmik Conceptual Models?**

*This model can be used in any field.*

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

74. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input checked="" type="checkbox"/> |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input checked="" type="checkbox"/> |
| e. Change socio cultural practice .....                     | <input checked="" type="checkbox"/> |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input type="checkbox"/>            |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

75. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

76. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

77. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

a. Correspondence

High  Medium  Low



**b. Consistency**

High  Medium  Low

**c. Coherency**

High  Medium  Low

**Note:** Correspondence relates to the agreement or similarity of the idea.  
Consistency relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
Coherency relates to the wholeness consistency of the models

**78. How do you regard the Sipesmik conceptual models in terms of their:**

- |                  |      |                          |        |                          |     |                          |
|------------------|------|--------------------------|--------|--------------------------|-----|--------------------------|
| a. Effectiveness | High | <input type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| b. Efficiency    | High | <input type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| c. Efficacy      | High | <input type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| d. Equity        | High | <input type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| e. Ethicality    | High | <input type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| f. Elegancy      | High | <input type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |

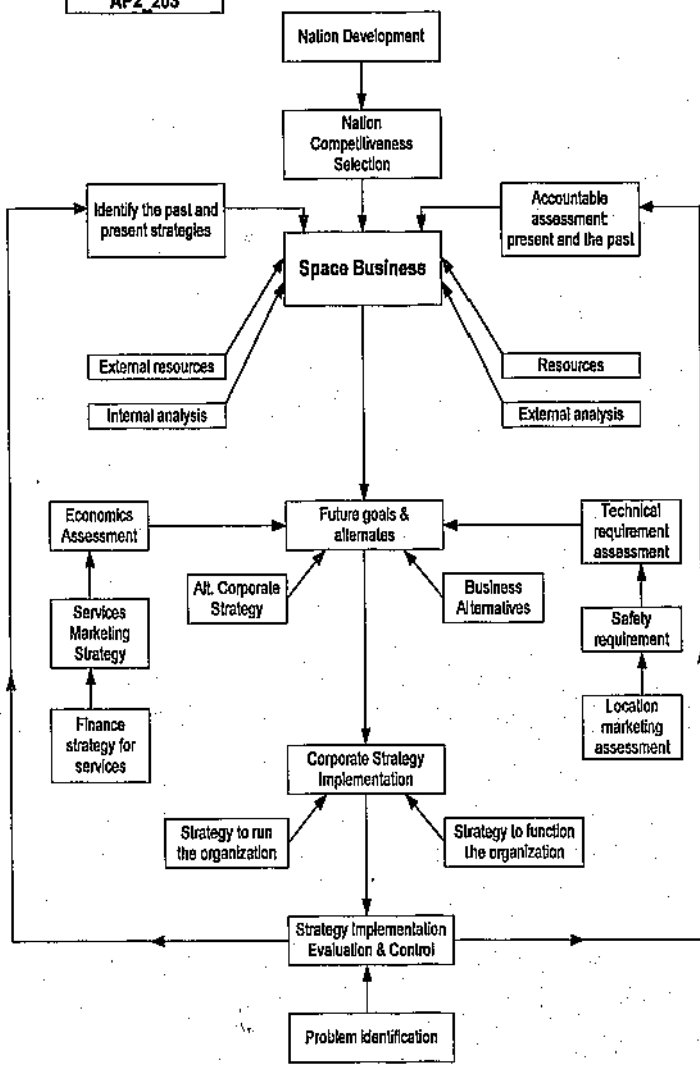
**Note:** Effectiveness relates to objective achievement,  
Efficiency relates to the use of resources in achieving their objectives,  
Efficacy relates to easiness use,  
Equity relates to equal treatment to parts or parties involved and effected,  
Ethicality relates to degree of morality in the models,  
Elegancy relates to aesthetics or public effect of the models.

**79. Could you please give any further general comments on the on the Sipesmik Conceptual Models?**

*As I explained earlier (in the interview), 'equity', 'ethicality' and 'elegancy' are included in the 'effectiveness', therefore no need to further explore. To manage effectively a national development I suggest you to consult the attached model.*

**MANY THANKS FOR YOUR ASSISTANCE**

Attachment to  
AP2\_203



## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

80. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input type="checkbox"/>            |
| b. Create/ maintain sustainable foods .....                 | <input checked="" type="checkbox"/> |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input checked="" type="checkbox"/> |
| e. Change socio cultural practice .....                     | <input checked="" type="checkbox"/> |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

81. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

82. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

83. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

High  Medium  Low

**b. Consistency**

High  Medium  Low

**c. Coherency**

High  Medium  Low

**Note:** Correspondence relates to the agreement or similarity of the idea.  
Consistency relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
Coherency relates to the wholeness consistency of the models

**84. How do you regard the Sipearnik conceptual models in terms of their:**

- |                  |      |                                     |        |                                     |     |                          |
|------------------|------|-------------------------------------|--------|-------------------------------------|-----|--------------------------|
| a. Effectiveness | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| b. Efficiency    | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| c. Efficacy      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| d. Equity        | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| e. Ethicality    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| f. Elegancy      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |

**Note:** Effectiveness relates to objective achievement,  
Efficiency relates to the use of resources in achieving their objectives,  
Efficacy relates to easiness use,  
Equity relates to equal treatment to parts or parties involved and effected,  
Ethicality relates to degree of morality in the models,  
Elegancy relates to aesthetics or public effect of the models.

**85. Could you please give any further general comments on the on the Sipesmik Conceptual Models?**

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

86. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input type="checkbox"/>            |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input checked="" type="checkbox"/> |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

87. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

88. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

89. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

a. Correspondence

- |                | High                                     | Medium                          | Low                          |
|----------------|--|---------------------------------|------------------------------|
| b. Consistency | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| c. Coherency   | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |

Note: Correspondence relates to the agreement or similarity of the idea.  
 Consistency relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
 Coherency relates to the wholeness consistency of the models

90. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |  |  |   |
|------------------|--|--|---|
| a. Effectiveness | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/>            |
| b. Efficiency    | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/>            |
| c. Efficacy      | High <input type="checkbox"/>            | Medium <input type="checkbox"/>            | Low <input checked="" type="checkbox"/> |
| d. Equity        | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/>            |
| e. Ethicality    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/>            |
| f. Elegancy      | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/>            |

Note: Effectiveness relates to objective achievement,  
 Efficiency relates to the use of resources in achieving their objectives,  
 Efficacy relates to easiness use,  
 Equity relates to equal treatment to parts or parties involved and effected,  
 Ethicality relates to degree of morality in the models,  
 Elegancy relates to aesthetics or public effect of the models.

91. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

*The truth is not easy and eventually resource consuming. This is one of the risks that should be faced when searching the truth. I remember the first interview, when you asked me about 'what ought to be', I understand that you need to know the 'truth'. Congratulation, you get it.*

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

92. In Figure 3, what kind of tasks might your participation focus on?

- |  |                                     |
|--|-------------------------------------|
| a. Science & technology innovation development .....       | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                | <input type="checkbox"/>            |
| c. Manage natural environment .....                        | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....       | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                    | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                             | <input type="checkbox"/>            |
| g. Change institutional practice .....                     | <input type="checkbox"/>            |
| h. Increase/ maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

93. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

94. How do you consider the Sipesmik conceptual models in transforming '*the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement*' into comprehensive actions:

High  Medium  Low

95. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

- |                | High                                     | Medium                          | Low                          |
|----------------|--|---------------------------------|------------------------------|
| b. Consistency | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| c. Coherency   | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |

Note: **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

36. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |  |  |                              |
|------------------|--|--|------------------------------|
| a. Effectiveness | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| b. Efficiency    | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| c. Efficacy      | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| d. Equity        | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| e. Ethicality    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| f. Elegancy      | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |

Note: **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

97. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

*Please improve continuously (Make continuous improvements)*

**MANY THANKS FOR YOUR ASSISTANCE**



## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  excutor,  or client.

You may choose more than one.

98. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input checked="" type="checkbox"/> |
| g. Change institutional practice .....                      | <input type="checkbox"/>            |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

99. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

100. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

101. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

a. Correspondence

- |                       | High                                     | Medium                          | Low                          |
|-----------------------|--|---------------------------------|------------------------------|
| b. <b>Consistency</b> | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| c. <b>Coherency</b>   | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |

Note: **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

102. How do you regard the Sipesmik conceptual models in terms of their:

- |                         |  |                                 |                              |
|-------------------------|--|---------------------------------|------------------------------|
| a. <b>Effectiveness</b> | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| b. <b>Efficiency</b>    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| c. <b>Efficacy</b>      | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| d. <b>Equity</b>        | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| e. <b>Ethicality</b>    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| f. <b>Elegancy</b>      | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |

Note: **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

103. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

*Personally, as a lawyer, I am very much impressed by the Sipesmik conceptual models, which has been explained and developed comprehensively. Hopefully, this can be presented academically. I am convinced these conceptual models can be used as the principle of decision making.*

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

104. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input checked="" type="checkbox"/> |
| c. Manage natural environment .....                         | <input checked="" type="checkbox"/> |
| d. Increase and maintain economic productivity .....        | <input checked="" type="checkbox"/> |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

105. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

106. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

107. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

- |                | High                                     | Medium                          | Low                          |
|----------------|--|---------------------------------|------------------------------|
| b. Consistency | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| c. Coherency   | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |

**Note:** Correspondence relates to the agreement or similarity of the idea.  
 Consistency relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
 Coherency relates to the wholeness consistency of the models

108. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |  |  |                              |
|------------------|--|--|------------------------------|
| a. Effectiveness | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| b. Efficiency    | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| c. Efficacy      | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| d. Equity        | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| e. Ethicality    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| f. Elegancy      | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |

**Note:** Effectiveness relates to objective achievement,  
 Efficiency relates to the use of resources in achieving their objectives,  
 Efficacy relates to easiness use,  
 Equity relates to equal treatment to parts or parties involved and effected,  
 Ethicality relates to degree of morality in the models,  
 Elegancy relates to aesthetics or public effect of the models.

109. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

110. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input checked="" type="checkbox"/> |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

111. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

112. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

113. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

High  Medium  Low

**b. Consistency**

High  Medium  Low

**c. Coherency**

High  Medium  Low

**Note:** Correspondence relates to the agreement or similarity of the idea.  
Consistency relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
Coherency relates to the wholeness consistency of the models

**114. How do you regard the Sipesmik conceptual models in terms of their:**

- |                  |      |                                     |        |                                     |     |                          |
|------------------|------|-------------------------------------|--------|-------------------------------------|-----|--------------------------|
| a. Effectiveness | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| b. Efficiency    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| c. Efficacy      | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| d. Equity        | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| e. Ethicality    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| f. Elegancy      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |

**Note:** Effectiveness relates to objective achievement,  
Efficiency relates to the use of resources in achieving their objectives,  
Efficacy relates to easiness use,  
Equity relates to equal treatment to parts or parties involved and effected,  
Ethicality relates to degree of morality in the models,  
Elegancy relates to aesthetics or public effect of the models.

**115. Could you please give any further general comments on the on the Sipesmik Conceptual Models?**

*How to develop mechanism among stakeholders who continuously work and grow?*

*How with the security and resilience aspects?*

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

116. In Figure 3, what kind of tasks might your participation focus on?

- |  |                                     |
|--|-------------------------------------|
| a. Science & technology innovation development .....       | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                | <input checked="" type="checkbox"/> |
| c. Manage natural environment .....                        | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....       | <input checked="" type="checkbox"/> |
| e. Change socio cultural practice .....                    | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                             | <input type="checkbox"/>            |
| g. Change institutional practice .....                     | <input checked="" type="checkbox"/> |
| h. Increase/ maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

117. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

118. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

119. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

a. Correspondence

- |                | High                                     | Medium                                     | Low                          |
|----------------|--|--|------------------------------|
| b. Consistency | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| c. Coherency   | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |

Note: **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

120. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |  |  |                              |
|------------------|--|--|------------------------------|
| a. Effectiveness | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| b. Efficiency    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| c. Efficacy      | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| d. Equity        | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| e. Ethicality    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| f. Elegancy      | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |

Note: **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

121. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

**MANY THANKS FOR YOUR ASSISTANCE**



## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

2. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input checked="" type="checkbox"/> |
| c. Manage natural environment .....                         | <input checked="" type="checkbox"/> |
| d. Increase and maintain economic productivity .....        | <input checked="" type="checkbox"/> |
| e. Change socio cultural practice .....                     | <input checked="" type="checkbox"/> |
| f. Regulate the Sipesmik .....                              | <input checked="" type="checkbox"/> |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input checked="" type="checkbox"/> |

You may choose more than one.

3. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

4. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

5. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

High  Medium  Low

b. **Consistency**

High  Medium  Low

c. **Coherency**

High  Medium  Low

Note: **Correspondence** relates to the agreement or similarity of the idea.

**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.

**Coherency** relates to the wholeness consistency of the models

6. How do you regard the Sipesmik conceptual models in terms of their:

a. **Effectiveness** High  Medium  Low

b. **Efficiency** High  Medium  Low

c. **Efficacy** High  Medium  Low

d. **Equity** High  Medium  Low

e. **Ethicality** High  Medium  Low

f. **Elegancy** High  Medium  Low

Note: **Effectiveness** relates to objective achievement,

**Efficiency** relates to the use of resources in achieving their objectives,

**Efficacy** relates to easiness use,

**Equity** relates to equal treatment to parts or parties involved and effected,

**Ethicality** relates to degree of morality in the models,

**Elegancy** relates to aesthetics or public effect of the models.

7. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

8. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input type="checkbox"/>            |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

9. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

10. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

11. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

	High	Medium	Low
b. Consistency	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>
c. Coherency	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>

- Note: **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

12. How do you regard the Sipesmik conceptual models in terms of their:

a. Effectiveness	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>
b. Efficiency	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>
c. Efficacy	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>
d. Equity	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>
e. Ethicality	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>
f. Elegancy	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>

- Note: **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

13. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

14. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

15. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

16. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

17. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

High  Medium  Low

**b. Consistency**

High  Medium  Low

**c. Coherency**

High  Medium  Low

**Note:** Correspondence relates to the agreement or similarity of the idea.  
Consistency relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
Coherency relates to the wholeness consistency of the models

**18. How do you regard the Sipesmik conceptual models in terms of their:**

- |                  |      |                                     |        |                                     |     |                          |
|------------------|------|-------------------------------------|--------|-------------------------------------|-----|--------------------------|
| a. Effectiveness | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| b. Efficiency    | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| c. Efficacy      | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| d. Equity        | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| e. Ethicality    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| f. Elegancy      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |

**Note:** Effectiveness relates to objective achievement,  
Efficiency relates to the use of resources in achieving their objectives,  
Efficacy relates to easiness use,  
Equity relates to equal treatment to parts or parties involved and effected,  
Ethicality relates to degree of morality in the models,  
Elegancy relates to aesthetics or public effect of the models.

**19. Could you please give any further general comments on the on the Sipesmik Conceptual Models?**

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

20. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input type="checkbox"/>            |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

21. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

22. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

23. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

- |                       | High                          | Medium                                     | Low                          |
|-----------------------|-------------------------------|--|------------------------------|
| b. <b>Consistency</b> |                               |  |                              |
|                       | High <input type="checkbox"/> | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| c. <b>Coherency</b>   |                               |  |                              |
|                       | High <input type="checkbox"/> | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |

**Note:** **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

24. How do you regard the Sipesmik conceptual models in terms of their:

- |                         |                               |  |                              |
|-------------------------|-------------------------------|--|------------------------------|
| a. <b>Effectiveness</b> | High <input type="checkbox"/> | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| b. <b>Efficiency</b>    | High <input type="checkbox"/> | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| c. <b>Efficacy</b>      | High <input type="checkbox"/> | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| d. <b>Equity</b>        | High <input type="checkbox"/> | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| e. <b>Ethicality</b>    | High <input type="checkbox"/> | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| f. <b>Elegancy</b>      | High <input type="checkbox"/> | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |

**Note:** **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

25. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

*Sipesmik conceptual model must be valuable for implementation in the real world, not just a concept.*

**MANY THANKS FOR YOUR ASSISTANCE**



## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

26. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input type="checkbox"/>            |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

27. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

28. How do you consider the Sipesmik conceptual models in transforming '*the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement*' into comprehensive actions:

High  Medium  Low

29. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

High  Medium  Low

**b. Consistency**

High  Medium  Low

**c. Coherency**

High  Medium  Low

**Note:** **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

**30. How do you regard the Sipesmik conceptual models in terms of their:**

- |                  |      |                                     |        |                          |     |                          |
|------------------|------|-------------------------------------|--------|--------------------------|-----|--------------------------|
| a. Effectiveness | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| b. Efficiency    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| c. Efficacy      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| d. Equity        | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| e. Ethicality    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| f. Elegancy      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |

**Note:** **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

**31. Could you please give any further general comments on the on the Sipesmik Conceptual Models?**

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

32. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

33. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

34. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

35. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

- |                | High                                     | Medium                          | Low                          |
|----------------|--|---------------------------------|------------------------------|
| b. Consistency | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| c. Coherency   | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |

Note: Correspondence relates to the agreement or similarity of the idea.  
 Consistency relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
 Coherency relates to the wholeness consistency of the models

36. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |  |                                 |   |
|------------------|--|---------------------------------|---|
| a. Effectiveness | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/>            |
| b. Efficiency    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/>            |
| c. Efficacy      | High <input type="checkbox"/>            | Medium <input type="checkbox"/> | Low <input checked="" type="checkbox"/> |
| d. Equity        | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/>            |
| e. Ethicality    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/>            |
| f. Elegancy      | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/>            |

Note: Effectiveness relates to objective achievement,  
 Efficiency relates to the use of resources in achieving their objectives,  
 Efficacy relates to easiness use,  
 Equity relates to equal treatment to parts or parties involved and effected,  
 Ethicality relates to degree of morality in the models,  
 Elegancy relates to aesthetics or public effect of the models.

37. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

*Please be advised that operational sub-system normally be divided into two sub-sub systems: the mission sub-subsystem and the house keeping sub-subsystem. The first has the role to execute the satellite mission such as remote sensing and telecommunication, and the second is maintain its life as an earth satellite.*

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

38. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

39. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

40. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

41. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

- |                       | High                                     | Medium                          | Low                          |
|-----------------------|--|---------------------------------|------------------------------|
| <b>b. Consistency</b> | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| <b>c. Coherency</b>   | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |

**Note:** **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

**42. How do you regard the Sipesmik conceptual models in terms of their:**

- |                         |  |  |                              |
|-------------------------|--|--|------------------------------|
| <b>a. Effectiveness</b> | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| <b>b. Efficiency</b>    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| <b>c. Efficacy</b>      | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| <b>d. Equity</b>        | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| <b>e. Ethicality</b>    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| <b>f. Elegancy</b>      | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |

**Note:** **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

**43. Could you please give any further general comments on the on the Sipesmik Conceptual Models?**

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

44. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input type="checkbox"/>            |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

45. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

46. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

47. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

High  Medium  Low

b. **Consistency**

High  Medium  Low

c. **Coherency**

High  Medium  Low

Note: **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

48. How do you regard the Sipesmik conceptual models in terms of their:

- |                         |      |                                     |        |                                     |     |                          |
|-------------------------|------|-------------------------------------|--------|-------------------------------------|-----|--------------------------|
| a. <b>Effectiveness</b> | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| b. <b>Efficiency</b>    | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| c. <b>Efficacy</b>      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| d. <b>Equity</b>        | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| e. <b>Ethicality</b>    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| f. <b>Eleganey</b>      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |

Note: **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Eleganey** relates to aesthetics or public effect of the models.

49. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

**MANY THANKS FOR YOUR ASSISTANCE**



## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

50. In Figure 3, what kind of tasks might your participation focus on?

- a. Science & technology innovation development .....
- b. Create/ maintain sustainable foods .....
- c. Manage natural environment .....
- d. Increase and maintain economic productivity .....
- e. Change socio cultural practice .....
- f. Regulate the Sipesmik .....
- g. Change institutional practice .....
- h. Increase / maintain local government participation .....

You may choose more than one.

51. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

52. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

53. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

- |                | High                                     | Medium                          | Low                          |
|----------------|--|---------------------------------|------------------------------|
| b. Consistency | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| c. Coherency   | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |

Note: **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

54. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |  |  |                              |
|------------------|--|--|------------------------------|
| a. Effectiveness | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| b. Efficiency    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| c. Efficacy      | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| d. Equity        | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| e. Ethicality    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| f. Elegancy      | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |

Note: **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to casiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

55. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client:

You may choose more than one.

56. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input checked="" type="checkbox"/> |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

57. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

58. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

59. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

High  Medium  Low

b. Consistency

High  Medium  Low

c. Coherency

High  Medium  Low

Note: Correspondence relates to the agreement or similarity of the idea.  
Consistency relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
Coherency relates to the wholeness consistency of the models

60. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |      |                                     |        |                          |     |                          |
|------------------|------|-------------------------------------|--------|--------------------------|-----|--------------------------|
| a. Effectiveness | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| b. Efficiency    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| c. Efficacy      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| d. Equity        | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| e. Ethicality    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| f. Elegancy      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |

Note: Effectiveness relates to objective achievement,  
Efficiency relates to the use of resources in achieving their objectives,  
Efficacy relates to easiness use,  
Equity relates to equal treatment to parts or parties involved and effected,  
Ethicality relates to degree of morality in the models,  
Elegancy relates to aesthetics or public effect of the models.

61. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

MANY THANKS FOR YOUR ASSISTANCE

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

62. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

63. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

64. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

65. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

- |                       | High                                     | Medium                          | Low                          |
|-----------------------|--|---------------------------------|------------------------------|
| <b>b. Consistency</b> | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| <b>c. Coherency</b>   | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |

**Note:** **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

66. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |      |                                     |        |                                     |     |                          |
|------------------|------|-------------------------------------|--------|-------------------------------------|-----|--------------------------|
| a. Effectiveness | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| b. Efficiency    | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| c. Efficacy      | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| d. Equity        | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| e. Ethicality    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| f. Elegancy      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |

**Note:** **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

67. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

68. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input type="checkbox"/>            |
| b. Create/ maintain sustainable foods .....                 | <input checked="" type="checkbox"/> |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input checked="" type="checkbox"/> |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

69. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

70. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

71. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

High  Medium  Low

**b. Consistency**

High  Medium  Low

**c. Coherency**

High  Medium  Low

**Note:** Correspondence relates to the agreement or similarity of the idea.  
Consistency relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
Coherency relates to the wholeness consistency of the models

**72. How do you regard the Sipesmik conceptual models in terms of their:**

- |                  |      |                                     |        |                                     |     |                          |
|------------------|------|-------------------------------------|--------|-------------------------------------|-----|--------------------------|
| a. Effectiveness | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| b. Efficiency    | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| c. Efficacy      | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| d. Equity        | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| e. Ethicality    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| f. Elegancy      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |

**Note:** Effectiveness relates to objective achievement,  
Efficiency relates to the use of resources in achieving their objectives,  
Efficacy relates to easiness use,  
Equity relates to equal treatment to parts or parties involved and effected,  
Ethicality relates to degree of morality in the models,  
Elegancy relates to aesthetics or public effect of the models.

**73. Could you please give any further general comments on the on the Sipesmik Conceptual Models?**

*As you wished, you get what you want: 'the truth' which is derived from 'what ought to be'. The truth is hard to get, but it does not always serve you in practice, even in certain cases, you might get difficulties to use it. Like Pancasila as the Indonesian weltanschauung was not easy to get approved, now you used it as a genetivus-subyektivus to help develop Sipesmik model. I am sure this is not an easy task. Congratulation you did it.*

**MANY THANKS FOR YOUR ASSISTANCE**



## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

74. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input type="checkbox"/>            |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input checked="" type="checkbox"/> |
| g. Change institutional practice .....                      | <input type="checkbox"/>            |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

75. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

76. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

77. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

a. Correspondence

High  Medium  Low

**b. Consistency**

High  Medium  Low

**c. Coherency**

High  Medium  Low

**Note:** Correspondence relates to the agreement or similarity of the idea.  
Consistency relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
Coherency relates to the wholeness consistency of the models

**78. How do you regard the Sipesmik conceptual models in terms of their:**

- |                  |      |                          |        |                                     |     |                          |
|------------------|------|--------------------------|--------|-------------------------------------|-----|--------------------------|
| a. Effectiveness | High | <input type="checkbox"/> | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| b. Efficiency    | High | <input type="checkbox"/> | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| c. Efficacy      | High | <input type="checkbox"/> | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| d. Equity        | High | <input type="checkbox"/> | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| e. Ethicality    | High | <input type="checkbox"/> | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| f. Elegancy      | High | <input type="checkbox"/> | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |

**Note:** Effectiveness relates to objective achievement,  
Efficiency relates to the use of resources in achieving their objectives,  
Efficacy relates to business use,  
Equity relates to equal treatment to parts or parties involved and effected,  
Ethicality relates to degree of morality in the models,  
Elegancy relates to aesthetics or public effect of the models.

**79. Could you please give any further general comments on the on the Sipesmik Conceptual Models?**

*It's quite good because the stakeholders has already been taken into consideration*

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

80. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input type="checkbox"/>            |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

81. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

82. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

83. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

High  Medium  Low

**b. Consistency**

High  Medium  Low

**c. Coherency**

High  Medium  Low

**Note:** Correspondence relates to the agreement or similarity of the idea.  
Consistency relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
Coherency relates to the wholeness consistency of the models

**84. How do you regard the Sipesmik conceptual models in terms of their:**

- |                  |      |                                     |        |                                     |     |                          |
|------------------|------|-------------------------------------|--------|-------------------------------------|-----|--------------------------|
| a. Effectiveness | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| b. Efficiency    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| c. Efficacy      | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| d. Equity        | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| e. Ethicality    | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| f. Elegancy      | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |

**Note:** Effectiveness relates to objective achievement,  
Efficiency relates to the use of resources in achieving their objectives,  
Efficacy relates to easiness use,  
Equity relates to equal treatment to parts or parties involved and effected,  
Ethicality relates to degree of morality in the models,  
Elegancy relates to aesthetics or public effect of the models.

**85. Could you please give any further general comments on the on the Sipesmik Conceptual Models?**

*Please be advised, that close monitoring to 'the next steps' is properly proceeded*

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

86. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input checked="" type="checkbox"/> |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input checked="" type="checkbox"/> |
| e. Change socio cultural practice .....                     | <input checked="" type="checkbox"/> |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input type="checkbox"/>            |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

87. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

88. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

89. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

High  Medium  Low

**b. Consistency**

High  Medium  Low

**c. Coherency**

High  Medium  Low

**Note:** Correspondence relates to the agreement or similarity of the idea.  
Consistency relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
Coherency relates to the wholeness consistency of the models

**90. How do you regard the Sipesmik conceptual models in terms of their:**

- a. **Effectiveness** High  Medium  Low
- b. **Efficiency** High  Medium  Low
- c. **Efficacy** High  Medium  Low
- d. **Equity** High  Medium  Low
- e. **Ethicality** High  Medium  Low
- f. **Elegancy** High  Medium  Low

**Note:** Effectiveness relates to objective achievement,  
Efficiency relates to the use of resources in achieving their objectives,  
Efficacy relates to casiness use,  
Equity relates to equal treatment to parts or parties involved and effected,  
Ethicality relates to degree of morality in the models,  
Elegancy relates to aesthetics or public effect of the models.

**91. Could you please give any further general comments on the on the Sipesmik Conceptual Models?**

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

92. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input checked="" type="checkbox"/> |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input checked="" type="checkbox"/> |
| e. Change socio cultural practice .....                     | <input checked="" type="checkbox"/> |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

93. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

94. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

95. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

- |                | High                          | Medium                                     | Low                          |
|----------------|-------------------------------|--|------------------------------|
| b. Consistency | High <input type="checkbox"/> | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| c. Coherency   | High <input type="checkbox"/> | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |

Note: **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', 'logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models.

96. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |                               |                                 |                              |
|------------------|-------------------------------|---------------------------------|------------------------------|
| a. Effectiveness | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| b. Efficiency    | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| c. Efficacy      | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| d. Equity        | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| e. Ethicality    | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| f. Elegancy      | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |

Note: **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

97. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

*Question 2f, 2g, should be "Improve" not "Increase/maintain". Implementation of the model is a pre-requisite to the successful achievement of the goals of the Sipesmik: space for security and prosperity for the general population. Therefore it not necessary for me to judge as to whether its' effectiveness, efficiency, efficacy, equity, ethicality and elegancy, ure highs. This method resemble to Delphi method that is not scientific, since in certain cases solutions taken were not rational but compromised.*

**MANY THANKS FOR YOUR ASSISTANCE**



## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

98. In Figure 3, what kind-of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input type="checkbox"/>            |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input checked="" type="checkbox"/> |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

99. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

- 100: How do you consider the Sipesmik conceptual models in transforming 'the high level' goals of the Sipesmik: *Space for security and prosperity, with focus on sustainable food and community involvement* into comprehensive actions:

High  Medium  Low

101. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

High  Medium  Low

b. Consistency

High  Medium  Low

c. Coherency

High  Medium  Low

Note: **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models.

102. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |      |                                     |        |                          |     |                          |
|------------------|------|-------------------------------------|--------|--------------------------|-----|--------------------------|
| a. Effectiveness | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| b. Efficiency    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| c. Efficacy      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| d. Equity        | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| e. Ethicality    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |
| f. Elegancy      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/> | Low | <input type="checkbox"/> |

Note: **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

103. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

*It is true. When you develop satellite for sustainable food, you have not to limit your self on building and operating satellite, you have to include in your program, how sustainable food could be achieved by the help of satellite technology.*

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

104. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input type="checkbox"/>            |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input checked="" type="checkbox"/> |
| f. Regulate the Sipesmik .....                              | <input checked="" type="checkbox"/> |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input checked="" type="checkbox"/> |

You may choose more than one.

105. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

106. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

107. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

a. Correspondence

High  Medium  Low

**b. Consistency**

High  Medium  Low

**c. Coherency**

High  Medium  Low

**Note:** Correspondence relates to the agreement or similarity of the idea.  
Consistency relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
Coherency relates to the wholeness consistency of the models

**108. How do you regard the Sipesmik conceptual models in terms of their:**

- |                  |      |                                     |        |                                     |     |                          |
|------------------|------|-------------------------------------|--------|-------------------------------------|-----|--------------------------|
| a. Effectiveness | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| b. Efficiency    | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| c. Efficacy      | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| d. Equity        | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| e. Ethicality    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| f. Elegancy      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |

**Note:** Effectiveness relates to objective achievement,  
Efficiency relates to the use of resources in achieving their objectives,  
Efficacy relates to easiness use,  
Equity relates to equal treatment to parts or parties involved and effected,  
Ethicality relates to degree of morality in the models,  
Elegancy relates to aesthetics or public effect of the models.

**109. Could you please give any further general comments on the on the Sipesmik Conceptual Models?**

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

110. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input checked="" type="checkbox"/> |
| g. Change institutional practice .....                      | <input type="checkbox"/>            |
| h. Increase / maintain local government participation ..... | <input checked="" type="checkbox"/> |

You may choose more than one.

111. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

112. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

113. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

- |                | High                                     | Medium                          | Low                          |
|----------------|--|---------------------------------|------------------------------|
| b. Consistency | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| c. Coherency   | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |

Note: **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

114. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |  |  |                              |
|------------------|--|--|------------------------------|
| a. Effectiveness | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| b. Efficiency    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| c. Efficacy      | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| d. Equity        | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| e. Ethicality    | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| f. Elegancy      | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |

Note: **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

115. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

*It should be given the concept for transforming this management model to the real model in order to assist the engineers in absorbing/interpreting this idea.*

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MANY THANKS FOR YOUR ASSISTANCE  
 SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

116. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input checked="" type="checkbox"/> |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input checked="" type="checkbox"/> |
| e. Change socio cultural practice .....                     | <input checked="" type="checkbox"/> |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input type="checkbox"/>            |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

117. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

118. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

119. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

a. Correspondence

High  Medium  Low

b. Consistency

High  Medium  Low

c. Coherency

High  Medium  Low

Note: Correspondence relates to the agreement or similarity of the idea.  
Consistency relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
Coherency relates to the wholeness consistency of the models

120. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |      |                                     |        |                                     |     |                          |
|------------------|------|-------------------------------------|--------|-------------------------------------|-----|--------------------------|
| a. Effectiveness | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| b. Efficiency    | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| c. Efficacy      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| d. Equity        | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| e. Ethicality    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| f. Elegancy      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |

Note: Effectiveness relates to objective achievement,  
Efficiency relates to the use of resources in achieving their objectives,  
Efficacy relates to easiness use,  
Equity relates to equal treatment to parts or parties involved and effected,  
Ethicality relates to degree of morality in the models,  
Elegancy relates to aesthetics or public effect of the models.

121. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

*What you can get by asking 'what ought to be' is a truth but not the truth. The truth is only Thy truth. What you get now is a relative-truth therefore bevares of the coming disagreement of people. It was not a truth since everyone said so, but it is a truth since everyone says so, therefore do not stop from truth searching if you would like to be up to date.*

MANY THANKS FOR YOUR ASSISTANCE



## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

122. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input type="checkbox"/>            |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

123. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

124. How do you consider the Sipesmik conceptual models in transforming '*the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement*' into comprehensive actions:

High  Medium  Low

125. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

a. Correspondence

High  Medium  Low

b. Consistency

High  Medium  Low

c. Coherency

High  Medium  Low

Note: Correspondence relates to the agreement or similarity of the idea.

Consistency relates to 'harmony', logic relations' or agreement of each of the elements of the models.

Coherency relates to the wholeness consistency of the models

126. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |      |                                     |        |                                     |     |                          |
|------------------|------|-------------------------------------|--------|-------------------------------------|-----|--------------------------|
| a. Effectiveness | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| b. Efficiency    | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| c. Efficacy      | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| d. Equity        | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| e. Ethicality    | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| f. Elegancy      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |

Note: Effectiveness relates to objective achievement,

Efficiency relates to the use of resources in achieving their objectives,

Efficacy relates to easiness use,

Equity relates to equal treatment to parts or parties involved and effected,

Ethicality relates to degree of morality in the models,

Elegancy relates to aesthetics or public effect of the models.

127. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

*Supposed I still at power would take the opportunity to support the success of Sipesmik conceptual models, that are in line with national concepts: 'Wawasan Nusantara' (Nusantara Weltanschauung), 'Ketahanan Nasional' (National Resilience) and 'Kewaspadaan Nasional' (National Alert).*

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

128. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input checked="" type="checkbox"/> |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

129. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

130. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

131. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

a. Correspondence

High  Medium  Low

b. Consistency

High  Medium  Low

c. Coherency

High  Medium  Low

Note: Correspondence relates to the agreement or similarity of the idea.  
Consistency relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
Coherency relates to the wholeness consistency of the models

132. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |      |                                     |        |                                     |     |                          |
|------------------|------|-------------------------------------|--------|-------------------------------------|-----|--------------------------|
| a. Effectiveness | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| b. Efficiency    | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| c. Efficacy      | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| d. Equity        | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| e. Ethicality    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| f. Elegancy      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |

Note: Effectiveness relates to objective achievement,  
Efficiency relates to the use of resources in achieving their objectives,  
Efficacy relates to easiness use,  
Equity relates to equal treatment to parts or parties involved and effected,  
Ethicality relates to degree of morality in the models,  
Elegancy relates to aesthetics or public effect of the models.

133. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

134. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input type="checkbox"/>            |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

135. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

136. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

137. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

- |                | High                                     | Medium                          | Low                          |
|----------------|--|---------------------------------|------------------------------|
| b. Consistency | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| c. Coherency   | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |

Note: **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

138. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |  |  |                              |
|------------------|--|--|------------------------------|
| a. Effectiveness | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| b. Efficiency    | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| c. Efficacy      | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| d. Equity        | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| e. Ethicality    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| f. Elegancy      | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |

Note: **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

139. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

140. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input checked="" type="checkbox"/> |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input checked="" type="checkbox"/> |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input checked="" type="checkbox"/> |
| g. Change institutional practice .....                      | <input type="checkbox"/>            |
| h. Increase / maintain local government participation ..... | <input checked="" type="checkbox"/> |

You may choose more than one.

141. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

142. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

143. How well do you think Sipesmik conceptual models transform the Paucasilla values into comprehensive actions, in terms of their:

- a. Correspondence

- |                | High                          | Medium                          | Low                                     |
|----------------|-------------------------------|---------------------------------|---|
| b. Consistency | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input checked="" type="checkbox"/> |
| c. Coherency   | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input checked="" type="checkbox"/> |

Note: **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

144. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |                               |                                 |   |
|------------------|-------------------------------|---------------------------------|---|
| a. Effectiveness | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input checked="" type="checkbox"/> |
| b. Efficiency    | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input checked="" type="checkbox"/> |
| c. Efficacy      | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input checked="" type="checkbox"/> |
| d. Equity        | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input checked="" type="checkbox"/> |
| e. Ethicality    | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input checked="" type="checkbox"/> |
| f. Elegancy      | High <input type="checkbox"/> | Medium <input type="checkbox"/> | Low <input checked="" type="checkbox"/> |

Note: **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

145. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

- Very theoretical for me as a practical person
- Too difficult for implementation

MANY THANKS FOR YOUR ASSISTANCE



## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

146. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input checked="" type="checkbox"/> |
| c. Manage natural environment .....                         | <input checked="" type="checkbox"/> |
| d. Increase and maintain economic productivity .....        | <input checked="" type="checkbox"/> |
| e. Change socio cultural practice .....                     | <input checked="" type="checkbox"/> |
| f. Regulate the Sipesmik .....                              | <input checked="" type="checkbox"/> |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input checked="" type="checkbox"/> |

You may choose more than one.

147. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

148. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

149. How well do you think Sipesmik conceptual models transform the Paucasila values into comprehensive actions, in terms of their:

- a. Correspondence

- |                | High                                     | Medium                          | Low                          |
|----------------|--|---------------------------------|------------------------------|
| b. Consistency | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |
| c. Coherency   | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/> | Low <input type="checkbox"/> |

Note: **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

150. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |  |  |                              |
|------------------|--|--|------------------------------|
| a. Effectiveness | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| b. Efficiency    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| c. Efficacy      | High <input type="checkbox"/>            | Medium <input checked="" type="checkbox"/> | Low <input type="checkbox"/> |
| d. Equity        | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| e. Ethicality    | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |
| f. Elegancy      | High <input checked="" type="checkbox"/> | Medium <input type="checkbox"/>            | Low <input type="checkbox"/> |

Note: **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

151. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

152. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input type="checkbox"/>            |
| b. Create/ maintain sustainable foods .....                 | <input checked="" type="checkbox"/> |
| c. Manage natural environment .....                         | <input checked="" type="checkbox"/> |
| d. Increase and maintain economic productivity .....        | <input checked="" type="checkbox"/> |
| e. Change socio cultural practice .....                     | <input checked="" type="checkbox"/> |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

153. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

154. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: *Space for security and prosperity, with focus on sustainable food and community involvement*' into comprehensive actions:

High  Medium  Low

155. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

a. Correspondence

High  Medium  Low

**b. Consistency**

High  Medium  Low

**c. Coherency**

High  Medium  Low

**Note:** **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

156. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |      |                                     |        |                                     |     |                          |
|------------------|------|-------------------------------------|--------|-------------------------------------|-----|--------------------------|
| a. Effectiveness | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| b. Efficiency    | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| c. Efficacy      | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| d. Equity        | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| e. Ethicality    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| f. Elegancy      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |

**Note:** **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

157. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

158. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input type="checkbox"/>            |
| b. Create/ maintain sustainable foods .....                 | <input checked="" type="checkbox"/> |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input checked="" type="checkbox"/> |
| e. Change socio cultural practice .....                     | <input checked="" type="checkbox"/> |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input type="checkbox"/>            |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

159. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

160. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

161. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

	High	Medium	Low
b. Consistency	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>
c. Coherency	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>

Note: **Correspondence** relates to the agreement or similarity of the idea.  
**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
**Coherency** relates to the wholeness consistency of the models

162. How do you regard the Sipesmik conceptual models in terms of their:

a. Effectiveness	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>
b. Efficiency	High <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	Low <input type="checkbox"/>
c. Efficacy	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>
d. Equity	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>
e. Ethicality	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>
f. Elegancy	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>

Note: **Effectiveness** relates to objective achievement,  
**Efficiency** relates to the use of resources in achieving their objectives,  
**Efficacy** relates to easiness use,  
**Equity** relates to equal treatment to parts or parties involved and effected,  
**Ethicality** relates to degree of morality in the models,  
**Elegancy** relates to aesthetics or public effect of the models.

163. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the model(s) that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

164. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input checked="" type="checkbox"/> |
| c. Manage natural environment .....                         | <input checked="" type="checkbox"/> |
| d. Increase and maintain economic productivity .....        | <input checked="" type="checkbox"/> |
| e. Change socio cultural practice .....                     | <input checked="" type="checkbox"/> |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

165. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

166. How do you consider the Sipesmik conceptual models in transforming '*the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement*' into comprehensive actions:

High  Medium  Low

167. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

a. Correspondence

High  Medium  Low

b. Consistency

High  Medium  Low

c. Coherency

High  Medium  Low

Note: Correspondence relates to the agreement or similarity of the idea.  
Consistency relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
Coherency relates to the wholeness consistency of the models

168. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |      |                                     |        |                                     |     |                          |
|------------------|------|-------------------------------------|--------|-------------------------------------|-----|--------------------------|
| a. Effectiveness | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| b. Efficiency    | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| c. Efficacy      | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| d. Equity        | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| e. Ethicality    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| f. Elegancy      | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |

Note: Effectiveness relates to objective achievement,  
Efficiency relates to the use of resources in achieving their objectives,  
Efficacy relates to easiness use,  
Equity relates to equal treatment to parts or parties involved and effected,  
Ethicality relates to degree of morality in the models,  
Elegancy relates to aesthetics or public effect of the models.

169. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

MANY THANKS FOR YOUR ASSISTANCE



## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

170. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input checked="" type="checkbox"/> |
| b. Create/ maintain sustainable foods .....                 | <input checked="" type="checkbox"/> |
| c. Manage natural environment .....                         | <input type="checkbox"/>            |
| d. Increase and maintain economic productivity .....        | <input checked="" type="checkbox"/> |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input type="checkbox"/>            |
| g. Change institutional practice .....                      | <input type="checkbox"/>            |
| h. Increase / maintain local government participation ..... | <input type="checkbox"/>            |

You may choose more than one.

171. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

172. How do you consider the Sipesmik conceptual models in transforming '*the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement*' into comprehensive actions:

High  Medium  Low

173. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

- a. Correspondence

	High	Medium	Low
b. Consistency	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>
c. Coherency	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>

Note: **Correspondence** relates to the agreement or similarity of the idea.

**Consistency** relates to 'harmony', logic relations' or agreement of each of the elements of the models.

**Coherency** relates to the wholeness consistency of the models

174. How do you regard the Sipesmik conceptual models in terms of their:

a. Effectiveness	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>
b. Efficiency	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>
c. Efficacy	High <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	Low <input type="checkbox"/>
d. Equity	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>
e. Ethicality	High <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	Low <input type="checkbox"/>
f. Elegancy	High <input type="checkbox"/>	Medium <input type="checkbox"/>	Low <input checked="" type="checkbox"/>

Note: **Effectiveness** relates to objective achievement,

**Efficiency** relates to the use of resources in achieving their objectives,

**Efficacy** relates to easiness use,

**Equity** relates to equal treatment to parts or parties involved and effected,

**Ethicality** relates to degree of morality in the models,

**Elegancy** relates to aesthetics or public effect of the models.

175. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

*The comprehensiveness and linkage among aspects are really demonstrated perfectly*

**MANY THANKS FOR YOUR ASSISTANCE**

## SIPESMIK CONCEPTUAL MODELS VALIDATION QUESTIONS

After having examined the Sipesmik conceptual models, could you like please answer the following questions? This is needed to validate the models that have been created.

1. In Figure 1, where do you might position yourselves in the Sipesmik model?

owner  executor,  or client.

You may choose more than one.

176. In Figure 3, what kind of tasks might your participation focus on?

- |   |                                     |
|---|-------------------------------------|
| a. Science & technology innovation development .....        | <input type="checkbox"/>            |
| b. Create/ maintain sustainable foods .....                 | <input type="checkbox"/>            |
| c. Manage natural environment .....                         | <input checked="" type="checkbox"/> |
| d. Increase and maintain economic productivity .....        | <input type="checkbox"/>            |
| e. Change socio cultural practice .....                     | <input type="checkbox"/>            |
| f. Regulate the Sipesmik .....                              | <input checked="" type="checkbox"/> |
| g. Change institutional practice .....                      | <input checked="" type="checkbox"/> |
| h. Increase / maintain local government participation ..... | <input checked="" type="checkbox"/> |

You may choose more than one.

177. Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

178. How do you consider the Sipesmik conceptual models in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:

High  Medium  Low

179. How well do you think Sipesmik conceptual models transform the Pancasila values into comprehensive actions, in terms of their:

a. Correspondence

High  Medium  Low

b. Consistency

High  Medium  Low

c. Coherency

High  Medium  Low

Note: Correspondence relates to the agreement or similarity of the idea.  
Consistency relates to 'harmony', logic relations' or agreement of each of the elements of the models.  
Coherency relates to the wholeness consistency of the models.

180. How do you regard the Sipesmik conceptual models in terms of their:

- |                  |      |                                     |        |                                     |     |                          |
|------------------|------|-------------------------------------|--------|-------------------------------------|-----|--------------------------|
| a. Effectiveness | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| b. Efficiency    | High | <input checked="" type="checkbox"/> | Medium | <input type="checkbox"/>            | Low | <input type="checkbox"/> |
| c. Efficacy      | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| d. Equity        | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| e. Ethicality    | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |
| f. Elegancy      | High | <input type="checkbox"/>            | Medium | <input checked="" type="checkbox"/> | Low | <input type="checkbox"/> |

Note: Effectiveness relates to objective achievement,  
Efficiency relates to the use of resources in achieving their objectives,  
Efficacy relates to easiness use,  
Equity relates to equal treatment to parts or parties involved and effected,  
Ethicality relates to degree of morality in the models,  
Elegancy relates to aesthetics or public effect of the models.

181. Could you please give any further general comments on the on the Sipesmik Conceptual Models?

*Sipesmik conceptual model should not be limited to sustainable food, but sustainable development as a whole, a new concept to be applied (Ref. WSSD September 2002, in Johannesburg). Gender concept should take into account in model. Ref. Johannesburg and Beijing conference on Woman '78: gender equality, equity and justice.*

**MANY THANKS FOR YOUR ASSISTANCE**

## VALIDATION RESULTS (VR)

VR\_100

### VALIDATION RESULT OF SIPESMIK CONCEPTUAL MODELS

**Question 1: Where do you position yourself in the Sipesmik?**

10 Respondents: Owner:  Executor:  Client:

**Question 2: What kind of tasks might your participation focus on?**

10 respondents

a. Science & technology innovation development .....	<b>8</b>
b. Create/ maintain sustainable foods .....	<b>5</b>
c. Manage natural environment .....	<b>5</b>
d. Increase and maintain economic productivity .....	<b>5</b>
e. Change socio cultural practice .....	<b>5</b>
f. Regulate the Sipesmik .....	<b>7</b>
g. Change institutional practice .....	<b>8</b>
h. Increase / maintain local government participation .....	<b>7</b>

**Question 3: Do you think the Sipesmik conceptual model has included your views given during the interview?**

10 respondents: High:  Medium:  Low:

**Question 4: How do you consider the Sipesmik conceptual model in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:**

10 respondents: High:  Medium:  Low:

**Question 5: How well do you think Sipesmik conceptual model transform the Pancasila values into comprehensive actions, in terms of their:**

Correspondence: (10 resps) High:  Medium:  Low:

Consistency (10 resps) High:  Medium:  Low:

Coherency: (10 resps) High:  Medium:  Low:

**Question 6: How do you regard the Sipesmik conceptual model in terms of their:**

Effectiveness (10 resps)	High: <input type="text" value="9"/>	Medium: <input type="text" value="1"/>	Low: <input type="text"/>
Efficiency (10 resps)	High: <input type="text" value="5"/>	Medium: <input type="text" value="5"/>	Low: <input type="text"/>
Efficacy (10 resps)	High: <input type="text" value="5"/>	Medium: <input type="text" value="5"/>	Low: <input type="text"/>
Equity (10 resps)	High: <input type="text" value="8"/>	Medium: <input type="text" value="2"/>	Low: <input type="text"/>
Ethicality (10 resps)	High: <input type="text" value="6"/>	Medium: <input type="text" value="4"/>	Low: <input type="text"/>
Elegancy (10 resps)	High: <input type="text" value="8"/>	Medium: <input type="text" value="2"/>	Low: <input type="text"/>

### VALIDATION RESULT OF SIPESMIK CONCEPTUAL MODEL

**Question 1: Where do you position yourself in the Sipesmik?**

10 Respondents: Owner:  Executor:  Client:

**Question 2: What kind of tasks might your participation focus on?**

10 respondents

a. Science & technology innovation development .....	7
b. Create/ maintain sustainable foods .....	5
c. Manage natural environment .....	2
d. Increase and maintain economic productivity .....	5
e. Change socio cultural practice .....	5
f. Regulate the Sipesmik .....	1
g. Change institutional practice .....	5
h. Increase / maintain local government participation .....	1

**Question 3: Do you think the Sipesmik conceptual model has included your views given during the interview?**

10 respondents: High:  Medium:  Low:

**Question 4: How do you consider the Sipesmik conceptual model in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:**

10 respondents: High:  Medium:  Low:

**Question 5: How well do you think Sipesmik conceptual model transform the Pancasila values into comprehensive actions, in terms of their:**

Correspondence: (10 resps) High:  Medium:  Low:

Consistency (10 resps) High:  Medium:  Low:

Coherency: (10 resps) High:  Medium:  Low:

**Question 6: How do you regard the Sipesmk conceptual model in terms of their:**

Effectiveness (9 resps)	High: <input type="text" value="8"/>	Medium: <input type="text" value="1"/>	Low: <input type="text"/>
Efficiency (9 resps)	High: <input type="text" value="4"/>	Medium: <input type="text" value="5"/>	Low: <input type="text"/>
Efficacy (9 resps)	High: <input type="text" value="4"/>	Medium: <input type="text" value="4"/>	Low: <input type="text" value="1"/>
Equity (9 resps)	High: <input type="text" value="7"/>	Medium: <input type="text" value="2"/>	Low: <input type="text"/>
Ethicality (9 resps)	High: <input type="text" value="8"/>	Medium: <input type="text" value="1"/>	Low: <input type="text"/>
Elegancy (9 resps)	High: <input type="text" value="8"/>	Medium: <input type="text" value="1"/>	Low: <input type="text"/>



### VALIDATION RESULT OF SIPESMIK CONCEPTUAL MODEL

**Question 1: Where do you position yourself in the Sipesmik?**

10 Respondents: Owner:  Executor:  Client:

**Question 2: What kind of tasks might your participation focus on?**

10 respondents

a. Science & technology innovation development .....	8
b. Create/ maintain sustainable foods .....	1
c. Manage natural environment .....	1
d. Increase and maintain economic productivity .....	1
e. Change socio cultural practice .....	2
f. Regulate the Sipesmik .....	1
g. Change insitutional practice .....	5
h. Increase / maintain local government participation .....	1

**Question 3: Do you think the Sipesmik conceptual model has included your views given during the interview?**

10 respondents: High:  Medium:  Low:

**Question 4: How do you consider the Sipesmik conceptual model in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:**

10 respondents: High:  Medium:  Low:

**Question 5: How well do you think Sipesmik conceptual model transform the Pancasila values into comprehensive actions, in terms of their:**

Correspondence: (10 resps) High:  Medium:  Low:

Consistency (10 resps) High:  Medium:  Low:

Coherency: (10 resps) High:  Medium:  Low:

**Question 6: How do you regard the Sipesmik conceptual model in terms of their:**

Effectiveness (10 resps)	High:	<input type="text" value="8"/>	Medium:	<input type="text" value="2"/>	Low:	<input type="text"/>
Efficiency (10 resps)	High:	<input type="text" value="5"/>	Medium:	<input type="text" value="5"/>	Low:	<input type="text"/>
Efficacy (10 resps)	High:	<input type="text" value="4"/>	Medium:	<input type="text" value="6"/>	Low:	<input type="text"/>
Equity (10 resps)	High:	<input type="text" value="8"/>	Medium:	<input type="text" value="2"/>	Low:	<input type="text"/>
Ethicality (10 resps)	High:	<input type="text" value="8"/>	Medium:	<input type="text" value="2"/>	Low:	<input type="text"/>
Elegancy (10 resps)	High:	<input type="text" value="8"/>	Medium:	<input type="text" value="2"/>	Low:	<input type="text"/>

## THE SUMMARY OF THE MODELS VALIDATION RESULTS

**Question 1: Where do you position yourself in the Sipesmik?**

50 Respondents: Owner:  Executor:  Client:

**Question 2: What kind of tasks might your participation focus on?**

50 respondents

a. Science & technology innovation development .....	39
b. Create/ maintain sustainable foods .....	21
c. Manage natural environment .....	13
d. Increase and maintain economic productivity .....	21
e. Change socio cultural practice .....	19
f. Regulate the Sipesmik .....	15
g. Change institutional practice .....	27
h. Increase / maintain local government participation .....	15

**Question 3: Do you think the Sipesmik conceptual model has included your view given during the interview?**

50 respondents: High:  Medium:  Low:

**Question 4: How do you consider the Sipesmik conceptual model in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:**

50 respondents: High:  Medium:  Low:

**Question 5: How well do you think Sipesmik conceptual model transform the Pancasila values into comprehensive actions, in terms of their:**

Correspondence: (50 resps) High:  Medium:  Low:

Consistency (50 resps) High:  Medium:  Low:

Coherency:(50 resps) High:  Medium:  Low:

**Question 6: How do you regard the Sipesmik conceptual model in terms of their:**

Effectiveness (48 resps) High:  Medium:  Low:

Efficiency (48 resps) High:  Medium:  Low:

Efficacy (48 resps)	High: <input type="text" value="16"/>	Medium: <input type="text" value="30"/>	Low: <input type="text" value="2"/>
Equity (48 resps)	High: <input type="text" value="34"/>	Medium: <input type="text" value="13"/>	Low: <input type="text" value="1"/>
Ethicality (48 resps)	High: <input type="text" value="33"/>	Medium: <input type="text" value="14"/>	Low: <input type="text" value="1"/>
Elegancy (48 resps)	High: <input type="text" value="32"/>	Medium: <input type="text" value="15"/>	Low: <input type="text" value="1"/>

**Note: 2 respondents did not answer Question 6**

**Reasons:**

- (1) *As he stated in the interview, 'equity', 'ethicality' and 'elegancy' are included in the 'effectiveness'.*
- (2) *Sipesmik conceptual model is a pre-requisite to achieve the objective: space for security and prosperity of the general population. It is not necessary to judge as to whether it is effective, efficient, equitable, easy to use, ethics and elegance.*

**Question 7: Could you please give any further general comment on the Sipesmik conceptual model?**

**VR101**

- *Sipesmik conceptual models figure out only the functional and structural policies.*
- *The National Air Force contribution is limited to strategic planning development, does not yet include technical operational actions.*
- *The Sipesmik conceptual models do not yet give the more structured picture of Sipesmik, its time scheduling, resources needed and other details.*

**VR105**

*We hope that General Sipesmik Concept will be applicable in Indonesia and by this concept could give wide contribution in outer space exploration and also support national security effort.*

**VR106**

- a. *Explore roles of owners, pin point owners*
- b. *Be aware about critical and crucial points, especially in formulating the performance standards*
- c. *Explore the classification of critical and crucial process*

**VR107**

*I'm very admire the Sipesmik Conceptual Models that the researcher has been designed. It is a new innovation. I do hope the Sipesmik has value added in terms of science and technology development, increase and maintain the dynamics of managing the natural environment etc.*

**VR108**

*This will encourage the opening new business activities for the application of remote sensing technology.*

**VR109**

*I find this research interesting and sure that it will become important input for national planning.*

**VR110**

*The truth is not easy to do and even resource consuming, but surely it will achieve the expected result with less (might be no) conflictive actions. This research is quite good as an exercise to function Pancasila as a 'genetivus-subjectivus'.*

**VR201**

*By overlapping members of 'owners', 'executors' and 'clients', this model show how equal access for all: to information, to science and technology, to market, to resources and to decision making, is well translated in the model. This also shows how 'self-control' the main character the 'tabiat saleh' of Pancasilaist is well translated in a modeling of 'science and technology development'. Congratulations! This can be seen as an exercise of Pancasila as a 'genetivus subyektivus'.*

**VR202**

*This model can be used in any field.*

**VR203**

*As I explained earlier (in the interview), 'equity', 'ethicality' and 'elegancy' are included in the 'effectiveness', therefore no need to further explore. To manage effectively a national development I suggest you to consult the attached model.*

**VR205**

*The truth is not easy and eventually resource consuming. This is one of the risks that should be faced when searching the truth. I remember the first interview, when you asked me about 'what ought to be', I understand that you need to know the 'truth'. Congratulations, you get it.*

**VR206**

*Please improve continuously (Make continuous improvements)*

**VR207**

*Personally, as a lawyer, I am very much impressed by the Sipesmik conceptual models, which has been explained and developed comprehensively. Hopefully, this can be presented academically. I am convinced these conceptual models can be used as the principle of decision making.*

**VR209**

*How to develop mechanism among stakeholders which works and grows continuously? How with the security and resilience aspects?*

**VR304**

*Sipesmik conceptual model must be valuable for implementation in the real world, not just a concept.*

**VR306**

*Please be advised that operational sub-system normally be divided into two sub-sub systems: the mission sub-subsystem and the house keeping sub-subsystem. The first has the role to execute the satellite mission such as remote sensing and telecommunication, and the second is to maintain its life as an earth satellite.*

**VR402**

*As you wished, you get what you want: 'the truth' which is derived from 'what ought to be'. The truth is hard to get, but it does not always serve you in practice, even in certain cases, you might get difficulties to use it. Like Pancasila as the Indonesian weltanschauung was not easy to get approved, now you used it as a genetivus-subyektivus to help develop Sipesmik model. I am sure this is not an easy task. Congratulations you did it.*

**VR403**

*It's quite good because the stakeholders has already been taken into consideration*

**VR404**

*Please be advised, that close monitoring to 'the next steps' is properly proceeded*

**VR406**

*Question 2-f, 2g, should be "Improve' not 'Increase/maintain'. Implementation of the model is a pre-requisite to the successful achievement of the goals of the Sipesmik: space for security and prosperity for the general population. Therefore it not necessary for me to judge as to whether its' effectiveness, efficiency, efficacy, equity, ethicality and elegancy, are highs. This method resemble to Delphi method that is not scientific, since in certain cases solutions taken were not rational but compromised.*

**VR409**

*It should be given the concept for transforming this management model to the real model in order to assist the engineers in absorbing/interpreting this idea.*

**VR410**

*What you can get by asking 'what ought to be' is a truth but not the truth. The truth is only Thy truth. What you get now is a relative-truth therefore bewares of the coming disagreement of people. It was not a truth since everyone said so, but it is a truth since everyone says so, therefore do not stop from truth searching if you would like to be up to date.*

**VR501**

*Sipesmik conceptual models are in a line with national concepts: 'Wawasan Nusantara' (Nusantara Weltanchauung), 'Ketahanan Nasional' (National Resilience) and 'Kewaspadaan Nasional' (National Alert).*

**VR504**

*- Very theoretical for me as a practical person*

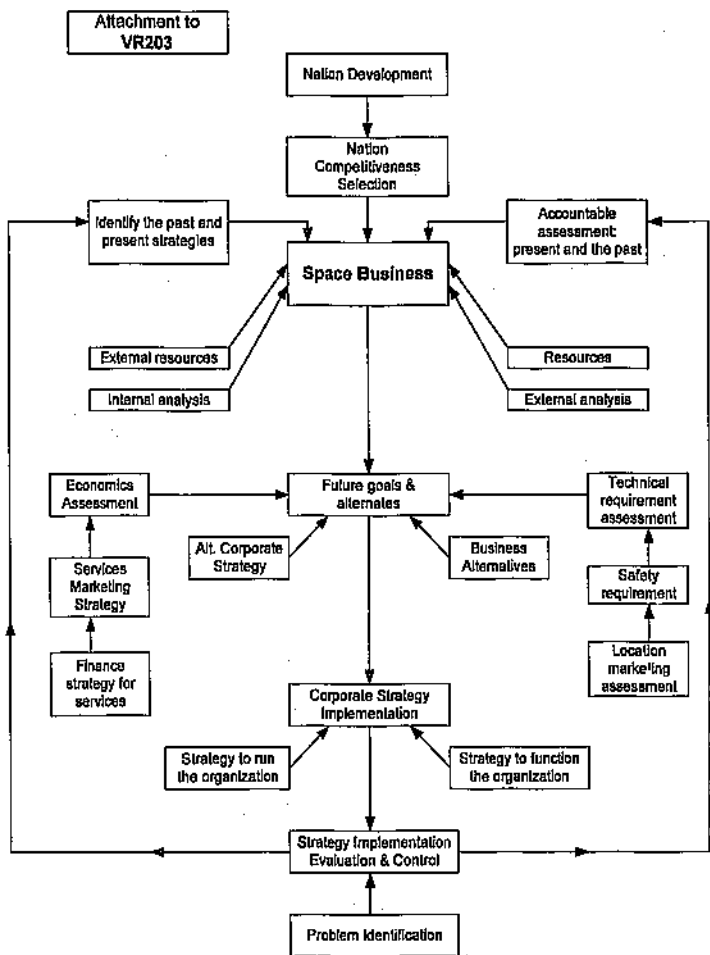
*- Too difficult for implementation*

**VR509**

*The comprehensiveness and linkage among aspects are really demonstrated perfectly*

**VR510**

*Sipesmik conceptual model should not be limited to sustainable food, but sustainable development as a whole, a new concept to be applied (Ref. WSSD September 2002, in Johannesburg). Gender concept should take into account in model. Ref. Johannesburg and Beijing conference on Woman '78: gender equality, equity and justice.*





### VALIDATION RESULT OF SIPESMIK CONCEPTUAL MODEL

**Question 1: Where do you position yourself in the Sipesmik?**

10 Respondents: Owner:  Executor:  Client:

**Question 2: What kind of tasks might your participation focus on?**

10 respondents

a. Science & technology innovation development .....	5
b. Create/ maintain sustainable foods .....	4
c. Manage natural environment .....	0
d. Increase and maintain economic productivity .....	4
e. Change socio cultural practice .....	4
f. Regulate the Sipesmik .....	4
g. Change institutional practice .....	6
h. Increase / maintain local government participation .....	2

**Question 3: Do you think the Sipesmik conceptual model has included your views given during the interview?**

10 respondents: High:  Medium:  Low:

**Question 4: How do you consider the Sipesmik conceptual model in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:**

10 respondents: High:  Medium:  Low:

**Question 5: How well do you think Sipesmik conceptual model transform the Pancasila values into comprehensive actions, in terms of their:**

Correspondence: (10 resps) High:  Medium:  Low:

Consistency (10 resps) High:  Medium:  Low:

Coherency: (10 resps) High:  Medium:  Low:

**Question 6: How do you regard the Sipesmik conceptual model in terms of their:**

Effectiveness (9 resps)	High: <input type="text" value="8"/>	Medium: <input type="text" value="1"/>	Low: <input type="text"/>
Efficiency (9 resps)	High: <input type="text" value="3"/>	Medium: <input type="text" value="6"/>	Low: <input type="text"/>
Efficacy (9 resps)	High: <input type="text" value="2"/>	Medium: <input type="text" value="6"/>	Low: <input type="text" value="1"/>
Equity (9 resps)	High: <input type="text" value="7"/>	Medium: <input type="text" value="2"/>	Low: <input type="text"/>
Ethicality (9 resps)	High: <input type="text" value="6"/>	Medium: <input type="text" value="3"/>	Low: <input type="text"/>
Elegancy (9 resps)	High: <input type="text" value="6"/>	Medium: <input type="text" value="3"/>	Low: <input type="text"/>

### VALIDATION RESULT OF SIPESMIK CONCEPTUAL MODEL

**Question 1: Where do you position yourself in the Sipesmik?**

10 Respondents: Owner:  Executor:  Client:

**Question 2: What kind of tasks might your participation focus on?**

10 respondents

a. Science & technology innovation development .....	7
b. Create/ maintain sustainable foods .....	6
c. Manage natural environment .....	4
d. Increase and maintain economic productivity .....	6
e. Change socio cultural practice .....	4
f. Regulate the Sipesmik .....	3
g. Change institutional practice .....	5
h. Increase / maintain local government participation .....	4

**Question 3: Do you think the Sipesmik conceptual model has included your views given during the interview?**

10 respondents: High:  Medium:  Low:

**Question 4: How do you consider the Sipesmik conceptual model in transforming 'the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement' into comprehensive actions:**

10 respondents: High:  Medium:  Low:

**Question 5: How well do you think Sipesmik conceptual model transform the Pancasila values into comprehensive actions, in terms of their:**

Correspondence: (10 resps) High:  Medium:  Low:

Consistency (10 resps) High:  Medium:  Low:

Coherency: (10 resps) High:  Medium:  Low:

**Question 6: How do you regard the Sipesmik conceptual model in terms of their:**

Effectiveness (10 resps)	High: <input type="text" value="9"/>	Medium: <input type="text" value="0"/>	Low: <input type="text" value="1"/>
Efficiency (10 resps)	High: <input type="text" value="8"/>	Medium: <input type="text" value="1"/>	Low: <input type="text" value="1"/>
Efficacy (10 resps)	High: <input type="text" value="9"/>	Medium: <input type="text" value="0"/>	Low: <input type="text" value="1"/>
Equity (10 resps)	High: <input type="text" value="7"/>	Medium: <input type="text" value="2"/>	Low: <input type="text" value="1"/>
Ethicality (10 resps)	High: <input type="text" value="3"/>	Medium: <input type="text" value="6"/>	Low: <input type="text" value="1"/>
Elegancy (10 resps)	High: <input type="text" value="1"/>	Medium: <input type="text" value="8"/>	Low: <input type="text" value="1"/>

## **APPENDIX 3**

**Paper presented in the 9<sup>th</sup> ANZSYS Conference,  
Melbourne, 18<sup>th</sup> – 20<sup>th</sup> November 2003  
Category: Refereed Paper**

***'Verifying Conceptual Systems Models for the Indonesian  
Micro Satellite Programme and the Truth'***

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# VERIFYING CONCEPTUAL SYSTEMS MODELS FOR THE INDONESIAN MICRO SATELLITE PROGRAMME AND THE TRUTH

By

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## Abstract

Since 2002, the author has run a research project having three research questions. The first is to investigate whether a western systemic approach can be successfully used to define solutions of complex, pluralist and coercive problems in a developing eastern world country such as Indonesia. The second is to examine whether the generated solutions will be acceptable to the stakeholders. The third is to explore whether systems approach can be used to transform high values and goals of Indonesians held within the state philosophy Pancasila into realistic and acceptable actions. The case study is the micro satellite development activities, which is abbreviated as Sipesmik (Sistem Indonesia Pengembangan Satelit Mikro = Indonesia system in developing micro satellite). This paper especially relates with the second and third research questions.

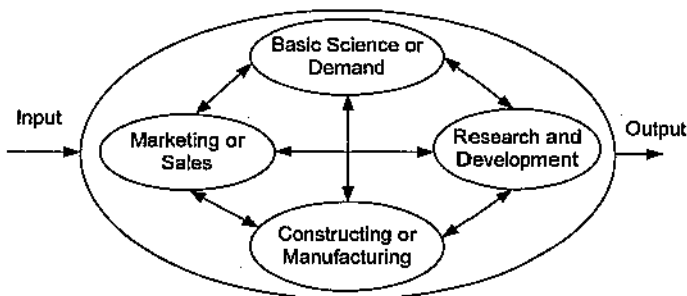
Using a combined of system thinking and action research, the author developed models. To investigate the stakeholders' acceptance of those models, it was carried out a Sipesmik conceptual models verification in March- April 2003. In this event, there were comments from some respondents that recount the truth. To understand better those comments and to assess the relationship between truth and verification of models, this paper was prepared. For this, the author had taken advantages of (1) 'The correspondence theory of truth' (2) 'The disquotationality theory of truth' (3) 'The pragmatist theory of truth' (4) 'The coherence theory of truth' and (5) 'The Tarski's semantics of truth'.

## 1. INTRODUCTION

On December the 10<sup>th</sup> 1998, the President of the Republic of Indonesia promulgated the manuscript of the 'Indonesia National Concept on Space' (INCS). Since then the concept, the basic teaching and the direction of views, which are contained in the INCS has to be the concept, the basic teaching, and the direction of views of Indonesia in space. The INCS states that national space of Indonesia is developed through its seven components: *human resources, manufacture industry, service industry, natural resources, science and technology, political and legal aspects and institutional aspects*.

As a follows up action of INCS, the author is well appointed to assess on how to manage the space science and technology development in Indonesia. For this purpose the author uses a combined method of systems thinking and action research to develop conceptual models for space science and technology development, which the case study is the micro satellite development that has been pioneered by LAPAN.

The modus of study was interpretive investigation on what the stakeholders experience by participating in an action research to improve the situation using toolkits provided by systems thinking. Critical System Heuristic (Ulrich, 1987) was chosen due its powerful technique that provides possibility to get what people think about present situation ('what is') and what they think about 'what ought to be' the situation (see Appendix 1). The data of 'what is' can be input for the Rich Picture of the present situation, and the data of 'what ought to be' that represents the ideal situation can be input for the Root Definition, as requested by the Soft System Methodology (SSM) (Checkland, 1981). Aware of unfamiliarity of the chosen respondents with Systems Approach, it was thought necessary to implement an engagement process as suggested by Ledington and Ledington (2001). For this purpose the Interactive Model of Innovation Process (Manley, 2001) (see Figure 1) was thought appropriate since it presents a systemic view of technology innovation process, which also becomes the concern of the study. Up to this stage the investigation can generate conceptual models (Rich Picture, Root Definition and Task Models). This was thought enough for interpretive targets, however aware of possibility of respondents asking for implementation steps, and rationality of the identified tasks, the Viable System Model was used to map the present organization situation and provide suggestion on how to improve the project organization; and the System Dynamics (SD) (Forrester, 1990a, b) was used to describe the causality relationships among the identified tasks.



**Figure 1: INTERACTIVE MODEL OF INNOVATION PROCESS**  
(Source: Manley, 2001)

The resultant models were then verified with the help of respondents based on their judgments. The models validation form comprised 7 questions (see Appendix 1). The first and second questions were designed to find out whether respondents could recognize their role in the designed system shown in the model. The third question was designed to capture whether there are views or comments made during the interviews that were not yet included in the models. The fourth and fifth questions were designed to get the respondents judgment on how well the models transformed:

- (fourth) the high level goals: space for prosperity and security with a focus on sustainable food and community involvement into comprehensive actions,

- (fifth) the Pancasila, the state philosophy of Indonesia (Department of Information, 1996, Sukarno, 1945) values and goals into comprehensive actions, in term of its accordance, consistency and coherence.

The sixth question was designed to get the respondents' judgment on how well the viability of the model in terms of its effectiveness, efficiency, efficacy, equity, ethicality and elegancy, using the formulas suggested (by the respondents) during the interview. The seventh question invited respondents give further comments. A statistic method was designed to process the validation data from which results can be generated on how well the models were judged by the respondents.

This paper focuses on five comments given by the respondents with regard to the seventh question that relates the Sipesmik modeling with truth. Those comments are as follows:

- (1) *The truth is not easy to do and even resource consuming, but surely it will achieve the expected result with less (might be no) conflictive actions .....*
- (2) *The truth is not easy and eventually resource consuming. This is one of the risks that should be faced when searching the truth. I remember the first interview, when you asked me about 'what ought to be', I understand that you need to know the 'truth'. Congratulation, you get it.*
- (3) *As you wished, you get what you want: 'the truth' which is derived from 'what ought to be'. The truth is hard to get, but it does not always serve you in practice, even in certain cases, you might get difficulties to use it. ....I am sure this is not an easy task. Congratulation you did it.*
- (4) *What you can get by asking 'what ought to be' is a truth but not the truth. The truth is only Thy truth. What you get now is a relative-truth therefore bewares of the coming disagreement of people. It was not a truth since everyone said so, but it is a truth since everyone says so, therefore do not stop from truth searching if you would like to be up to date.*
- (5) *It is true. When you develop satellite for sustainable food, you have not to limit your self on building and operating satellites, you have to include in your program, how sustainable food could be achieved by the help of satellite technology.*

The five comments above hold three basic remarks that relate to:

- (a) The notion of truth.
- (b) The use of 'what ought to be' questions and the search for truth.
- (c) The agreement between 'develop satellite for sustainable food' and 'building and operating satellites that have the approved capability for achieving and maintaining the sustainable food.

To understand better of those remarks, five truth-theories have been assessed, and have been used to investigate the relationship between systems models verification and the truth.



## 2. CORRESPONDENCE THEORY OF TRUTH

When answering the question of 'what is truth' there are writers with different answers, such as 'truth' means quality or state of being true (Hornby, 1974), 'truth' is the relation-to-reality pattern (David, 1994), and 'truth' is the correspondence between the representation and what it represents (Lloyd, 1996). All of these answers concerns with the correspondence theory of truth. Among these answers the author has the interest most with the latter, especially with Lloyd (1996) further description on the word 'true' that denotes the validity of an intended or expected correspondence between a representation and what it represents.

The above answers brought the author into a reflection that the correspondence theory of truth concerns with four items:

- a. 'A representative' is something that represents another, such as a model, a map, a diagram, a sample and an ambassador
- b. 'Fact', 'reality' is something represented by another such as:
  - a. a car represented by a car model,
  - b. a city represented by a city map,
  - c. a process represented by a flow diagram of process,
  - d. a population represented by a sample, and
  - e. a country represented by an ambassador.
- c. Method of 'representation', 'relation', 'correspondence' or 'transformation' such as:
  - a. reducing size and functions of a real car into its model
  - b. transforming/ mapping a city into a city map
  - c. simplifying a process into a flow diagram of process
  - d. deducting characteristic of a population from samples
  - e. delegating, a president gives power or authority on behalf of the country to a person to represent the state (ambassador)
- d. 'Validity' of the 'representation', 'relation', 'correspondence' or transformation, such as:
  - a. proof of the performance of the car model to the real car
  - b. ground truth of a map to the city
  - c. verification of a flow diagram to the real process
  - d. sampling validation to proof whether the method applied to select samples results samples that are valid to represent population
  - e. power letter showing delegation of authority from a president to an ambassador

The above reflection shows that the validity or degree of correspondence of a model with its reality depends on the method used to transform the characteristics of the reality into a model. When the transformation reduces (corrupts) the characteristic of the reality then the characteristics held by the model are less than those of the reality. For example due to the size and function are reduced, the performance of a car model is less than the real car. But it gives other benefits such as that the car model is easily brought, it can be put into your bag, and you can easily show it up to your friends that your favorite car is that is represented by the model. This implies that in 'modeling of a reality' there must be an objective (s), thus losing something, but substituted by gaining other things. These gains should be of significance, so that the modeling

effort is worthwhile. Due to specific objective, modeling can focus on or amplify certain characteristics of the reality, so that people can easily recognize 'what' or 'who' is represented by the model. This type of transformation or modeling is commonly practiced by caricaturists where in certain cases people recognize easier a public figure through a caricature than a photographic picture.

The above reflection teaches the author that the correspondence theory of truth helps explain some of the respondents' comments. The Sipesmik conceptual models are the representation and they represent the idealism of the respondents (the world) on how to develop micro-satellites for sustainable food. The question of 'what ought to be' develop micro satellite for sustainable food, was answered by most of the respondents that 'it must include building and operating micro-satellites and achieving sustainable food with the help of micro-satellite technology'. Therefore there is no doubt that 'building and operating micro-satellites and achieving sustainable food with the help of micro satellite technology' correspondence or agrees with 'develop micro satellite for sustainable food'. The question of 'what ought to be' is a request to the respondents on their idealism. This idealism becomes the 'reality' and 'the combined system thinking and action research (Sipesmik modelling)' is the 'mapping' that transforms the idealism into operational actions. The map is the Sipesmik conceptual models that contain the operational actions. The correspondence between the 'idealism of the respondents in developing micro satellite for sustainable food' and the 'Sipesmik conceptual models' is the truth of Sipesmik. This means that the Sipesmik conceptual models are true when they represent the reality. Therefore, to investigate whether 'Sipesmik conceptual models' correspondence with the 'idealism of the respondents in developing micro satellite for sustainable food', a Sipesmik conceptual models verification was executed in March - April 2003.

Regarding objective of the Sipesmik modeling, it can be seen from a number of angels, but actually the most attractive is fulfilling the need of a tool to market the idea of creating and maintaining sustainable food with the help of space technology application and community involvement. A number of models were developed due to the need to amplify certain characteristic. The Root Definition is to show the general view of the system. The Viable System Model is to show how to organize the system. The System Dynamic Model is to show the detail of certain components of the system.

To end this section the author presents here a quotation the Lloyd (1996) answer on the question of precisely what does the correspondence consist of. He says that it consists in a complicated mapping function that comprises the conventions that govern our use of language. Further he explains that in general, if  $p$  is the proposition expressed by a sentence  $lp$ , then:  $p$  is true, just in case the state of affairs  $f(lp)$  obtains in reality. Then, as an acknowledgment to reality, the function  $f$  is extremely complicated, which integrate a lot of facts about the language, human culture, and about the world.

From this quotation the author learns that it is impossible to transform all characteristics held by reality into models. Since reality is infinite and a model is finite. Therefore when executing a models-verification, one has to be aware of facts or reality that are not yet included in the models. Also, that there may be statements that

the models are not perfect. Beside the discussed model verification has a slight difference to what Maani and Cavana (2000) describe with model validation/verification that operationally investigates the behaviour of the real world modelled.

### 3. DISQUOTATIONALITY THEORY OF TRUTH

Disquotationalism is a radically deflationary theory of truth for sentences (David, 1994, p.52). It will deflate the correspondence theory of truth. Therefore, to show up the theoretical positions of disquotationality theorists, the author contrasts their positions then derive the necessary knowledge or experience, in support to this assessment.

The following is a passage, quoted from Quine (1987, p 213), a deflationist whose views about sentence-truth was expressed to deflate the correspondence theory of truth.

*"What on the part of true sentence is meant to correspond to what on the part of reality? If we seek a correspondence word by word, we find ourselves eking reality out with a complement of abstract objects fabricated for the sake of the correspondence. Or perhaps we settle for a correspondence of whole sentences with facts: a sentence is true if it reports a fact. But here again we have fabricated substance for an empty doctrine. The world is full of things, variously related, but what, in addition to all that, are facts? They are projected from true sentences for the sake of correspondence.*

*But let us ponder this last maneuver for a moment. The truth of 'Snow is white' is due, we are told, to the facts that snow is white. The true sentence 'Snow is white' corresponds to the fact that snow is white. Now we have worked the fact, factitious fiction that it is, into a corner where we can deal it the coup de grace. The combination 'it is a fact that' is vacuous and can be dropped; 'It is a fact that snow is white' reduces to 'Snow is white'. Our account of truth in terms of facts has now come down to this: 'Snow is white' is true if and only if snow is white."*

Observing the above quotation, the author agrees with David (1994, p.53) who writes that: "...the deflationary suggested by Quine is the view that the right theory of truth for sentences equals the correspondence theory minus entities like states of affairs, propositions and facts, and minus semantics relations like representation, expression, and correspondence". Therefore from this section the author focuses only on truth-sentence.

If the right theory of truth for sentences equals the correspondence theory minus entities and minus semantic relations, then what is the rest? Nil, then how this is compared to Aquinas proof of truth: *The existence of truth is self evident. For whoever denies the existence of truth grants that truth does not exist; and, if truth does not exist, then the proposition Truth does not exist is true; and if there is anything that is true, there must be truth (The Aquina's proof in Summa Theologiae; see David, 1994, p.60)*

Lloyd (1996) writes that the correspondence theorists agree that truth is

disquotational, and is not a feature of truth, but a feature of the use of language, since it is a convention of the use of language that if a proposition is true then it is justified in asserting it. From this statement the author learns that the act of asserting a proposition as assertible just in case there is a proof that it is true. But Lloyd (1996) also provides further statement that there are many other ways in which the simple act of making an assertion implicitly asserts something about the proposition that is being asserted.

Implied from the above quotation the author tries to show up a bi-conditional situation in a question "Is there any disquotationality of truth for Sipesmik objective?" To answer this, the author invites the original stakeholders take opportunity to do so. Anyhow, post modernism rejects any single truth and sees it as being entirely dependent on the viewpoint from which truth is seen (Vardy, 1999). From the management science point of view, there are two types of objective: the 'stated objective' and the 'real objective'. Stated objective is the objective informed to public, while real objective is the objective that is really would like to be achieved with the project. Normally, the stated objective is launched to get political or public support, while real objective is used to guide the organization of the project. In the case of Sipesmik '*develop micro-satellites for sustainable food*' is the stated objective. Is there any other objective? Up to this paper was written, the author has no proof of differentiating the stated and the real objective. Therefore, there is no disquotationality of truth for Sipesmik objective to be worried about. This could be seen as an indication of a good-governance practice, since it has no differences between stated objective and real objective.

Lloyd (1996) also writes that notwithstanding the strong view that the correspondence theory of truth is a superior theory of truth, some people may deny its validity and some criticisms might focus on the epistemological predicament that is concerned in knowing whether or not a proposition does indeed correspond or agree with the facts. This statement gives further stressing that a '**proposition**' needs proof.

In the case of the truthfulness of '*develop satellite for sustainable food*'. People may not sure as to whether it is a real meaning or just a trick to gain political support. People may also not sure as to whether this was said, with in depth thought about the meaning of '*develop satellite for sustainable food*'. For, they clearly do classify propositions as true or false in everyday life, yet they cannot securely do so on the basis of their correspondence to reality. If they cannot know with absolute certainty that '*develop satellite for sustainable food is intended or expected that it shall include both the building and operating satellites and the achieving sustainable food with the help of satellite technology*', then that simply means that they cannot know with certainty whether the proposition "*develop satellite for sustainable food*" is true.

#### 4. THE PRAGMATISM THEORY OF TRUTH

The pragmatic theory of truth was first enunciated by Charles Peirce in 1878 (James, 1967) who introduced pragmatism into philosophy. According to him, the term is derived from the same Greek word *πραγμα*, meaning action, from which the words 'practice' and 'practical' come from. Then, it became famous especially from the work of William James (Lloyd, 1996).

The followings are several quotation from the work of William James (1967, p214-215)

- (1) ".....an idea is 'true' so long as to believe it is profitable to our lives". ....
- (2) "...truth is 'one species of good', and not, as usually supposed, a category distinct from good, and co-ordinate with it. The true is the name of what ever proves itself to be good in the way of belief, and good, too, for definite, assignable reasons".
- (3) "..... it would be better for us to believe in that idea, unless, indeed, belief in it incidentally clashed with other greater vital benefits."

Observing the first and second quotations above, the author has the same opinion as Lloyd (1996) who writes that it is completely understandable to any rational person that a proposition is true or false autonomously of the utility of our belief in it. Does it mean that pragmatist irrational? For this, the author invites the reader to judge. The third quotation shows that pragmatists do not have any 'fixed truth', what they have just 'temporary truth'. If this philosophical stance applied in real world, there are possibilities to cause conflictive troubles. To further empathize this, the author borrowed an example given by Lloyd (1996). Say that based on a space observation classified report, our planet earth was about to be destroyed by a smash of a gigantic meteor. If this report informed in public, this might cause people so much misery and stress to know the world was about to end, so that, it would be better not to tell anyone. Based on this reasoning, then a cruel pragmatist would say that it was simply not 'true' that the world was about to end.

Assessing this theory in this way, the author does not have the intention to recount with respondent's comment number (4), but directing to focus that all of the above examples show the important of giving a completely new meaning to the word "true" for the pragmatists. In support to this evaluation the author recalls what F.H. Bradley (in Lloyd, 1996, p5) said of pragmatism: "*interpret it one way, and pragmatism is a set of commonplaces; in another, it is absurd*".

Then what does the author learn from this assessment? He really does not wish to deny that the value of a man's work may be increased by its implications for the research of other and for practice. But yet, he believes that it is unfavourable to the progress of science to measure the importance of any research, findings, or ideas mainly in terms of its usefulness and applicability. People can learn from the history that many important research results, ideas and discoveries have to wait centuries before they were applied in any field. This facts support to the thought that there might be important factors that cannot be disregarded in determining the value of a scientific work.

The author agrees with Tarski (2003) that there are special domains of very profound and strong human needs related to scientific research, which are similar in many ways to aesthetic and perhaps religious needs. Besides that such satisfaction of these needs should also be considered important task of research. Therefore, the question of the value of any research cannot be adequately answered without taking into account the intellectual satisfaction which the results of that research bring to those who understand it and care for it. Recognizing the respondent comment number (1) the author invites the readers to think that a research result such as the

Sipesmik conceptual models which gives a better understanding of the world (*the respondents' idealism*) and makes it more harmonious in people eyes (*the generated solutions accepted by the stakeholders' representative: the respondents*) should be held in lower esteem than, say, an invention of practical benefits which reduces the cost of microchip production, or improves a welding technique, should be thought as unjust.

## 5. THE COHERENCE THEORY OF TRUTH

A coherence theory of truth states that the truth of any (true) proposition consists in its coherence with some specified set of propositions (Joung, 2001). The primary competitor of this theory is the correspondence theory of truth. There are two basic differences between them. The first is that both of them give conflicting accounts of the relation between propositions and their truth conditions. The first says the relation is coherence, and the second says it is correspondence. Both of them give conflicting accounts of truth conditions. The coherence theorists say that the truth conditions of propositions consist in other propositions. The correspondence theorists tell the contrast that the truth conditions of propositions are not (in general) propositions, but rather objective features of the world. Even though, the correspondence theorists are at the view that propositions about propositions have propositions as their truth conditions (see section 3).

Based on the above short observation the author will focus the philosophical stance of coherence theorists as quoted in first paragraph of this section saying in other form that a proposition's truth consists in its fitting into a coherent system of propositions. This proposition seems to be irrelevant, when viewed as a theory of 'mathematical-truth'. Example, if one claims that a proposition about imaginary numbers (such as  $p \times x$  where  $p = -1$ ) is true by virtue of its corresponding to reality, then one might get difficulties to identify which reality it corresponds to. And then, one might be attracted to say that this equation's truth consists in its coherent relationship with the axioms and definitions of the arithmetic of complex numbers.

In the above example the author agrees with Lloyd (1996). Therefore, in the Sipesmik context, the author is sure that he can not refer to 'mathematical reality' without incurring any metaphysical or epistemological liabilities! Of course, he can meaningfully and usefully talk of mathematical reality without committing himself to any particular view of the nature of mathematical reality, since mathematical objects are merely fictions. Anyhow, he could still define the truth of a mathematical proposition as its correspondence to reality, with an annotation that that reality is a fictional one. In this regard, Lloyd (1996) provides a good analogy with literary criticism. The truth of a proposition about Sherlock Holmes would consist in its correspondence with a fictional reality defined by the novels of Sir Arthur Conan Doyle. Unfortunately, the coherence theory of truth would, in these cases, come to the same format of true propositions as the correspondence theory. This shows an example of conflictive point between coherence and correspondence theory of truth in relation between propositions and their truth conditions (see first paragraph of this section).

Then, what does the author get from this assessment? This assessment provides

reason why there were so many respondents have come to a conclusion that Sipesmik has both high coherency and correspondency to Pancasila. It seems that because both of those theories could come into the same result. The following, the author compares those two different perspectives:

From the correspondence theorists' perspective:

- (a) "Respondents' idealism about how to achieve sustainable food with the help of space technology" is the state of affairs, 'a combination of system thinking and action research' is the mapping and 'the Sipesmik conceptual models' is the map.
- (b) Sipesmik conceptual models were judge as having 'high correspondency' to Pancasila. Then the question is: "Does 'the state of affair' could be judged as having high correspondency with Pancasila?"

From the coherence theorists' perspective:

- (a) 'A combination of system thinking and action research' consistently transforms the "Respondent/s' idealism about how to achieve sustainable food with the help of space technology" into 'Sipesmik conceptual models'.
- (b) Sipesmik conceptual models were judge as having 'high coherency' to Pancasila. Then the question is: "Does the respondent idealism could be judged as having high coherency with Pancasila?"

At this point, the author invites the readers to give the answer of those two questions, but for him it becomes a new project, since it is still arguable the validity of 'mathematical truth' in this context (see second paragraph of this section).

## 6. TARSKI'S SEMANTICS THEORY OF TRUTH

Semantics is a branch of linguistics that concerns with studying the meaning of words and sentences (Hornby, 1974). Tarski's theory of truth also relates to the meaning of truth as a word and as a part of a sentence or sentences. Tarski (2003) formulates his semantics theory of truth, with defining the notion of truth. For this, he needs a definition which is *materially adequate* and *formally correct*. Therefore he describes the formal structure of the language in which the definition will be given to the word truth.

To help diminish any possible ambiguity Tarski (2003) catches hold of the actual meaning of an old notion of truth by recalling the *classical Aristotelian conception of truth* -- intuitions which find their expression in the well-known words of Aristotle's *Metaphysics*: *To say of what is that it is not, or of what is not that it is, is false, while to say of what is that it is, or of what is not that it is not, is true*. Then, to adapt modern philosophical terminology, he expresses this conception by means of the familiar formula (correspondence theory of truth): *The truth of a sentence consists in its agreement with (or correspondence to) reality*. As an alternate in extending the popular usage of the term "*designate*" he applies it not only to names, but also to sentences. Furthermore, he speaks of the designata of sentences as "states of affairs," and uses for the same purpose the following phrase: *A sentence is true if it designates an existing state of affairs*.

However, he finds that all these formulations can lead to various misunderstandings, for none of them is sufficiently precise and clear (though this applies much less to the

original Aristotelian formulation than to either of the others). At any rate, none of them can be considered a satisfactory definition of truth. He then concludes that it is up to him to look for a more precise expression of his intuition.

For this purpose he then employs the classical conception of truth and the medieval logical-terminology to get a criterion for the material adequacy of the definition. He uses a classical example: *snow is white is true if and only if snow is white*. On the 'left wing' snow is white is in *suppositio formalis*, and on the 'right wing' snow is white is in *suppositio materialis*. When in *suppositio formalis* snow is white is the name, while in *suppositio materialis* snow is white is the material, therefore he resumes that: the *name* is true if the *material* is true. This supports of what definition he needs, which is *materially adequate* and *formally correct*.

He then names an arbitrary sentence in *suppositio formalis* as 'X' and the same sentence in *suppositio materialis* as 'p'. Using the same classical conception of truth he comes to acknowledge the equivalency of 'X' and 'p' and this equivalence holds form (T) that *X is true if, and only if, p*; therefore he concludes that any such equivalence is an "equivalence of the form (T)". This supports him to be able to put into a precise form the conditions under which he will consider the usage and the definition of the term "true" as adequate from the material point of view; and he wishes to use the term "true" in such a way that all equivalences of the form (T) can be asserted, and he will call a definition of truth "adequate" if all these equivalences follow from it.

For the conception of truth that has been discussed above, Tarski (2003) proposes the name of 'the semantics conception of truth'. He writes that semantics is a discipline that deals with certain relations between expressions of a language and the objects (or "states of affairs") "referred to" by those expressions. Using this notion, he gives typical examples of semantic concepts of *designation*, *satisfaction*, and *definition* as these occur in the following examples:

- (1) The expression "the father of his country" *designates* (*denotes*) George Washington
- (2) Snow *satisfies* the sentential function (the condition) of cold and pure
- (3) The equation " $2x = 1$ " *defines* (uniquely determines) the number  $1/2$ .

While the words "*designates*," "*satisfies*," and "*defines*" express relations (between certain expressions and the objects "referred to" by these expressions), the word "*true*" is of a different logical nature: it expresses a property (or denotes a class) of certain expressions, namely of sentences. However, it is easily seen that all the formulations which aimed to explain the meaning of this word referred not only to sentences themselves, but also to objects "talked about" by these sentences, or possibly to "states of affairs" described by them.

Then the author invites the readers to observe the last comment of the respondents (see section 1) and implement the Tarski's semantics conception of truth. He asks to converse '*develop satellites*' into 'X', '*satellites for sustainable food*' into 'Y'; '*building and operating satellites*' into 'p' and '*achieving sustainable food with the help of satellite technology*' into 'q'. Then he asks to formulate the test question: "Is there any logical relationship between 'X' and 'p' and between 'Y' and 'q'?" **If we think there are equivalences, then the comment is valid.** The author also suggests



use other test: "Does either 'p' satisfy/denotes/defines 'X' or 'q' satisfy/denotes/defines 'Y'?" If we think, the answer is yes then the comment is valid. In this case among the three options, the author suggests that the most appropriate seems to be 'satisfy', and then the test question become: "Does either 'p' satisfy 'X' or 'q' satisfy 'Y'".

Further the author asks the reader to operate this formula into practice: "Does either 'building and operating satellite' satisfy 'develop satellites' or 'achieving sustainable food with the help of satellite technology' satisfy 'satellite for sustainable food'?". According to the quoted comment of the respondent, the answer of the question is yes, ('It is true'), therefore the notion of 'building and operating satellites' satisfy the notion of 'develop satellites' and the notion of 'achieving sustainable food with the help of satellite technology' satisfy the notion of 'satellite for sustainable food'.

## 7. CONCLUSION

From the above assessment, the author concludes that one cannot define an acceptable definition of 'truth' without the basic concept supporting such a definition and on what condition such a definition should be applied. Therefore it is not acceptable to the author, defining truth without describing the formal structure of the language in which the definition will be given to the word truth, also the adequacy of the material and the correctness process of expressing the sentence should be considered (please consult Appendix 3).

In the case of Sipesmik context, where respondents' idealism is functioned as the reality (of the world views), the combined systems thinking and action research as the transformation tools (mapping), and the Sipesmik conceptual models as the representation, the correspondence theory of truth is the best theory to implement in understanding the circumstances. However, this does not mean that the Semantics theory of truth and others do not give important support to understand better the respondents comment on the Sipesmik conceptual models. Some benefits of these assessments are indicated in Appendix 3.

While the relationship between the systems models verification and the truth is well shown also by the correspondence theory of truth. The correspondence between the 'idealism of the respondents in developing micro satellite for sustainable food' and the 'Sipesmik conceptual models' is the truth of Sipesmik. This means that the Sipesmik conceptual models are true when they represent the reality. To investigate this, Sipesmik conceptual models verification was carried out.

This assessment gives the author opportunity to do reflection on what should be searched in doing research. He agrees to the opinion stating that to get something that has implications for the research of other and for practice. The fact tells him that it is unfavourable to the progress of science to measure the importance of any research mainly in terms of its usefulness and applicability. From Sipesmik research he learns that there are important factors that cannot be disregarded in determining the value of a scientific work. Those are special domains of very profound and strong human needs related to scientific research, which are similar in many ways to aesthetic and also to religious needs. Therefore he agrees that this should also be

considered important task of research. As a resume he agrees that the answer to the question of what does the researcher tries to get in doing research is as follows: (1) to get better understanding of the world, (2) to make it more harmonious in the people eyes (3) to make great impacts to other research works and (4) to get practical benefit. It will be excellent to get all of them, but its already fantastic to get some of them

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## Appendix 1

### LIST OF QUESTIONS FOR INVESTIGATING THE SIPESMIK

(Sistem Indonesia Pengembangan Satelit Mikro = the Indonesia system for developing micro satellite)

#### Question 1.

What is your underlying **philosophical stance** for investigating the Sipesmik, for example:

- a. Cost benefit analysis is capable to show the economic value of an action program, therefore each action program of Sipesmik shall accomplish an economically acceptable cost benefit ratio.
- b. Although Sipesmik is a research activity that should be managed as a non profit entity, but it should be also seen as a way of developing national prosperity and security.
- c. Cooperative way of managing Sipesmik could guarantee the practice of open management and the use of micro satellite system, which is limited for peaceful purposes especially for preserving the nature.
- d. Why develop our own satellite, global space market provide choices so that we can choose based on our own criteria that include especially preserving our nature through minimum release of manmade debris in space.

#### Question 2

- a. Who is / ought to be :
  - i) The beneficiaries of the Sipesmik process?
  - ii) The decision makers in the Sipesmik process?
  - iii) The planner in the Sipesmik process?
  - iv) The experts used in the Sipesmik process?
  - v) The representative of those affected by Sipesmik?
- b. What conditions are/ are not controlled by the decision maker?
- c. What are/ought to be the constraints on the decision maker?
- d. Who has the power to ensure success of Sipesmik?
- e. Are those affected by Sipesmik allowed to take their fate into their own hands despite the experts? Should they be allowed to?

#### Question 3

Based on your (life) experience, would you mind telling me what criteria / formula do you use to measure **efficiency, effectiveness, efficacy** (ease of use and implementation), **equity, ethicality** and **elegancy** of a Sipesmik plan?

## Appendix 2

### Sipesmik Models Validation Questions

After having examined the Sipesmik conceptual models could you like please answer the following questions? This is needed to validate the models that have been created.

(1) In Model 1, where do you might position yourselves in the Sipesmik?

owner  executor,  or client.

You may choose more than one.

(2) In Model 3, what kind of tasks might your participation focus on?

- a. Science & technology innovation development .....
- b. Create/ maintain sustainable foods .....
- c. Manage natural environment .....
- d. Increase and maintain economic productivity .....
- e. Change socio cultural practice .....
- f. Regulate the Sipesmik .....
- g. Change institutional practice .....
- h. Increase / maintain local government participation ....

You may choose more than one.

(3) Do you think the Sipesmik conceptual models have included your views given during the interview?

High  Medium  Low

(4) Would you mind qualitatively measure the capability of Sipesmik conceptual models) in transforming '*the high level goals of the Sipesmik: Space for security and prosperity, with focus on sustainable food and community involvement*' into comprehensive actions:

High  Medium  Low

(5) How well do you think Sipesmik conceptual models transform the high values and goals held by **Pancasila** into comprehensive actions, in terms of their?

a. Correspondence

High  Medium  Low

b. Consistence

High  Medium  Low

c. Coherence

High  Medium  Low

**Note:** Correspondence relates to the agreement or similarity of basic idea.  
Consistence relates to 'harmony', 'logic relations' or 'agreement' of each of the elements of the models.  
Coherence relates to the wholeness consistency of the models.

(6) How do you regard the Sipesmik conceptual models in terms of their:

a. Effectiveness High  Medium  Low

b. Efficiency High  Medium  Low

c. Efficacy High  Medium  Low

d. Equity High  Medium  Low

e. Ethicality High  Medium  Low

f. Elegancy High  Medium  Low

**Note:** Effectiveness relates to objective achievement,  
Efficiency relates to the use of resources in achieving their objectives,  
Efficacy relates to casiness use,  
Equity relates to equal treatment to parts or parties involved and effected,  
Ethicality relates to degree of morality in the models,  
Elegancy relates to aesthetics or public effect of the models.

(7) Could you please give any further general comments on the on the Sipesmik Conceptual Models?

**MANY THANKS FOR YOUR ASSISTANCE**

**Appendix 3:**  
**Some Learning Benefits Derived From the Paper**

<b>Theory assessed</b>	<b>For Modelling</b>	<b>For Truth Theory</b>	<b>For Sipesmik</b>
<b>Section 2</b> Correspondence theory of truth	Reality is <i>infinite</i> while a model is <i>finite</i> , which means every model is less perfect than the reality so that in the modelling of a reality people should specify <b>objective or purpose</b> based on which the generated model is emphasized.	It describes 'partial truth' of a reality. Therefore it will be most beneficial if the selected part is the <b>basic idea</b> of the reality, since it can represent the <b>whole feature</b> of reality.	Correspondence investigation of Sipesmik should be focused on the <b>basic idea, to grasp the most holistic feature of the reality.</b>
<b>Section 3</b> Disquotational Theory of Truth	<b>Dialectics enriches views and more critical</b> in investigating reality to be modelled. This help better select objective of modelling	It contradicts with correspondence theory of truth unless they regard the basic idea of a reality in truth sentence.	It supports the <b>important of investigating the basic idea of a reality</b> to grasp the most holistic feature of a reality
<b>Section 4</b> Pragmatism theory of truth	It places the important of usability or applicability of a model.	There is a need to reformulate the pragmatist's definition of truth	Sipesmik was designed to attract actions. Therefore there is a need of evaluating the desirability and usability of the models.
<b>Section 5</b> The coherence theory of truth.	To be coherence with a reality, a model should present the functions of that reality.	If correspondence relates to partial truth then coherence relates to functional truth.	To be <b>correspondence and coherence</b> with reality, the basic idea of the reality should be consistently structured in the model and the parts as individual and as group that composes the structure should functionally be in agreement with the basic idea.
<b>Section 6</b> Tarski's Semantics Theory of Truth	<b>Sentence is a model.</b> In modelling: <b>'materially adequate'</b> can be conversed into <b>'structurally adequate'</b> in representing the basic idea'; <b>'formally correct'</b> can be conversed into <b>'functionally correct'</b> in representing the basic idea'	To be true a sentence <b>not only</b> materially adequate and formally correct, <b>but also</b> the process should be adequate. This becomes evident in oral. A person under stress, although says a sentence of materially correct and formally adequate, but its truth is not guaranteed.	To best represent the reality Sipesmik should be in agreement with the <b>basic idea of reality, structurally adequate to represent it and each part as individual or group that compose the structure should functionally be in accord with it and the process of investigation should be free from stress.</b>

## **APPENDIX 4**

**Paper presented in the 9<sup>th</sup> ANZSYS Conference,  
Melbourne, 18<sup>th</sup> - 20<sup>th</sup> November 2003  
Category: Refereed Paper**

***'A Suggested Viable System Model for Space Science and  
Technology Development in Indonesia'***

**by Alexander Sudibyo  
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**p. 603 - 620**

# A SUGGESTED VIABLE SYSTEM MODEL FOR SPACE SCIENCE AND TECHNOLOGY DEVELOPMENT IN INDONESIA

By

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## Abstract

Since 2002, the author has run a research project having three research questions. The first is to investigate whether a western systemic approach can be successfully used to define solution of complex, pluralist and coercive problems in a developing eastern world country such as Indonesia. The second is to examine whether the generated solutions will be acceptable to the stakeholders. The third is to explore whether systems approach can be used to transform high values and goals of Indonesians held within the state philosophy Pancasila into realistic and acceptable actions. The case study is the micro satellite development activities, which then abbreviated as Sipesmik (Sistem Indonesia Pengembangan Satelit Mikro = Indonesia system in developing micro satellite).

Using a combined of systems thinking and actions research, the author has developed models. One of those models is a Viable System Model (VSM) for Sipesmik, which becomes the discussion focus of this paper. To provide a general view on Sipesmik, its root definition is presented at the opening, followed by a short review on VSM, a VSM view of the present situation, and the suggested generic VSM. The ending part presents models validation result that stimulates the author to design a less radical approach of VSM for Sipesmik.

**Keywords:** System Thinking, Viable System Model, Space science and technology development.

## 1. INTRODUCTION

On the 3<sup>rd</sup> - 4<sup>th</sup> of February 1998, Depanri (The Space Council of Indonesia) organized the 'First Indonesia National Congress in Space'. The congress recommended the President of the Republic of Indonesia as the Chairman of Depanri to promulgate five manuscripts that contained space policies for Indonesia. One of those manuscripts is the Indonesia National Concept on Space (INCS). In accepting the recommendation, to be Chairman, on the 10<sup>th</sup> of December 1998 the President promulgated the manuscripts (see Depanri, 1998).

The INCS states that the development of the *national space* of Indonesia will be carried out through the development of its seven components: *human resources, manufacture industry, service industry, science and technology, natural resources, political and legal aspects and institutional aspects*.

Lapan functions as the Secretariat of Depanri, and has appointed the author to assess the development of one of those components i.e. *science and technology*. The initial



approach to assessing the problem was influenced by a perspective that space science and technology development is a complex, pluralist coercive situation. To cope with this situation, the Critical System Heuristic (CSH) (Ulrich, 1993) and the Soft System Methodology (SSM) (Checkland and Scholes, 1990a, b) were combined. A list of questions was designed to collect qualitative data of 'what is' and 'what ought to be' the system, from those who are involved in and affected by space science and technology development process. Assuming that not all respondents were familiar with systems thinking, a hint of an engagement process (Ledington and Ledington, 2001) to systems thinking using the Interactive Model of Innovation Process (Manley, 2001) was implemented.

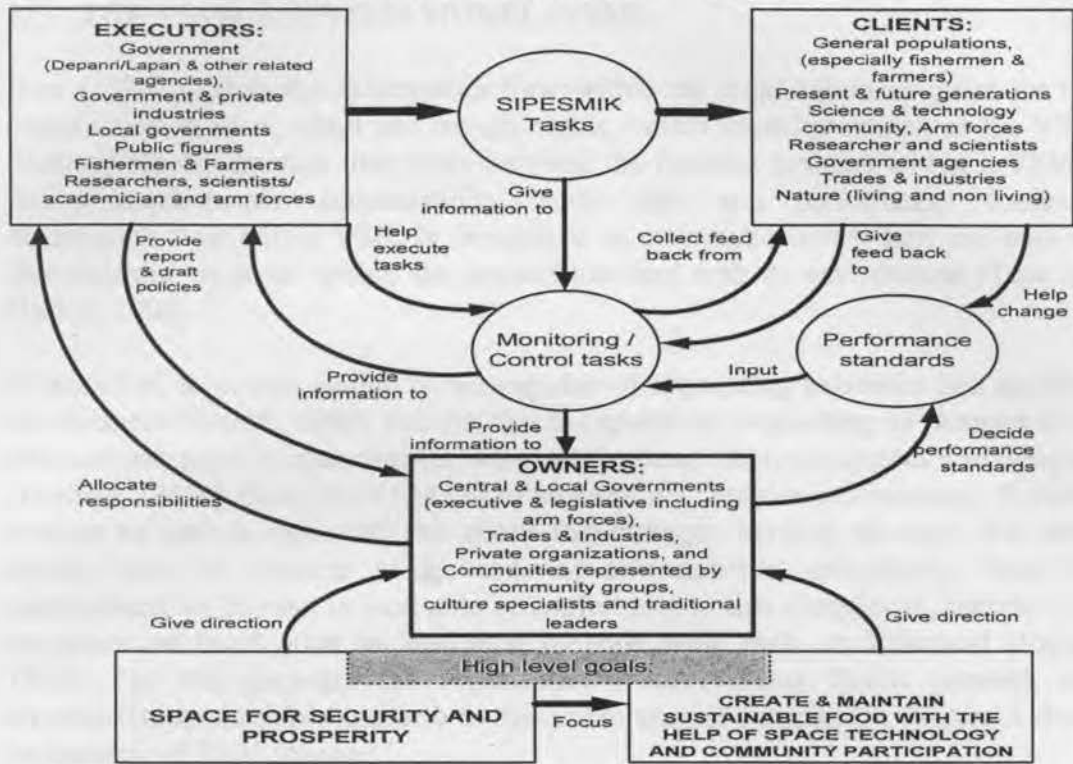
The 'what is' and 'what ought to be' data became consecutively input for developing the 'Rich Picture' and the 'Root Definition' models of the situation. Based on the collected data the Viable System Diagnostic (VSD) (Beers, 1984) was used to develop Sipesmik organization model. These models were then expanded using the System Dynamics (SD) (Forrester, 1994a, b) to discuss possible ways of 'how' to obtain the required end result (models). The resultant models were then validated with the help of respondents to evaluate the models based on their judgment.

## **2. THE ROOT DEFINITION OF SIPESMIK**

Sipesmik tasks include space technology innovation, food and environmental management, and community involvement processes. Figure 1 shows the root definition of Sipesmik and figure 2 presents a more detailed analysis of that root definition. These figures show the perceived main actors/ participants in Sipesmik processes (executors, owners and clients), as well as the three main functions of Sipesmik: setting performance standards, monitoring and controlling and the main processes.

Figure 1 also shows that most of data needed to monitor Sipesmik come from Sipesmik tasks and all participants as individual, institutional or group. Performance standards hold the desired target of Sipesmik, they are input for the monitoring systems and they should be set up by all participants (owners, executors and clients). Draft policies (including draft performance standards) of the system are prepared by executors, submitted to owners, exercised and established by the owners, however the clients have the right to help change them. The desired outcomes include science and technology, sustainable foods, ecological as well as changing in social, regulatory and institutional practices. The latter points will need significant shifts in public and organizational norms – a paradigm shift. The constraints indicated in the root definition consist of two types the fixed constraints that the management can do almost nothing, and the second is those that management have to create solutions such as the lack of national commitment, national blue-print of space activities, and pessimism of farmers and fishermen regarding the will of government to create and maintain sustainable food.

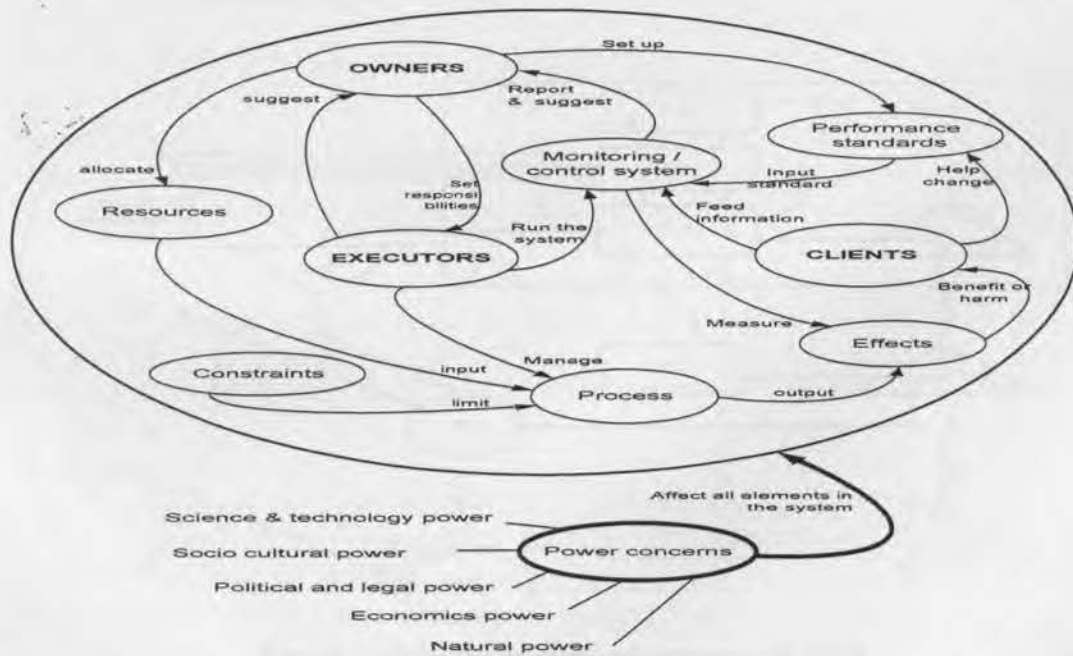
### THE ROOT DEFINITION OF SIPESMIK



**Note:**  
 MPR = The Peoples Consultative Assembly  
 DPR = The People Representatives Council  
 DEPANRI = The National Space Council  
 LAPAN = The National Institute of Aeronautics and Space  
 SIPESMIK = The Indonesian system in developing micro satellite

**Figure 1: The Root Definition of Sipesmik**

### RELATIONSHIP FEATURE OF ALL ELEMENTS IN THE SIPESMIK ROOT DEFINITION



**Figure 2: Relationship feature of all elements of Sipesmik**

### 3. THE VIABLE SYSTEM MODEL (VSM)

Beer (1984) models the information flow within an organization in order for that organisation to learn, adapt and remain viable, which model is named as the VSM. Some of the information that flows between the member systems within a VSM is policy requirements, accountability, audit data and performance feedback. Information flow within VSM is recognized as communication within and between five separate 'systems' within the organization and with its environment (Tepe and Haslett, 2002).

In the VSM, a 'viable' system is one capable of separating existence in a specified environment (Waeldi, 1989), and one that is capable of responding to changes in the environment even if those changes were not foreseen when the system was designed (Jackson, 1991a). Since the VSM has to be used in a complex environment, therefore it must be able to cope with the above two changes. So that, the state of a viable system must conform to the state of environmental complexity. Since the management on its own is incapable of conforming to this complexity, therefore the organization itself must be designed to cope with such environment (Espejo, 1989). For this purpose, the organization's information flows, control, and structure must therefore conform to the environmental complexity. Figure 3 shows an example of VSM scheme.

A VSM consists of five functional subsystems (Haynes and Stewart, 1993; Hutchinson, 1997) as the following:

- Interacting with the external environment.
- Stabilizing internal operations.
- Providing necessary functions (3\* = auditing operations).
- Creating appropriate vision and strategies.
- Providing legitimacy.

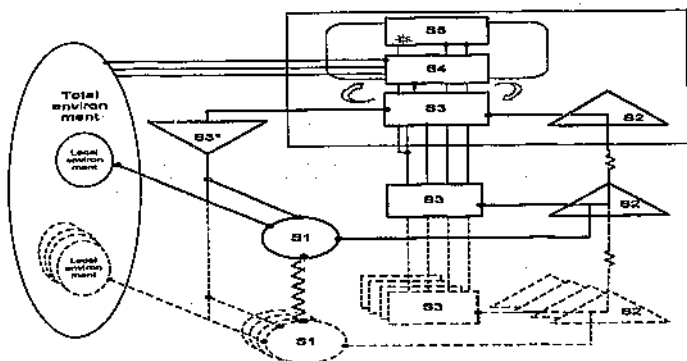


Figure 3: Five functional subsystems of VSM  
(Source Flood and Jackson, 1991 p. 91)

The above subsystems could also be identified as the five system functions that should be adequately performed in an organization:

- a) Implementation or operational units = system 1 (S1)
- b) Coordination and or supporting units = system 2 (S2)
- c) Control or management (3\* auditing) = system 3 (S3 and S3\*)
- d) Development and or intelligence = system 4 (S4)
- e) Policy makers = system 5 (S5)

Description of each of the said sub system is as follows:

**S1** is the operational unit of an organization (Tepe, Haslett, 2002), it 'does' what the system 'has to do'. S1 automatically adapts its environment and optimize its ongoing business (Schwaninger, 2001). It interacts with S3 in a continual feedback loop of receiving resources, and provides in returned the accountability for their use (Beer, 1985). Within an organization there are several S1s that communicate with one another as well as with their respective S3s within the environment in which they exist. In normal situation, there is no direct communication from S1 to S5, but in emergency cases S1 has the obligation to send algedonic signals directly to S5 (Tepe and Haslett, 2002).

**S2** is usually recognized as the information systems, the internal service providers and the coordination teams, but also includes cultural elements such as standards of behaviour (Schwaninger, 2001). Therefore, a VSM provides support such as information, communication and processes for issues common to all S1s. It is also used to co-ordinate various S1 units by providing stability and conflict resolution through reducing choice and attenuating variety from the environment as Beckford (1995) calls the '*organizational glue*'. It reflects managerial policies and decisions but does not make them (Tepe, Haslett, 2002).

**S3** essentially interfaces the S1 and the policy authority S5. Its primary function is to control the S1 activities by managing the 'resource bargain' that ensures S1 performs the organization's functions (Tepe and Haslett, 2002) that has deemed appropriately defined by S5. Flood and Jackson (1991) describe this system as the interpreter of the policy decisions of higher management. It also makes certain effective implementation of the policy through allocating resources to the parts of S1. By this way, it provides the control function that ultimately maintains internal organisational stability so that it is commonly identified as the 'management' of the system.

S3 which function is to investigate and validate the information flow between and among the systems is identified as S3\* that is usually called the auditor. It provides information to S1 management about its own functions but in parallel provides this information to S4 and S5 (Beer, 1985).

**S4** acts as the system intelligence. It monitors the environment and helps the organization adapt and plan for the future (Vidgen, 1998). In principle, S4 mainly communicates with the policy maker S5, but in a recursive structure, each viable group within an organisation needs its own intelligence to interpret how the environment affects its associated parts of the organisation.

**S5** is responsible for policy that defines of 'what is Sipesmik going to do'. It establishes policy in light of competing demands between the present and future, and

between internal and external perspectives (Schwaninger, 2001). Beer (1985) writes that there is legal and corporate requirement flow from senior management to its juniors that in response they provide accountability report.

A VSM in a recursive structure each viable organisational unit has embedded within it the individual structures of its organization, not unlike what Tepe and Haslett (2002) call a series of Russian dolls. This because a recursive structure requires every viable unit within the organization is responsible for the success of the mission and responding challenge coming from the environment (Tepe and Haslett, 2002). This includes accessing appropriate information and services, and acquiring intelligence and performance feedback from internal and external environment. Anyhow, each viable unit must make these decisions in light of the system policy conveyed from the higher recursions in the organisation. The S3\* with its independent reporting to management should ensure that this happens as designed.

According to Beer (1985) each of organization's systems must provide attenuation or amplification of the variety in their own activities and information flows so that the activities match the variety and complexity of the environment around them. Any variety not controlled in this way is construed as 'residual variety' and must be 'managed' by the organisation. Disobeying this will result in the potential for the organisation to be overwhelmed by the complexity and cease being viable.

To sum up this section it worthwhile to quote the statement of Jackson (1993a, p 571): '*VSM is a sophisticated model of great generality, pinpointing various systemic / structural constraints which must be observed if an enterprise is to succeed as an adaptive goal seeking entity*'. Even though, some criticisms present to value the VSM, such as given consecutively by Jackson (1989) alone and Flood and Jackson (1991) as the following

- a) In practice, the VSM could become fixed and inflexible, and encourage autocratic management practices and it's emphasize is on organizational structure.
- b) It might be difficult to apply in practice because of the resistance it may invoke with the entrenched structure.

However, certain examples of success usage of the VSM can be listed as follows:

- a) A model of organizational structure of San Francisco Zoo (Dickover, 1994)
- b) Organizational structures in an entertainment group and a motor dealership (Flood, 1995b, p.146-177)
- c) Corporate alignment of Occupational Health and Safety (OHS) (Tepe and Haslett, 2002).

### 3. MAPPING OF THE PRESENT SITUATION ON A VSM

It is illustrative to examine the existing structure of Sipesmik organization in terms of a VSM, since there is not yet realised. Figure 4 presents a model that outlines the present situation. This model was developed from the data collected by interviews and documents gathered from respondents. This model shows the policy, arbitration, and decision making level (S5) to be the Depanri (the national council for air and space affairs) chaired by the President. The level which has the task of obtaining the intelligence about the environment and distributing information up and down the

system (S4), is handed by the Secretariat of Depanri that has two working groups. The first is usually called "Kelompok Inti" (core group) representing upper management of institutions involved in air and space affairs (member of Depanri). The second is usually called "Kelompok Kerja" (working group) that consists of two working groups: technical working group and legal working group. However, this collection of information is carried out in a compartmentalised manner, which is a function of the departmentalised responsibilities of institutions and their associated ministers. Furthermore, most of the problems handled by these groups are still limited to what discussed in the United Nations Committee on Peaceful Uses of Outer Space (UNCOPUOS).

A program that invites public awareness on the idea of developing micro satellite is a national space congress, when people discussed the INCS implementation (see section 1), which was followed up by Lapan with initial effort of developing micro satellite. Therefore Lapan can be seen or belongs to S3, in the Sipesmik concept. Furthermore Lapan also established an inter-department team for this project (Lapan, 2002).

The above description shows that implementation of principles of S1, S2 and S3 is still missing and as a result there is no recursion structure and so do the requisite variety. There is S3\* run by the state auditor (Badan Pemerika Keuangan = BPK), but its duty still focus on financial accountability. Although lately, it tries to uncover success indicators of management other than financial but still is not in a comprehensive manner. BPS (the statistic central bureau) monitors social economic indicators but the author does not yet find its special concern on monitoring the equity and justice, while BPHN (the agency for national law development) monitors the national laws and regulations, but the author does not yet find its special concern on monitoring the distributive, interactional and procedural justice in a comprehensive manner. Bapedal (the agency for controlling the environment) monitors the environment indicators. Furthermore, there is no communication-link between BPK, BPS, BPHN, Bapedal and Secretariat of Depanri like that is supposed to do by S3\* and S4. There are ministries and departments that are members of Depanri but they do not yet administered as the relevant part of Sipesmik wether S2 or S3 principles. They participate in core and working groups, also in Sipesmik national team. But no factual support that is supposed to do like S2 principle.

This means those departments and ministries are acting independently of one another with the consequent lack of cohesion, and varying amounts of success. There is also no control over their conformance with an overall national strategy. The control function (S3) for all of these teams needs to be fulfilled. There are facilities spread out over the country, which with the owners agreement can be mobilized as S2 either at national or lower levels such as laboratories and experts own by Bapedal, and remote sensing system own by Lapan, BPPT (agency for technology assessment and application) and Bakosurtanal (agency for survey and mapping), Department of sea and fisheries, Department of agriculture, Department of public works and several universities like University of Gadjah Mada (Jogyakarta), Bogor Institute of Agriculture and Bandung Institute of Technology.

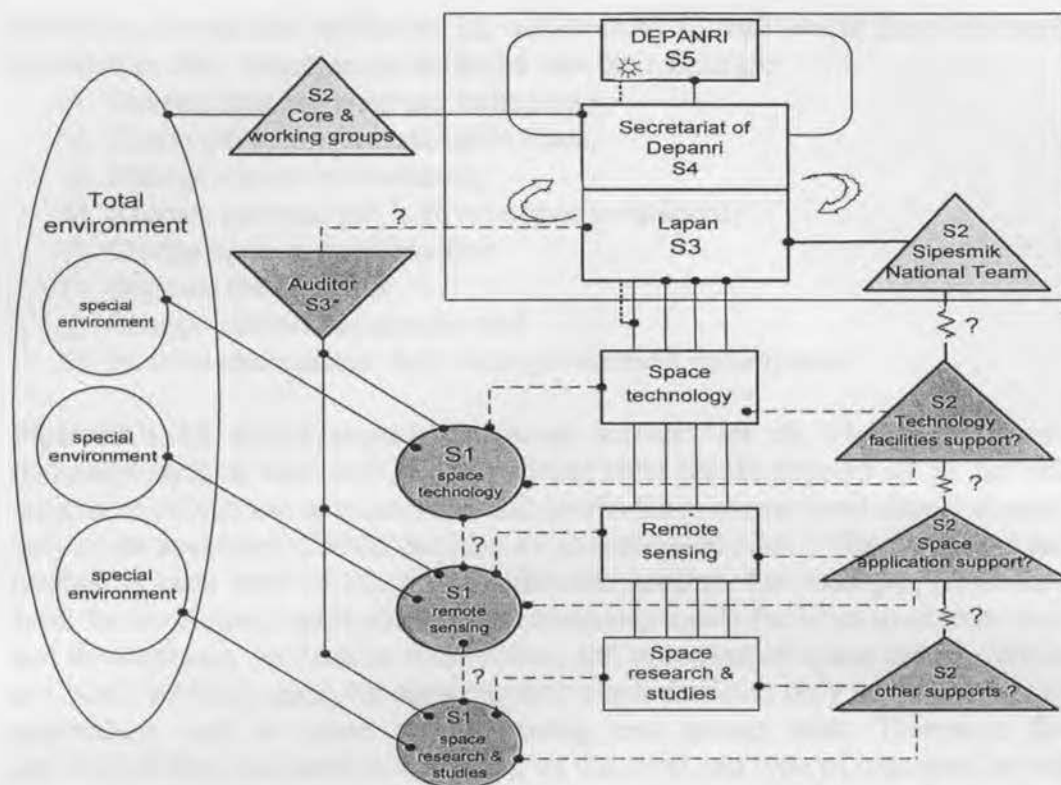


Figure 4: Present situation of Sipesmik seen from VSM point of view  
(Adapted from Flood and Jackson, 1991, p. 91)

#### 4. A SUGGESTED GENERIC VSM FOR SIPESMIK

Discussing the possible organization of Sipesmik, some respondents are at the opinion that assuming **different morphological unit has different natural capability to support food production** therefore Sipesmik organization should acknowledge the presence of various morphological situation. Based on its morphological situation, Indonesia was suggested to be classified into two parts divided by the 'Wallace Line' (Woodward, 1997). It passes between Bali and Lombok islands and between Kalimantan and Sulawesi then continues south of the Philippines. The western part shows more Asiatic nature whilst the eastern part presents more Australian nature. Based on its morphological feature, the western part can be divided into three groups: Sumatra, Kalimantan (Borneo) and Jawa-Bali. The eastern part can be divided into four groups: Sulawesi (Celebes), Maluku islands, Irian Jaya and Nusa Tenggara islands (excluded Bali). So that they suggested establish seven clusters within Indonesia region, three clusters of western part and four clusters of eastern part. Each cluster becomes a CNMU (Cluster of Natural Morphological Unit). Each cluster may have a number of NMU (Natural Morphological Unit) such as a river basin, volcanic plain, karst region, and catchment area.

**Sipesmik's S1**, as the operational units within Sipesmik should be accountable to the organisation for its Sipesmik performance therefore this system is where indicators of success of Sipesmik are controlled. S1s at all recursions of the organisation,

implement the policies defined by S5, resourced by S3, and benefit functional services provided by S2s. Based on the collected data their tasks are:

- a) Develop space science and technology,
- b) Create and maintain sustainable foods,
- c) Manage natural environment,
- d) Increase and maintain high economic productivity,
- e) Change socio cultural practice
- f) Regulate the Sipesmik
- g) Change institutional practice and
- h) Increase and maintain high local government participation

Sipesmik's S2 should provide functional services for all S1s so that they can optimally perform their duty. S2 at national level should support all S1 not only at national level but also at cluster and unit levels. S2 at cluster level should support not only to its associated CNMU but also to its associated NMU. The functional service needed by each level of S1, might differ one another. For example, S1 at national level for developing space science and technology needs facilities to execute research and development, production/construction, and operation of space system. Whilst S1 at CNMU or NMU level, for the same duty needs facilities only for space technology application, such as space remote sensing and ground truth. Therefore, the S2 activities differs one another depending on the level and type of organisation and the recursion within the organisation, and they may be owned by the organisation itself or acquired from an external service provider. A preliminary list contains 11 functional supporting entities that include:

a) Space science & technology innovation	g) Space debris monitoring
b) Natural environment management	h) Transportation
c) Foods management	i) Communication
d) Economic production data base	j) Training and education
e) Natural resources database	k) Indonesia regulation data base
f) Earth resource monitoring	

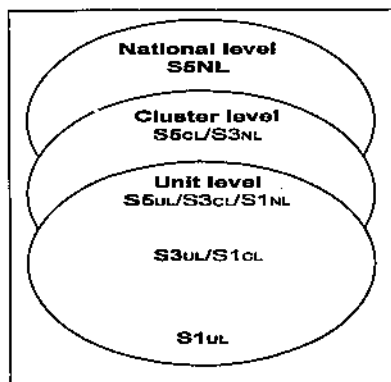
Sipesmik's S3 should be the system's management. It interprets the policy decisions concerning Sipesmik for the S1s and ensures that adequate resources are available for compliance with the policy. It has to monitor Sipesmik performance produced by the S1s that each of them has determined indicators of success. Whilst, S3\* provides additional independent audit information concerning: Sipesmik images, the number and nature of objections/ complaints, acceptance levels, economic productivity levels, amount of funding, level of waste, distributive justice, procedural justice, interactional justice, space products, food products, natural environment, space technology innovation cycle, food products economic cycle, social change, natural environment management cycle and Sipesmik management cycle. This information has to be informed not only to S1 but also to S4 and S5.

Sipesmik's S4 should monitor the environment consisting of political, legal, socio cultural, science and technology, and natural forces. Based on this monitoring result and report from the auditor (S3\*), S4 provides suggestion to S5 on how Sipesmik should adapt and plan for the future. It should be noted that, at a recursive structure, all systems at every levels in the organisation also require intelligence service appropriate to their activities.



Sipesmik's S5 should establish policy on how to use space for security and prosperity of the country, especially in creating and maintaining sustainable foods with the help of space technology and community participation. This policy must be communicated throughout the organisation in order for the lower recursions to reflect this policy in the context of their own activities.

VSM for Sipesmik should be recursive that each viable organisational unit has embedded within it the individual structures of its organization, not unlike what Tepe and Haslett (2002) call a series of Russian dolls. At national level, a CNMU group as S1 should have a complete S1 - S5 structure within it. Also at cluster level a NMU group should also have S1- S5 structure within it. Refers to Espejo et al (1996) each CNMU or NMU group should have its own management team responsible for control and access to services that provide coordination and intelligence gathering processes. This is to ensure that down to the smallest viable workgroup, each unit has the policy, intelligence information, control functions and coordination services to do the work that needs to be done in accordance to its environment. As Espejo et al (1996) write that recursion provides the organisation with the ability for the small groups to make 'policy' about how to handle the problems they encounter in their jobs and provides the flexibility to survive in complex and rapidly change.



**Figure 5: Sipesmik recursion**  
(Adapted from Tepe and Haslett, 2002)

To guarantee the consistency of policy framework, S5 at lower level should belong to S3 at the next higher level and S1 at lower level should belong to S3 at higher level. This means S5 of a NMU group should belong to S3 at its associated CNMU group, S5 of a CNMU group should belong to S3 of the national group; S3 of a NMU group should belong to S1 at its associated CNMU group and S3 of a CNMU group should belong to S1 of national group. Figure 5 shows the whole Sipesmik recursion.

The assumption is that if higher levels S5s have conveyed their policies clearly, these lower levels of recursion will understand the organization policies and apply them to their own circumstances. This recursive structure requires that every viable unit within Sipesmik is responsible for the success of the mission and responding challenge coming from the environment. This includes accessing appropriate Sipesmik information and services, and acquiring intelligence and performance feedback about the internal and external environment. Anyhow, each viable unit must make these decisions in light of the Sipesmik policy conveyed from the higher recursions in the organisation. The audit function in S3\*, with its independent reporting to management should ensure that this happens as designed.

According to Beer (1985) each of an organization's systems must provide attenuation or amplification of the variety in their own activities and information flows so that the activities match the variety and complexity of the environment around them. Any variety not controlled in this way is construed as 'residual variety' and must be 'managed' by the organisation. Disobeying this will result in the potential for the organisation to be overwhelmed by the complexity and cease being viable. The author believes that food issues not controlled, or controlled with less variety than the possible causes will overwhelm a country, therefore Sipesmik should implement such a requisite variety concept that reflects how an organisation deals with complexity in its environment.

Figure 6 shows a suggested VSM for Sipesmik. This is a generic model that can be implemented in all levels of recursion. The number of S1, S2 and S3 should be adjusted according the recursion and environment.

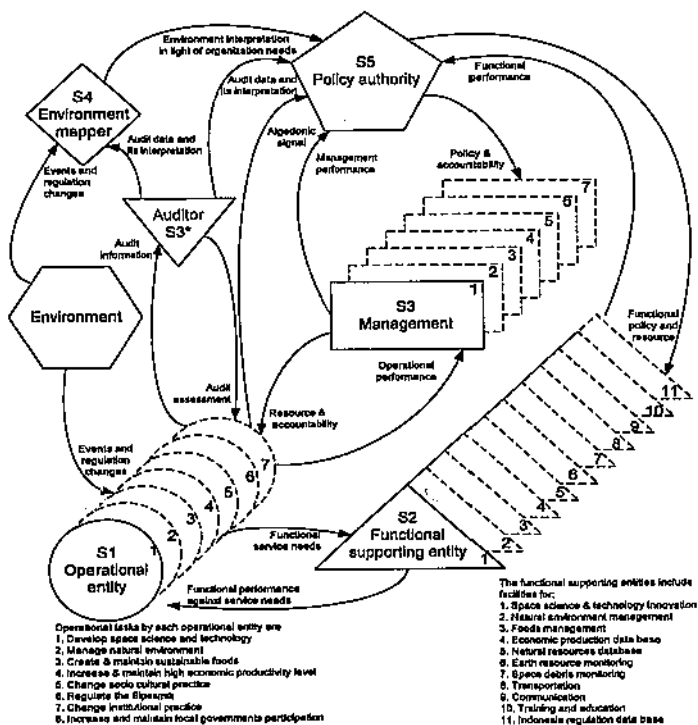


Figure 6: A suggested generic VSM for Sipesmik

The overall information flow within Sipesmik can be resumed as follows: the information that flows through out the Sipesmik should provides this organization the method for monitoring a sustainable development performance. Information concerning indicator of success and audit data flows from S1 to the other systems as proof of performance and evidence of accountability. S2 uses this information to interpret the services required and to affirm the organization attitude to sustainable development. S3 uses the information to determine the adequacy of performance and adjust the resources for S1s. S4 compiles summary performance reports and compares these to the needs and challenges reflected by the environment. S4 uses this information to assist S5 in determining if performance is adequate and / or if policy needs to change in response to the environmental trends. This process as a whole should provides the infrastructure for Sipesmik governance and refers to Argyris (1982) it should be a continuous improvement or double-loop learning.

## 5. MODELS VALIDATION

The models that were validated consisted of Root Definition, Task Models, Viable System Model (VSM) and System Dynamics Models (SDM). The model validation form was comprised of 7 questions, but for this paper the author focuses only on the sixth and the seventh questions. The sixth question was designed to get the respondents' judgment on how well the viability of the models in terms of: their effectiveness, efficiency, efficacy, equity, ethicality and elegancy, using the formulas suggested by the respondents during the interview. The seventh question invited respondents give further comments.

Table 1 shows the variation percentages of respondents who judged the viability characters of the models. The percentage variation that relates to the effectiveness of the models is 77% high, 21% medium, and 2% low. This variation has a slight different with that of equity character of the models, which is 71% high, 27% medium and 2% low. The next slight difference of variation is that of ethicality character of the models, which is 69% high, 29 medium, and 2% low. The next is elegancy character, which has 67% high, 31% medium and 2% low. The two other characters have far difference variations. The first is that of efficiency character, which has 38% high, 60% medium and 2% low. This has a slight difference with the second that has 34% high, 63% medium and 2% low.

**Table 1: Viability of the models**  
(in term of their effectiveness, efficiency, efficacy, equity, ethicality and elegancy, based on 48 respondents' judgments)

Viability characters of the models	% of respondents who judged the models as having the grade of		
	High	Medium	Low
Effectiveness	77	21	2
Efficiency	38	60	2
Efficacy	34	63	3
Equity	71	27	2
Ethicality	69	29	2
Elegancy	67	31	2

Regarding the viability of the models, there were three respondents who provided special notes. The first was a 'practical person', who did not find any of the character having more than low grade, 'since' the models are theoretical. The author agrees that the models are theoretical, since they form a methodological approach to space science and technology development management in Indonesia, but this does not mean that the models has no viable character et all. This is shown by the above respondents' judgments.

The second is the respondent who during the interview stated that all viability characters listed in the questionnaire were already included in the effectiveness character and there was no need to further detail. Due to this ignorance of the author, this respondent did not want to judge any of those characters. The third also did not want to judge any of those characters, since this respondent found that the models are pre-requisite for the success of space science and technology development in Indonesia. The author translates the latter judgment as the models having high viability.

## 6. FOLLOW UP OF THE MODELS VALIDATION

Observing the above validation result, the author has taken follow up actions to improve the suggested VSM for Sipesmik. The assumption made is that the less-efficacy and less-efficiency of the models were in some parts caused by the suggested VSM is the generic one that did not include the detail of each recursion, beside it should be more practical. The followings are some details and a less radical approach of VSM for Sipesmik.

### a. A suggested VSM for Sipesmik at national level

As described in in section 2 the owners of the system were perceived to consist of the central and local governments (both legislative and executive including the arm forces), trades and industries, private organizations and communities represented by DPR, community groups, cultural specialists and traditional leaders. These are assumed to form S4 and S5 in the VSM for Sipesmik at the national level. The actors involved in running the system were perceived to be: government (Depanri/Lapan and other related government agencies), government and private industries, local governments, public figures, fishermen and farmers, researcher, scientist/academician and arm forces. These actors are primarily thought to form the basis of S1 to S3 in the VSM for Sipesmik at the national level. The S2 function, providing what Beckford (1995) calls the "*organisational glue*", is filled by an integrated plan covering a state-wide natural unit classification and space system development with which those natural units will be managed to create and maintain sustainable foods, and supporting facilities for S1s can optimally perform the duty of overall system in its associated area.

The environment factors, which need to be monitored by S4 were determined to be: physical forces, science and technology forces, social forces and political and legal forces (see section 2). At the operational levels S3\* should monitor: Sipesmik images, the number and nature of objections/ complaints, acceptance levels, economic productivity levels, amounts of funding, level of waste, distributive justice, procedural justice, interactional justice, space products, food products, natural environment, space technology innovation cycle, food products economic cycle, social change, natural environment management cycle and Sipesmik management cycle. S3 should

monitor the indicators of success of each task that is run by S1 in its associated working area. As suggested by respondents that there are seven CNMU, therefore at national level there should be seven group of S3 and seven group of S1. Each of those seven groups should represent one of the following CNMUs: Sumatra, Kalimantan, Sulawesi, Maluku, Irian, Nusa Tenggara, and Jawa-Bali.

#### b. A suggested VSM for Sipesmik at cluster level

This suggested VSM is designed to be implemented in all seven CNMUs. The number of NMU of each cluster might be different, since it depends of its morphological situation. For this purpose an S2 at national level shall help assess the establishment of all NMU of the whole country. The criteria for establishing an NMU should be defined mainly from morphological situation but practical reasoning should also be considered.

As described in section 2; the owners of the system were perceived to consist of the central and local governments (both legislative and executive including the arm forces), trades and industries, private organizations and communities represented by DPR, community groups, cultural specialists and traditional leaders. All of these compose the S5 of the cluster.

Central government at cluster level should be represented by associated provincial governments, since in the administration system of Indonesia provincial government is the representative of central government in their associated provincial area. In the case of Jawa Bali cluster, it should be represented by all provincial governments in this cluster, which consist of DKI Jakarta, Banten, West Jawa, Central Jawa, DI Jogjakarta, East Jawa, and Bali. While local governments should be represented by district governments of the associated cluster levels. District government includes executive and legislative that includes arm forces. Trades and industries, private organizations, community groups, cultural specialist and traditional leaders are those whose domiciles are in the associated cluster.

**Table 2: The network of Sipesmik actors**

	National Level	Cluster Level	Unit Level
S5	Central and local governments (both legislative and executive including the arm forces), trades and industries, private organizations and communities represented by DPR, community groups, cultural specialists and traditional leaders		
	Local governments represented by provincial governments	Central government represented by provincial governments,	Central government represented by provincial governments
S4	Lapan that function as the Secretariat of Depanri supported by inter-department working groups		
	Run by Lapan Head Quarter & core working group	Run by the closest Lapan regional office & core working group	Run by the closest Lapan regional office & core working group
S3, S2 &	Government (Depanri/Lapan and other related government agencies), government and private industries, local governments, public figures, fishermen and farmers, researcher, scientist/academician and arm forces.		

S1			
S3	Run by a national coordinating entity which members represent S5 of all clusters.	Run by a regional coordinating entity which members represent S5 of all units associated with the cluster.	Run by a local coordinating entity which members represents of the unit.
S3*	Run by a national auditing consortium that includes BPK, BPKP, BPPN, BPS, Bapedal, BPS, and other related institutions (private & government)	Run by regional consortium of auditing entity that includes BPK, BPKP, BPPN, BPS, Bapedal and other related institutions (private and government)	Run by local auditing consortium that includes BPK, BPKP, BPPN, BPS, Bapedal and other related institutions (private and government)
S2	All facilities necessary in support to the accomplishment of the 8 Sipesmik tasks	All facilities necessary in support to the accomplishment of the 8 Sipesmik tasks, which domicile in the associated cluster	All facilities necessary in support to the accomplishment of the 8 Sipesmik tasks, which domicile in the associated unit.
S1	All representatives of S5 of cluster level	All representative of S5 unit level in the associated cluster.	Government and private industries, local governments, public figures, fishermen and farmers, researcher, scientist/ academician and arm forces domicile in the associated unit.

The S4 should be run by regional offices of Lapan as the Secretariat of Depanri supported by inter-departmental working groups. Like at national level, the Sipesmik actors at cluster level are government (Depanri/Lapan and other related government agencies), government and private industries, local governments, public figures, fishermen and farmers, researcher, scientist/academician and arm forces. These actors should also be primarily thought to form the basis of S1 to S3 at cluster level.

The S3 should be run by representatives of S5 of the units of the associated cluster. The S3\* should be run by a regional auditing consortium that includes BPK, BPKP, BPPN, BPS, Bapedal, BPS, and other related institutions (private & government) such as Survey Indonesia Corp.

The S2 functions to provide support for all S1 in their associated clusters and unit level. An S2 at cluster level shall help assess the establishment of S1 at unit level. The criteria for establishing an S1 should be defined mainly from morphological situation but practical reasoning should also be considered.

Further detail can be seen in table 2.

### **c. A suggested VSM for Sipesmik at unit level**

A VSM at this level should also consist of S1-S5 principles. As described in section 2 that the owner of Sipesmik consist of central and local governments (both legislative and executive including the arm forces), trades and industries, private organizations and communities represented by DPR, community groups, cultural specialists and traditional leaders.

Central government at unit level should be represented by associated provincial governments, since in the administration system of Indonesia provincial government is the representative of central government in their associated provincial area. While local governments should be represented by district governments of the associated unit levels. District government includes executive and legislative that includes arm forces. Trades and industries, private organizations, community groups, cultural specialist and traditional leaders are those whose domiciles are in the associated unit.

In the case of Bengawan Solo catchment area, an NMU that spread out over three provincial regions: East Jawa, Central Jawa and DI Jogjakarta, therefore the associated provincial and district governments are those of East Jawa, Central Jawa and DI Jogjakarta, also the trades, industries, private organizations, community groups, cultural specialist and traditional leaders.

The S4 should be run by the Lapan regional offices situated in this area, which is the The Watukosek Lapan Observation Station. Also, the S3\* should be run by a local auditing consortium that include BPK, BPKP, BPPN, BPS, Bapedal, BPS, and other related institutions (private & government) such as Survey Indonesia Corp. The S3 should be run by agencies and privates domiciles in this region, which are selected to participate in S1 of Sipesmik Jawa cluster, since Bengawan Solo catchment area belongs to Jawa cluster.

The S2 should be run by all facilities needed to support the 8 tasks of Sipesmik, which domicile in this region, for example PUSPIC's remote sensing facilities in Jogjakarta, which is developed by University of Gadjah Mada in cooperation with Bakosurtanal, and BPPH (research facilities for animal sickness) in Wates, Jogjakarta. Further detail can be seen in table 2.

### **d. A less radical approach of VSM for Sipesmik**

This less radical approach holds the principles of recursion and S1-S5 principles at national level, cluster level and unit level.

Depanri and Lapan as the national institutions responsible for aeronautic and space in Indonesia, has the moral obligation to market space technology for solving human life problems in Indonesia, therefore it is relevant for Depanri/Lapan to functions as the pioneer of the implementation of Sipesmik concept. Therefore, the S5 institutional forum should be run by Depanri. For this, the member of Depanri should be enlarged to include central and local governments (both legislative and executive including the arm forces), trades and industries, private organizations and communities represented by DPR, community groups, cultural specialists and traditional leaders.

When assessing a strategic decision, Depanri should convene (a) space congresses where the whole Sipesmik actors are represented. The congress' recommendations become input for the council to make decision.

This mechanism is also valid for cluster and unit level, where Lapan regional/local office functions as the secretariat to convene cluster or unit congress. The recommendation of the congress of each level become the agreed action program of the associated unit or cluster. Topic assessment of this congress should include identification of facilities and roles needed to accomplish the 8 tasks of Sipesmik.

## 7. CONCLUSION

That the viability of Sipesmik models were judged by some respondents as 'medium' or 'low' grade, in some parts, was caused by the suggested generic VSM that did not provide a comprehensive view on the suggested organization of Sipesmik. Some respondents had difficulties to figure out how recursions of each level in the VSM should occur. Also, some respondents thought that accepting the suggested VSM means approve or agree to establish a new institution or department to run the Sipesmik. Based on the above findings in this paper includes some details of the recursions of each level of the suggested VSM, and provides a less radical approach of VSM for Sipesmik. Submitting this paper, the author invites advices and suggestions from the audience of the conference and later from the readers when this paper is published electronically as planned.

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