A GENERAL SYSTEM PLANNING METHODOLOGY
- G.S.P.M. -
APPLIED TO NATIONAL AIRPORT SYSTEM PLANNING
- N.A.S.P. -
IN MIDDLE INCOME AND ECONOMICALLY ACTIVE COUNTRIES
- M.I.E.A.C. -

By

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To my parents for the lessons in the past,

to Teresa Cristina my wife and great partner,

to my dearest Titito, and our beloved daughters ;

Fabrizia, Fabiana, and Floriza, my infallible supporters

towards today's and future challenges,

...and to Dila, the synthesis !

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• After thirteen years of professional work in Architecture and Planning in Brazil the returning footpath to Academia for this recycling experience was a remarkable challenge...which I could not meet just by myself• There are many persons I am grateful to for their help, and many others for their support, also others I have met on my way who I am pleased for having become part of my life...

• My family, my friends, my teachers and my colleagues, it is almost impossible to mention all them, but some of them have to be named:

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• My grateful thanks to the unnamed individuals who have participated in my study making it reality for future challenges•

...from "Ta hsüeh", or The Great Learning,

...towards the five teachings of the "Tao":

1. "*All things go through their own transformations* ".
2. "*Truly, a great cutter does not cut* ".
3. "*Tao invariably does nothing, yet there is nothing that is not done* ".
4. "*The most yielding of things outruns the most unyielding* ".
5. "*To give life, but not to own, to achieve but not to cherish, to lead but not to be master-that is the mystic virtue* ".

(From Taoism and teachings of Lao-tze)

ABSTRACT

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• A General System Planning Methodology(G.S.P.M.) has been proposed in this dissertation with the objective to promote planning practices improvements regardless to the characteristics of the planning context and to the nature of the planning field where it may be applied• The G.S.P.M. is a normative planning methodology based on procedural theory of planning, and it is addressed mainly to the multi-disciplinary planning actors dealing with the multi-objective planning context• The G.S.P.M. has been given a "procedural framework" supported by two Axiomatic Theories, and three objectives of planning have been selected to express simultaneously the G.S.P.M. effectiveness and the aimed Planning Improvement, and they are; Planning Adequacy, Planning Flexibility and Planning Continuity• The National Airport System Planning(N.A.S.P.) has been selected to be the planning field test for the G.S.P.M. and two different planning contexts have been selected to be respectively, the investigation field and the application field for the G.S.P.M. test• A sample of five developed countries have been chosen to represent the investigation field as follows; Norway, U.S.A., United Kingdom, Federal Republic of Germany, and Canada• A sample of four Middle Income and Economically Active Countries(M.I.E.A.C.) have been chosen as the application field, and Brazil has been selected the prime country with three further Brazilian Scenarios designed with the help of Developmental Scenarios Writing to represent that sample•

• A Multiple Cross System Analysis Matrix(M.C.S.A.M.) has been designed to be an instrument for the G.S.P.M. operational process within the application test in the N.A.S.P. of the two sample of countries• The M.C.S.A.M. is a bidimensional assessment matrix supported by planning theories and operated by multi-disciplinary planning actors to select the preferred aspects of planning which have been used to identify the characteristics of the planning context and planning environment• The M.C.S.A.M. has been designed to select also the preferred planning factors and goals which may represent the potentially most effective planning factors and goals within the given planning context•

• A Developed Countries Realist N.A.S.P. Methodology Model has been identified within the investigation field which would express the common N.A.S.P. framework within the developed countries, representing the "emphatical understanding" from which we supposed to learn their planning practices• A M.I.E.A.C. N.A.S.P. Realist Methodology Model has been identified within the application field which would express the common N.A.S.P. framework within the M.I.E.A. Countries• This realist model which has been obtained from the Brazilian Scenarios has been also called the Brazilian Planned Scenario N.A.S.P. which is supposed to be the ideal planning context hypothetically designed to improve the actual Brazilian N.A.S.P. practices, as a planning exercise of "predictable understanding"• The comparative analyses of the two N.A.S.P. Realist Methodology Models has defined a Tailoring Process of Planning where the adequate planning method can be identified with the appropriate level of technology to the identified planning context•

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CHAPTER 1:

1. Problem Identification:

1.1. Introduction and importance of the problem:

• The main aim of this dissertation is to promote Planning Practices Improvement with a multi-disciplinary approach• This multi-disciplinary Planning Practices Improvement should happen simultaneously regardless with both the aspects of planning which are considered in this work, the dynamic characteristics of the Planning Field and the evolutionary circumstances of the Planning Context• Nevertheless, by examining the same Planning Field within different circumstances of the Planning Context it is believed to be possible to have the same mistakes avoidance in futures planning practices, at least within the same Planning Field, which has been selected by this dissertation• Hypothetically, the above same avoidance of mistakes can be achieved in a multi-disciplinary Planning Environment, where the democratic participation is a legal right and the unbiassed capability of judgement is a moral duty, as a normal compromise and continual learning process for Planners and Society• Furthermore, it is believed also that the above mentioned hypothetical multi-disciplinary Planning Environment should provide the necessary understanding among Planning actors in order to promote lesser unnecessary competitiveness among multi-disciplinary Planning Practices, towards better results in terms of both, fairness and equality in society•

• Before the identification of possible Planning Practices improvements within the selected Planning Field at a given circumstance of the selected Planning Context, a special attention is given to the real importance to the chosen problem world-wide, and how this problem can affect both the internal and external aspects of economy and society•

• The Air Transport Industry can be identified initially by Airports, Air Traffic Control, Airlines, and Aerospace activities• The importance of such a group of activities should be easily identifiable by their economic figures or by the number of other activities which depends on the Air Transport Industry performance• Opinions differ when the total volume of the world market just for Airport developments is being discussed• Five years ago at a time of negative growth in air traffic, it was thought that world-wide investment in just one of the elements of the Air Transport Industry such as new Airports infrastructure would be approximately US$ 20 Billion until the year 2.000• Then IATA suggested a total amount of US$ 40 Billion for the foreseeable future, but this figure was doubled to US$ 80 Billion by 1985• At present, this market has been estimated to be worth between US$ 90 and US$ 110 Billion until the end of this century• It seems that all these assumptions are totally erroneous, when some few examples are taken, for instance quoting Momberger(1987);

1. *Japan alone is planning to spend more than US$ 60 Billion until the year 2.000 in a major Airport Planning Investment, mainly due to the costly man-made islands solution that have to be taken in his densely populated country, like for instance he new Kansai International Airport in Osaka Bay, an investment of US$ 8 Billion •*

2. *Saudi Arabia, another country known for its bold Airport development has already plans to invest nearly US$ 14 Billion in the next decade •*

3. *Federal Republic of Germany, has been investing more than US$ 1 Billion annually in its Airport development programme which is expected to last for the next two decades; apart from that, the Munich-2 International Airport and Frankfurt International Airport have about US$ 8 Billion of investment programme up to the next five years •*

4. *U.K., France, Scandinavian Countries, plus the Mediterranean Countries are expected to have to spend more than US$ 35 Billion for infrastructure improvements at major European Airports during he next decade •*

5. *The U.S. National Airport System Plan has an investment programme of about US$ 12 Billion up to the end of the 80's, apart from the individual Airport development programme of the 12 major Airports which may easily come up to another US$ 12 Billion worth of investment in the next five years •*

6. *At China's southern border, Hong-Kong, Macao, Seoul plus in South-East Asia, Singapure, Bank-kok, Jakarta and Kuala Lumpur major Airport development programmes have been implemented in a clear competition to become the regional hub for long-haul passenger and cargo traffic with a global investment of more than US$ 15 Billion in the next eight year •*

7. *According to manufacturer estimates, some 7.270 to 7.965 new jet aircraft will be purchased by the world's airlines in the next 20 years• These new airlines are worth some US$ 400 to US$ 450 Billion and to operate these highly efficient new* *airliners, the world's Airports will have to be "up to the mark "•*

8. *According to ICAO the world's Airports handle actually around 1 billion scheduled air passengers per year and probably well over one billion such travellers if non-scheduled and charter travellers are included •*

• Assuming that all these Airports which handle together over 1 billion passengers per year and if only US$ 8 per passenger, levied by a number of countries for Airport development, were actually used for developing these Airports during the remaining 13 years of this century, the amount available would be more than US$ 104 Billion• In other words, all the projected investment of US$ 90 to US$ 110 Billion which would be needed, as mentioned earlier need not use a single penny of public money• But unfortunately that is not likely to happen within Air Transport Industry, on the contrary, society in general has been heavily penalized by economic costs due to the total lack of systematic planning and high level of uncertainty in Air Transport Planning and Policy•

• Nevertheless, building work is going on at airports outside Europe: in South-East Asia, the Far East and the Pacific region, the world's major current economic growth areas like the Middle East, in North, Central and South America, and even in the poorest African countries• The latter may come as a surprise, but the cost of building an airport, which provides immediate access to a world-wide transport network, is still far less than that of establishing a road or rail network that could offer the same economic benefits• It is still true that a basic runway and airport terminal structure costs about as much as 10km. of road• The airport would offer a link with the outside world at reasonable maintenance costs, but the 10km. road section might lead from nowhere to nowhere and, if not maintained properly, be washed away by the first tropical thunderstorm, like for example has happened to the Brazilian Transamazonic roads•

• The pessimism frequently encountered when talking to airport planners and equipment companies in Europe, which is caused by the problems connected with airport construction and extensions in densely populated central Europe, is not justified when looking at the world as a whole• China is a good example: the country, which eagerly wishes to catch up with the industrialized nations of the West, puts its hope into developing airports rather than the national road or rail networks for improving interprovince transport• According to the latest information from China, there has been an increase in the number of civil airports from 88 at the end of 1984 to 97 at the end of 1985, with the number of airports capable of handling Boeing 707s rising from 11 to 15 during the same one-year period• Also in China, five major new airports on which work has started or is about to start will cost US$ 11 Billion to build•

• In South America, Brazil, Columbia, Peru and Chile all have airport development plans for their capitals and major economic centres• Paraguay is already building a second international airport, Uruguay has plans to do so• Many Caribbean airports are being developed to handle increasing numbers of tourists both from North America and from Europe•

• However, airport development financing seems to be a problem, not only in developing countries, due to the fact that the amount to be spent is surely much higher• Concealing it from the tax-payer appears to be a sport practised all over the world• Why?; if it is believed that money spent on civil airports is usually returned manifold to the community that raided it, as many economic impact studies show• Who could say the same of military expenditures?• Nevertheless, the agreement about the Airport System Planning practices is not so obvious, due to its natural level of complexity•

• The economic growth of any Country of the World has been closely associated with the development of Transportation, regardless to any other Social or Political characteristics of any focused Country or Context• However, it has been very difficult to synchronize the Transportation Planning with all other also important areas of Planning such as; Social, Economic, Land Use and Environmental Planning, in terms of both, National needs and National priorities for development•

• The evolution of the planning process over the past two decades has been characterized by everincreasing complexity, where the government and public interests have been equally shared with the private objectives• This evolution in the planning process has happened not necessarily just within Transportation Planning but in any other Planning field• The narrow focus on economic efficiency prevalent in the 1960s has given way to a consideration of many diverse and conflicting planning areas, such as; economic, environmental and social objectives, which are called, multi-dimensional and multi-objective planning (Hall-1987)• In addition, the range of possible solutions for each problem considered has widened, which requires multi-analysis instruments•

• Transportation investment planning is a typical example of a multi-objective decision problem, and it has been defined as a problem in which there is more than one objective, and they cannot be combined in any way, by a single planning method• The number of participants in the planning process has increased as all levels of government and private agencies, as well as the public has been incorporated into the decision-making process(Giuliano-1984)•

• The planning process is by nature many-facetted and calls for decisions concerning many and diverse elements• Attempts at a comprehensive approach to planning, by public authorities and also by private companies, have generated various planning methods which are intended to facilitate rational decisions concerning these multiple facets and issues• In order to reflect the political reality within which any planning process usually takes place these methods have to recognize the existence of multiple interests and groups, seeking multiple objectives which may be in conflict• With the increasing right of the public to participate in determining policy for its socio-economical and environmental objectives, is also desirable that the methods should incorporate procedures for public participation explicitly and rationally(Hill-1980)•

• Since, the first principle of benefit-cost analysis was produced by Jeremy Bentham, a social philosopher of the 19th. century, which became the basis for the explicitly economic approach named cost-benefit analysis in the middle 1950s, many multiple objective planning methods have been formulated so far, as follows;

1-Lichfield, N. produced consecutively in1960 and 1964 the first cost-benefit analyses in city planning• In 1969 he had applied these results in producing the Planning Balance Sheet Analysis-(P.B.S.A.), which was a case study of the expansion of the town of Peterborough-U.K.•

2-Hill, M. produced in 1966 "A Method for Evaluating Alternative Plans: The Goals Achievement Matrix-(G.A.M.) Applied to Transportation Plans"•

3-Hill, M. produced in 1968"A Goals-Achievement Matrix-(G.A.M.) for Evaluation of Alternative Plans"• Starting from the agreed objectives which the plan-making machine sets up, it compels decision-makers to make specific judgments about weights they attach to the various objectives; these judgments are then applied to further judgement as to the degree to which alternative plans meet these objectives, expressed on a numerical scale•

4-Friend, J.K. and Jessop, W.N. produced in 1969 an important element in the broader strategic choice approach, which was defined as a design method of Analysis of Interconnected Decision Areas-(A.I.D.A.)•

5-Friend, J.K. and Wedgwood-Oppenheim, F. et al produced in 1970 a collaborative exercise in the application of a new approach to Local Government Implementation-(LOGIMP) Planning Programme•

6-Paelink, J.H.P. in 1976 produced "Qualitative Multiple Criteria Analysis: Environmental Protection and Multiregional Development"•

7-Nijkamp, P. in 1977 produced "Stochastic Quantitative and Qualitative Multicriteria Analysis for Environmental Design"•

8-Hill, M. and C. Lomovasky produced in 1980 "The Minimal Requirements Approach-(M.R.A.) to Plan Evaluation in Participatory Planning"• A characteristic of the approach is that, instead of attempting to achieve an optimal solution in terms of a set of weighted multiple criteria, it adopts a satisficing stance in order to achieve a compromise which satisfies at least minimally the interests of all participants•

9-Hickling, A. produced in 1985 "The Five-Finger Model" of evaluation in strategic planning• The six basic planning activities, called; scanning, shaping, designing, comparing, choosing and doing, are examined in the field of operations, political arena and technical domain•

• More recently, despite the existence of many multi-objective planning methods, the lack of more comprehensive approaches, specially with multi-disciplinary characteristics, to select better the adequate Planning methods has been identified(van Lierop-1986)•

• This has happened, mainly due to the lack of multi-disciplinary instruments of Analysis, Planning, Implementation and Evaluation• Some areas of planning have been coping quite satisfactorily, as far as their own planning objectives are concerned• The question is;"What about the identification and co-ordination of common planning objectives?"•

• Another point within the same approach is; "How to select the right multiple-objective planning methods to deal with the actual lack of financial resources in order to get the best from what are available?"• Another important question is; "How to chose the right planning methods concerning simultaneously the following aspects of adequacy?"• I.e.firstly, adequacy in coping with the normal evolutionary Planning Context of the Real World, which is called in this work the Planning Environment of any country, or more specifically where actually the Planning practices are taken place• Secondly, adequacy to the dynamic Planning Field or Planning area, which is supposed to be the specific reason for planning practices•

• Whether or not it is possible and effective to define rigorously the Planning boundaries of any particular Planning area, and to have their specific objectives properly insulated... : remains the major question to be answered by the Planners• Regardless of the Holistic idea of planning concerning with multi-objectives, the following question should be also formulated-"Is it possible to adopt a multi-disciplinary planning instrument, at least to permit the analysis and identification of common planning factors?"• That remains the major challenge within any Planning Practices•

• Transportation Planning Process plays an important part in any Developmental Planning practices, because it is considered an interface element between Land Use and Environmental issues• In fact, Transportation, Land Use and Environment Protection issues have become one of the actual trilogy of Planning• However, Transportation Planning Process represents the permanent conflict between public and private interests and can also be expressed by another Planning trilogy, which consists of; Economic Planning, Social Planning and Physical Planning, and they are basically one of the main concerns of any National Development Planning Process•

• Taking the Air Transport Industry as an example within Transportation issues, one can ask primarily; "How to select the suitable Planning methods to deal with all the continual changes within this Planning Field?"• And secondarily, "Which are the Planning methods capable of dealing simultaneously with all the multi-disciplinary and multi-objective aspects of the Air Transport Industry?"•

• The idea in this work is to produce at least an instrument of Planning Analysis, capable to deal simultaneously with all ex-ante, and post Planning evaluation aspects, evolved within any focused Planning Field, which might be defined by different issues such as: Economic, Social, Political, Cultural, Ethical, Physical, Environmental, and Philosophical aspects• The resulting instrument should help the Policy Makers within their Strategic Planning problems, such as: Decision Making, Decision Taking, Planning Implementation, and Post Implementation or Post Occupancy Evaluation• Consequently, this instrument should provide similar support at the short and medium-terms levels of Planning, or more specifically, with the identification and selection of multi-disciplinary planning variables within Engineering, Operational and Managerial issues•

• Probably, one should say; "Why should a Holistic instrument to solve Planning problems exist?"• The answer could be; The idea is not to have the problems solved, as a whole, which seems to be simply naive• But first of all, the idea is to produce a mature and unbiassed instrument of identification and analysis of the Planning problem, as a whole, and then afterwards, help to select and reselect the suitable Planning methods within the identified circumstances, in a continuous and iterative way, within the same methodological planning framework• The characteristic of continuity has to be assured without losing the multi-objective aspect at any stage of the Planning process• So, as the Planning process might has to be many times interrupted and again reinitiated, upon the complexity of circumstances within which all Planning process are normally evolved• Finally, the idea is to pursue the paradigm between Efficiency and Effectiveness which says: "...doing things right and doing the right things"(Drucker-1974)•

• It seams that if Transportation Planning, in particular, is to be responsive to the aspirations of a Country, it must be sensitive to prevailing cultural values and social desires(De Neufville-1976)• This concept has also been expressed by Khisty, C.J.(1985) in his work entitled; "Appropriate Planning Methodology in Developing Countries", where he pointed out the fact that Developing Countries have generally adopted the Planning Methodology conventionally practiced by Developed Countries• Consequently, he says; "The results have not been encouraging, due to the fact that there is a dire need to evolve inexpensive appropriate methodology especially applicable to developing countries, which would help policymakers reduce the inefficiencies in transport, correct misguided priorities, promote equity, and enhance the quality of life"• The above mentioned Khisty's research lies in the realm of methodology, which means; methods of selecting methods, a progression from theoretical enquiries toward practical solutions• As was pointed out by De Neufville(1976);..."As a profession solves old problems and moves on to new ones, its methodology should evolve too"•

• A basic lesson is that there is no universal methodology for Planning, appropriate to all needs, and its existence is a myth that should be exorcized (De Neufville-1976)• Analogy and comparison are some of the key words in this piece of work, where it is assumed that Planning is a continuous and never ending process of practicing, and learning by exchanging experiences throughout time•... " When you have least need of

Planning because nothing changes, Planning works best; it is one hundred per cent efficient- But when, because of rapid, universal changes, Planning is needed most, it does not work at all: its efficiency is zero" (Friedmann-1985)•

• Nevertheless, due to the fact that Planning is a natural need for Human Growth within any Country, Nationality or Context, and not a particular need of a specific activity at a given circumstance, this research has proposed a General System Planning Methodology-(G.S.P.M.), which is intended to be useful within any Planning field and within any Planning Context• At least within the Planning Analysis stage, which is one of the most important parts of any Decision Making process• It is important to point out the fact that, the idea of wideness, which has been given by the General System meaningfulness within this research, is based on the natural difficulty of Planning boundaries identification• Especially, when one is dealing with the common objectives and goals definition in Planning Practices•

• This G.S.P.M. is a normative planning methodology which is addressed basically, to multi-disciplinary Planning teams, dealing with multi-objectives Planning Processes• The G.S.P.M. can be also defined from the normative theory of planning point of view, as a methodological framework for system planning practices to help the mentioned teams with the difficult task of; Planning context and Planning environment identification, and the Planning methods selection• In other words, identification of the appropriate technology to the known planning context and planning environment through the adoption of the adequate planning methods• It is strongly believed that this selection can be better achieved if; first, by identifying properly the planning context and the planning environment where the planning problem is taking place, second, by identifying the preferred common planning factors and goals, which should be also the most potentially effective ones• This process should be performed at any given Planning Field, within any given Planning Context•

• Nevertheless, the proposed G.S.P.M. has been initially tested in the field of Transportation Planning, specifically within the Context of National Airport Systems Planning-(N.A.S.P.), in two different Planning Contexts, the Developed Countries and the Middle Income and Economically Active Countries-(M.I.E.A.C.)•

• The evaluation of effectiveness of the proposed G.S.P.M. has been based on specific objectives of Planning methods, which have been selected in part **1.5.** of **Chapter 1,** to cope with the identified research problem• The G.S.P.M. level of efficiency has been expressed by the selected specific objectives, as far as their level of adequacy are concerned to deal simultaneously with both the given Planning Field, and within the also given Planning Context• Further research is needed within other different areas of Planning Field and Planning Context•

1.2. Statement of the Problem:

• Since the main idea is to produce a General System Planning Methodology(G.S.P.M.) to improve Multi-Disciplinary Planning Practices by selecting the best planning methods to the specific circumstances of the identified planning context and planning environment, and the National Airport System Planning(N.A.S.P.) has been initially selected to be the testing Planning Field in two different Planning Contexts simultaneously, such as; Developed Countries and Middle Income and Economically Active Countries(M.I.E.A.C.), the next step should be the definition of a methodological identification of the above mentioned "specific circumstances", and that is what is been done in this statement of the problem•

• From the planning point of view, The Air Transport Industry is one of the most dynamic elements within The Transportation field and plays actually an important part in the evolutionary scenario which is defined either by The International Socio-Economic context or by The National Socio-Economic context regardless of the stage of development and political characteristic of any particular country within any region of the world• Consequently, The Air Transport Industry in most of the cases is subjected to the normal forces of the free market, which are normally created by the cyclic changes in The Natural System• This Natural Cyclic System (FIGURE 1.2.-1) is defined by the elements of "Society", "Science", and "Technology";

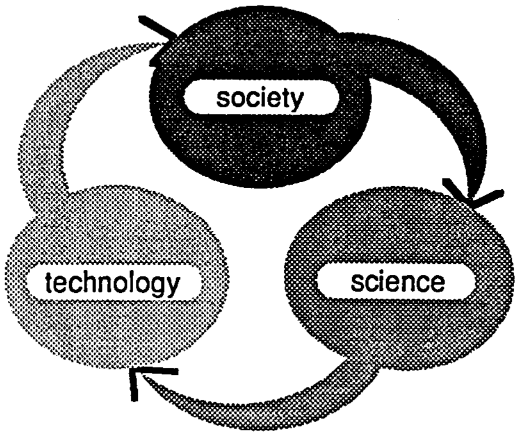


FIGURE 1.2.-1
THE NATURAL CYCLIC SYSTEM

• According to The Natural Cyclic System, the elements of Society or Societal elements with their specific behavioral standards and cultural values will have the correspondent level of knowledge about Science, in response to which they are able to produce the required level of Technology• Consequently, the resulting level of Technology promotes the specific behavioral response by Society in a continuous and cyclic process of changes within The Environment, as expressed in FIGURE 1.2.-2•

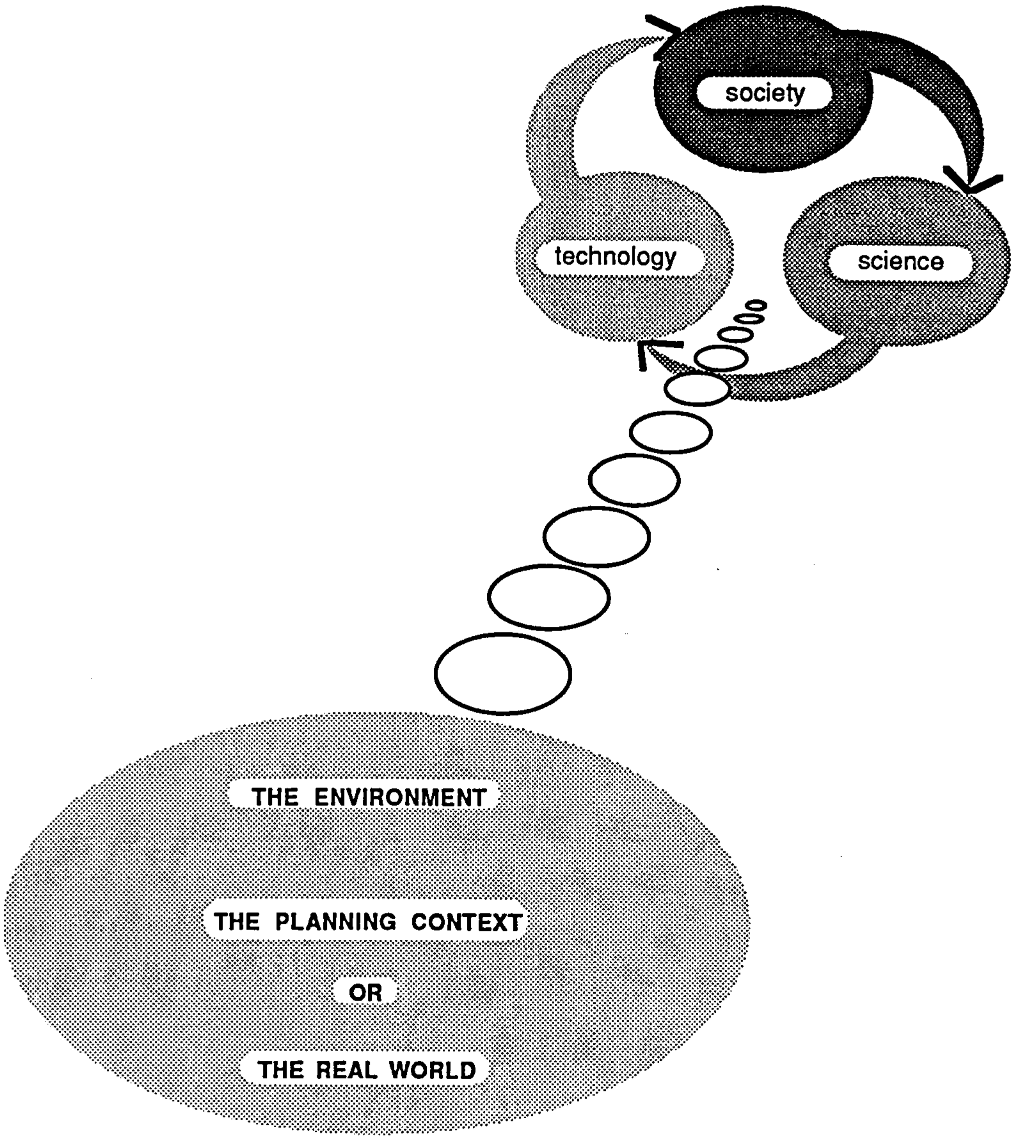


FIGURE 1.2.-2
THE NATURAL CYCLIC SYSTEM
AND
THE ENVIRONMENT OR THE PLANNING CONTEXT

• The Natural Cyclic System can also be expressed by continual changes in the following main Two Aspects of Transportation in FIGURE 1.2.-3;

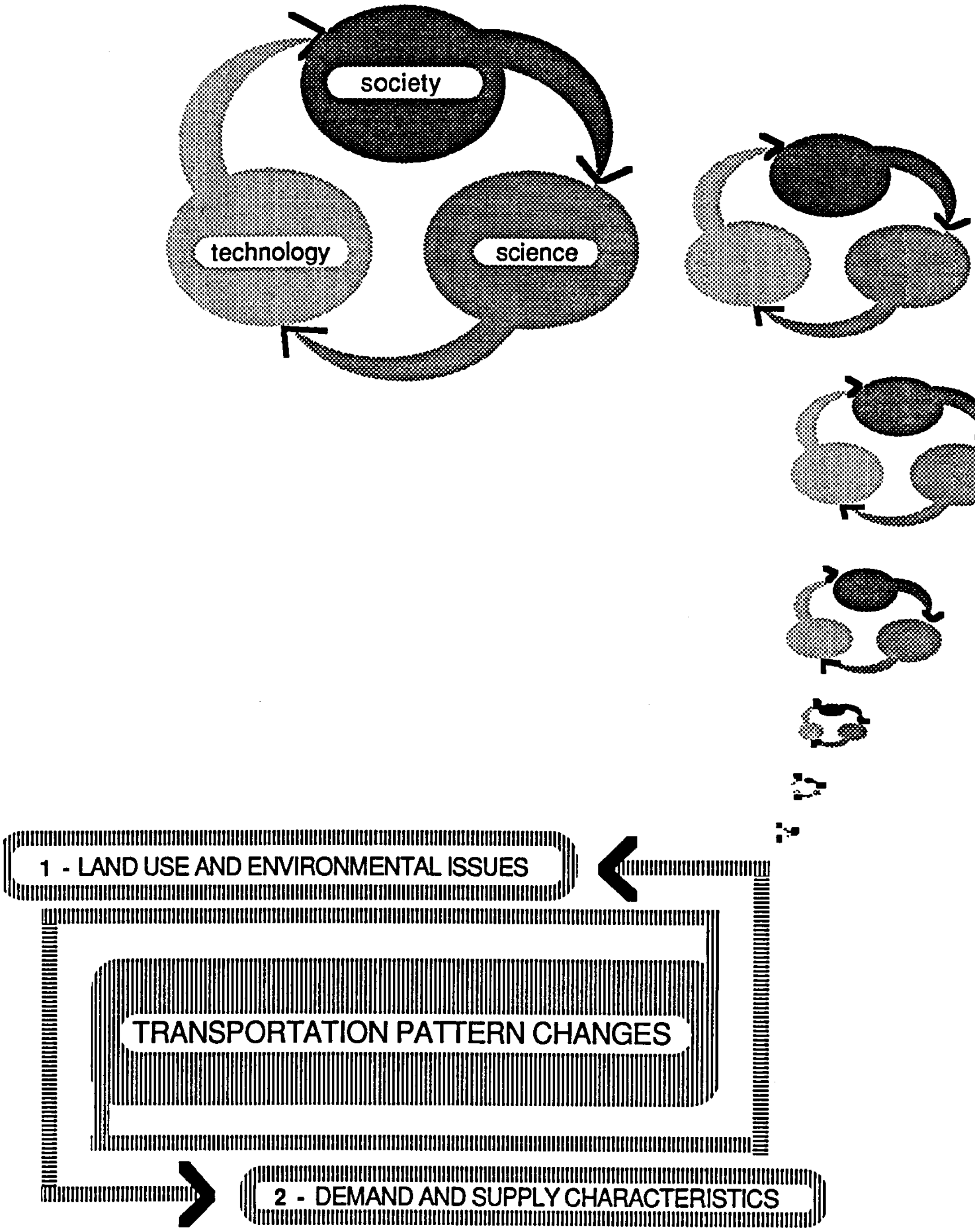


FIGURE 1.2.-3
THE TWO MAIN ASPECTS SELECTED
FROM TRANSPORTATION ISSUES

• Or more specifically, the continual changes within those Two Aspects of Transportation can be expressed by a large number of Unpredictable Factors of The Air Transport Industry• However, this work has selected from the research case studies the following nine most representative Unpredictable Factors of The Air Transport Industry to better illustrate this analysis, as shown in FIGURE 1.2.-4;

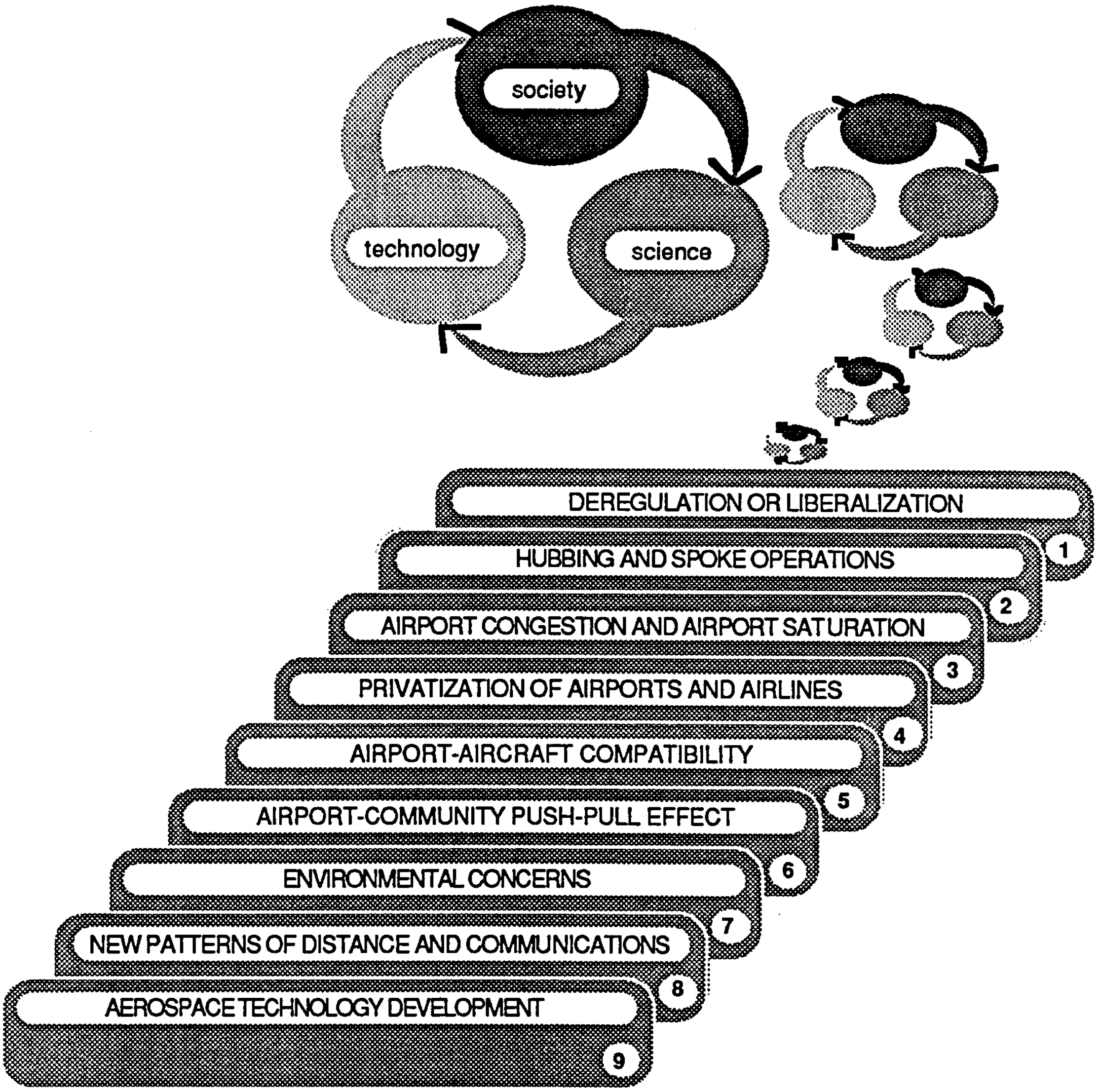


FIGURE 1.2.-4
THE NINE UNPREDICATABLE FACTORS SELECTED
FROM THE AIR TRANSPORT INDUSTRY

• The above Nine Unpredictable Factors have been used to identify empirically the characteristics of The Air Transport Industry as a System from the Planning Process point of view, and its Subsystems or Elements have been also identified as follows in FIGURE 1.2.-5;

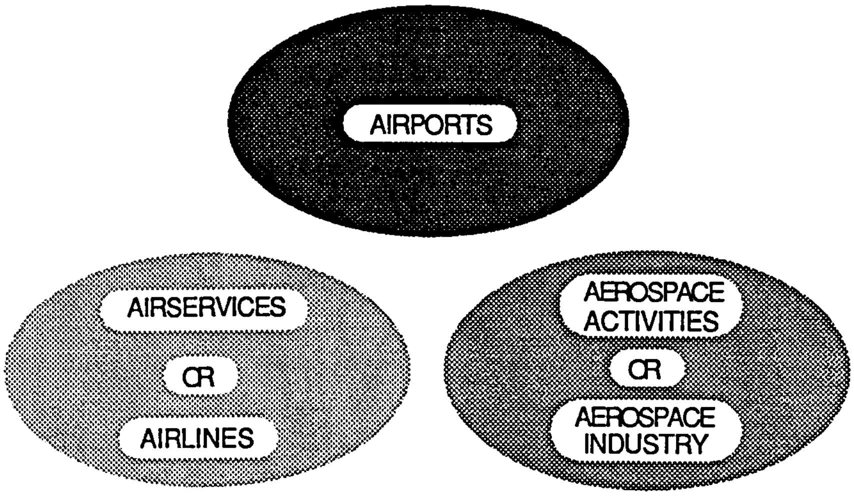


FIGURE 1.2.-5
THE AIR TRANSPORT ELEMENTS OR SUBSYSTEM

- These Subsystems or Elements are represented initially by the diagram in FIGURE 1.2.-6, which shows the identified Air Transport System or The Air Transport Industry within The Planning Context, as follows;

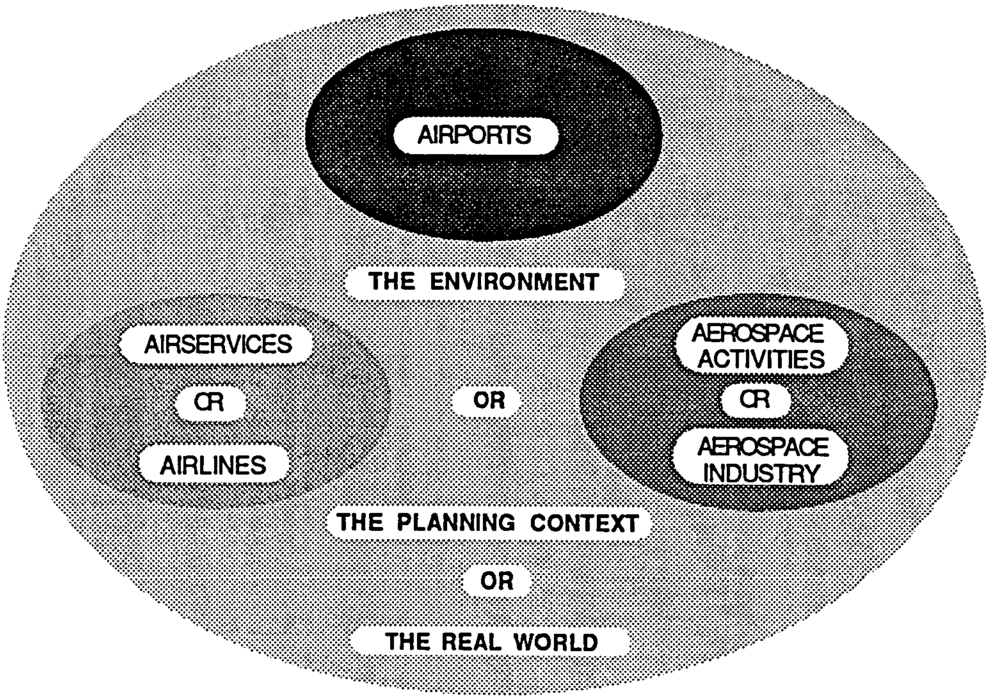


FIGURE 1.2.-6
THE AIR TRANSPORT SYSTEM
OR
THE AIR TRANSPORT INDUSTRY

- The Environment or Planning Context where The Air Transport System is originated is The Real World which can be described by similarities or inequalities within the following Six Circumstantial Factors selected by this work, according to FIGURE1.2.-7;

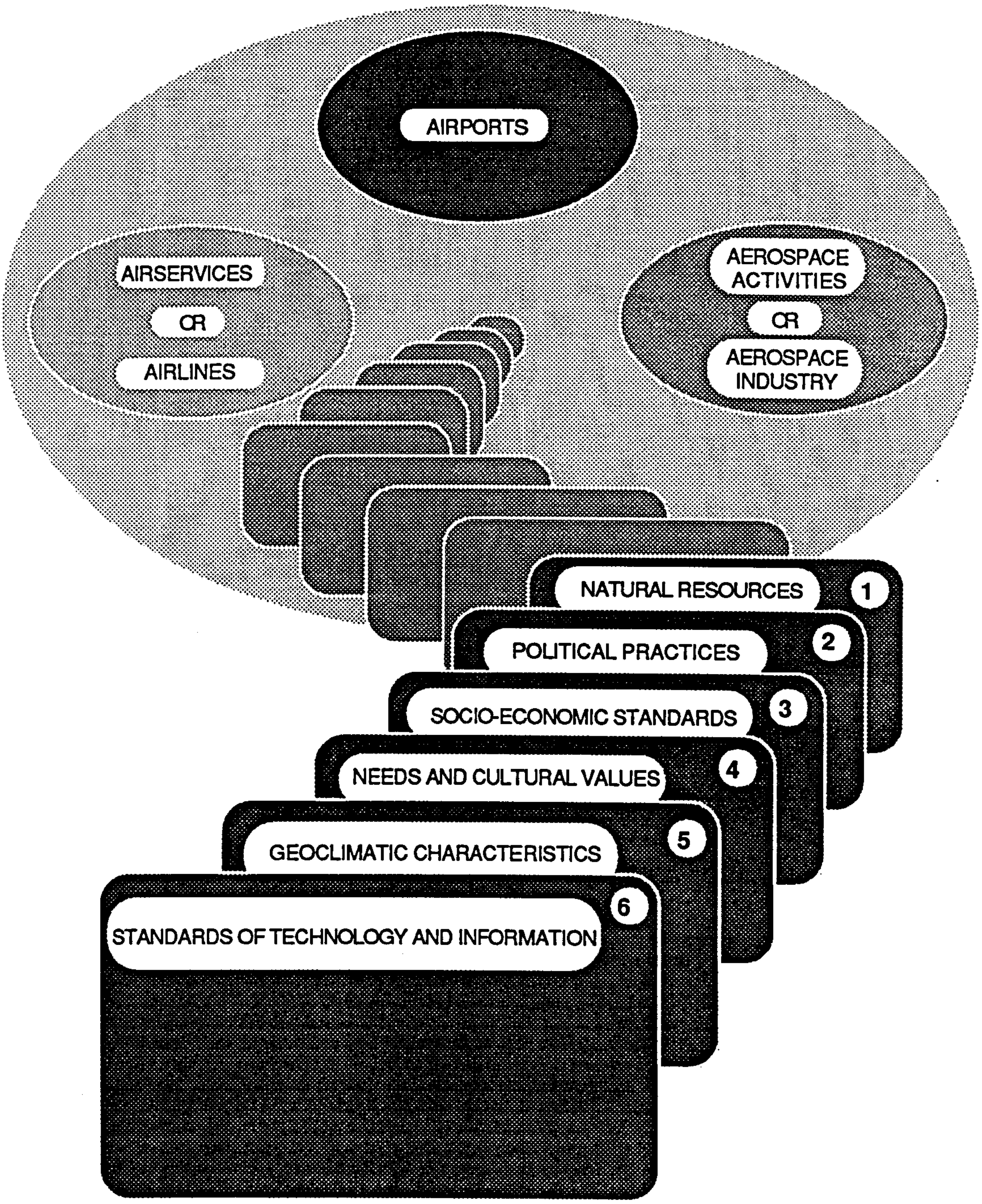


FIGURE 1.2.-7
THE SIX CIRCUMSTANCIAL FACTORS SELECTED
FROM
THE REAL WORLD OR THE PLANNING CONTEXT

• Consequently, within this detected Planning Context the Subsystems or Elements of The Air Transport System have to play an interactive and dynamic game among themselves, according to a set of rules and agreements and a large number of recommendations which are changeable at a given circumstance of The Real World, or actually within what can be identified as being The Normal Evolutionary Planning Context•

• Each one of the Subsystems , individually i.e. Airports, Airservices and Aerospace Industry has got its own set of Objectives and Goals which are part of their own individual Planning Process as well• Nevertheless, on one hand all the Subsystems or Elements of The Air Transport System are naturally within the same Planning Context, subjected then to some specific Common Planning Factors which have generated on the other hand what have been called in this work the specific Planning Linkages between either the Subsystems or Elements of The Air Transport System and also between The Air Transport System and the Detected Planning Context•

• This work has selected, however, the Eight most representative Air Transport Specific Common Planning Factors with their correspondent Planning Linkages with the Detected Planning Context, as follows:

1.**Airports** = as a common element of infrastructure•
2.**Aircraft** = as a common product or as a common operational equipment•
3.**Travellers + Cargo** = as a common target consumer•
4.**Profitability** = as a common economic target•
5.**Social Objectives** = as a common support for a major project or within a subsidized programme of accessibility•
6.**Community** = as a common agent to be satisfied•
7.**Land Use + Environment** = as a common issue of responsibility•
8.**Politics** = as a common factor within any planning practices•

• They can be diagrammatically expressed by FIGURE 1.2.-8 and FIGURE 1.2.-9 respectively:

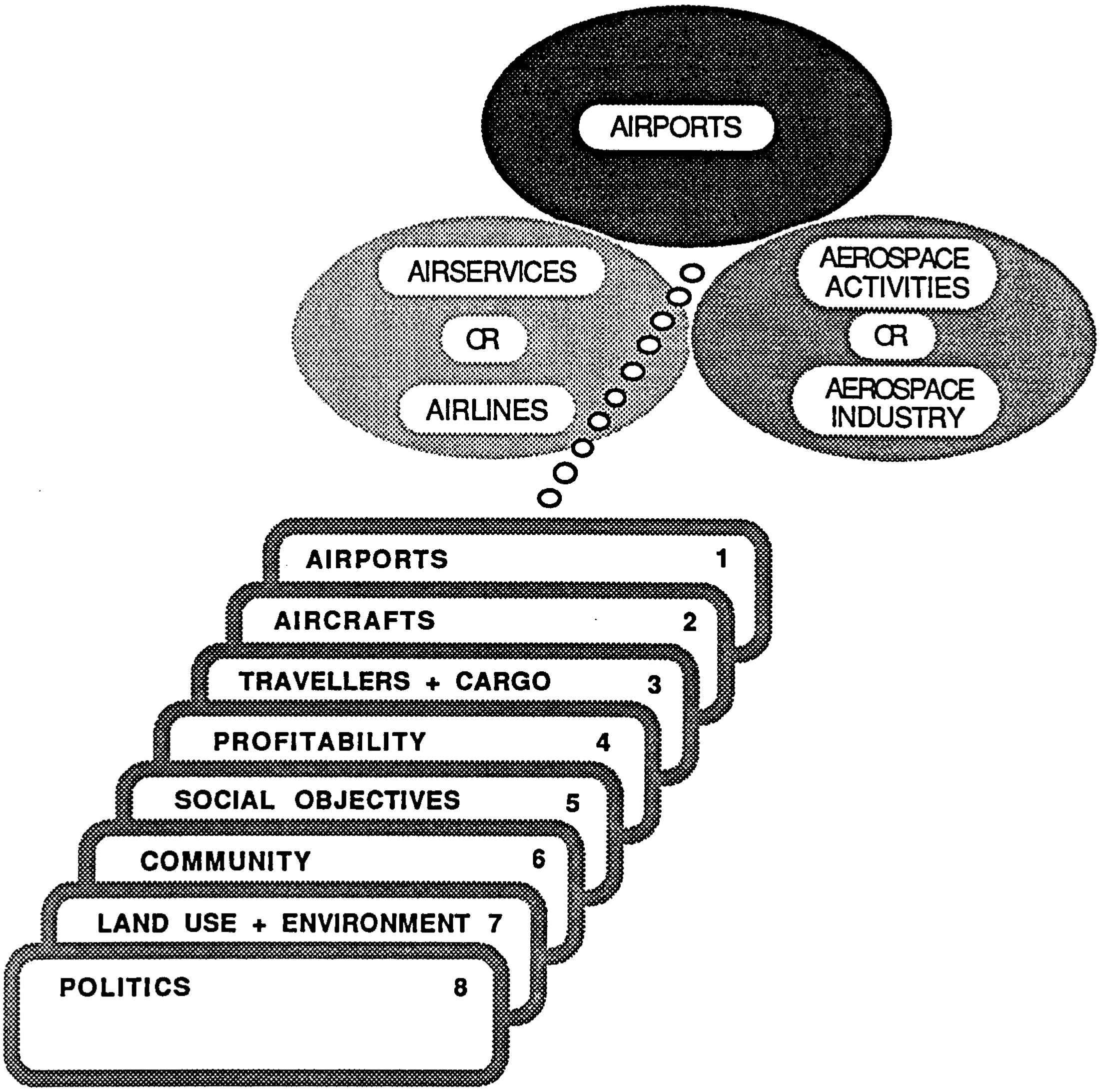


FIGURE 1.2.-8
SELECTED SPECIFIC COMMON PLANNING FACTORS
OF
THE AIR TRANSPORT SYSTEM

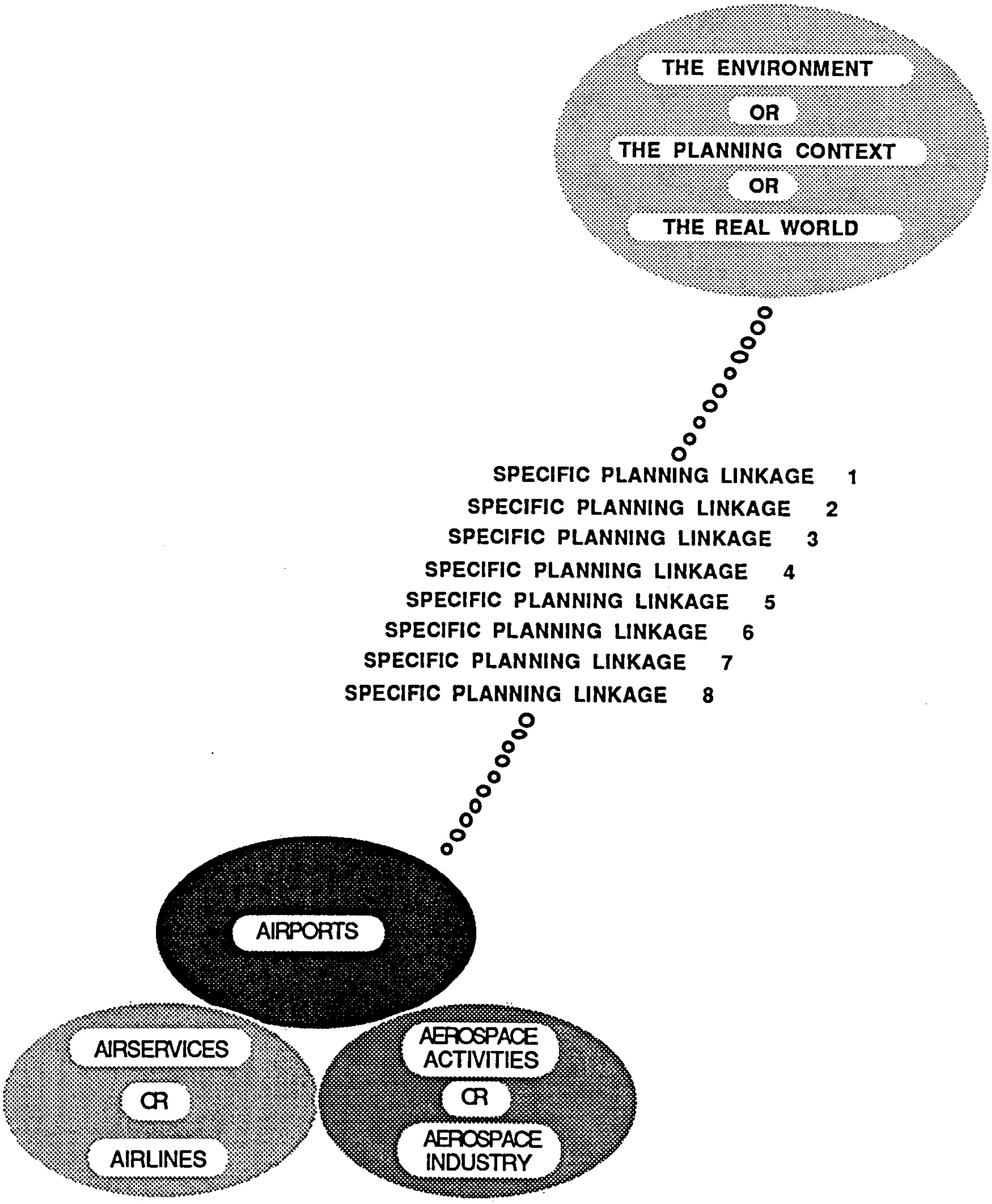


FIGURE 1.2.-9

SPECIFIC PLANNING LINKAGES
OF
THE DETECTED PLANNING CONTEXT

• The above mentioned Nine Unpredictable Factors which have been identified within The Air Transport Industry, combined with the Six Circumstantial Factors of the Real World gives the degree of complexity to The Planning Field of The Air Transport System, which this work is intended to describe•

• The Planning Field is defined either by The Air Transport Industry or by The Air Transport System, and also yet by The Planning Context or The Real World• However, this work has identified within the research case studies that The Planning Field has been in a permanent "State of Tension", due to either the internal areas of interaction of The Air Transport System or due to the external factors of influence over The Air Transport System•

• Both, the internal areas of interaction and the external factors of influence, can be either identified through the Six Circumstantial Factors of The Real World or by the Nine Unpredictable Factors of The Air Transport Industry•

• The definition of The Air Transport System Planning Field may be accomplished by the identification of the Eight Planning Linkages, which exist between The Air Transport System and The Planning Context• Nevertheless, those Eight Planning Linkages can also be identified among the Subystems themselves i.e. Airports, Airlines and Aerospace Industry•

• The above described identification methodology of System Planning Field and Planning Context has been used to identify the National Airport System Planning Methodologies within the Investigation Field of Developed Countries, and also to identify the National Airport System Planning Methodologies within the Application Field of Middle Income and Economically Active Countries•

• After the definition of an empirical identification methodology for The Air Transport System Planning Field this research now explores the following question:

• *" How to improve the Planning Process within the identified Planning Field of the Air Transport System? "•*

1.3. Overview of Research Procedure:

• A research methodology will be fully described later on in part **1.5.** of **Chapter 1** with the support of a proposed research framework• In the meantime a formal scientific treatment has been given to this dissertation according to Bailey(1987) and Nachmias & Nachmias(1982)•

• On the same way that any scientific research methodology evolves in a slow process of growth, through the continuous interchange of ideas and information in order to become possible the formulation of commonly accepted rules and procedures, and to develop corresponding methods and techniques to cope with them; the General System Planning Methodology-(G.S.P.M.) has been proposed to become a system of rules and procedures in a normative framework to support multi-disciplinary planning teams to improve their planning practices within any Planning Field and accordingly to any Planning Context• Consequently, this research is heavily based on theory in order to bring some sort of better communication and understanding among multi-disciplinary team of planners towards planning practices improvements• Before the selection of any supporting theory it is necessary further understanding as far as what scientific research process is concerned•

• The epistemological qualification for this piece of research should enable the finding results to promote knowledge with the following scientific components; first "explaining", second "predicting", and third even "understanding" the empirical phenomena that evolves the selected research proposal, which is the construction of a General System Planning Methodology• Therefore, further analysis over the meaning of the above components of scientific knowledge will suppress the both possibilities of "deductive explanation" and "probabilistic explanation", and also yet the other possibility of simple "prediction" for this work•

• From the three above scientific components the last one that has been considered is a sense of "understanding", which is being used in two radically different ways• One, which has been labeled by the German sociologist Max Weber as a "Verstehen" "or empathic understanding" and the other is called "predictive understanding"• These different usages evolved from the fact that the social sciences are both humanistic and scientific and that social sciences are observers as well as participants in the subject matter of their disciplines, which have been considered in this work as an ideal common place for multi-disciplinary planning analysis• It has been also argued that if social scientists are to "understand" the behaviour of individuals and groups, they must learn to "put themselves into the place of the subject of inquiry"-"They must gain an understanding of the other's view of reality: his or her symbols, values and attitudes" (Weber-1964)•

• More recently, Herbert Blumer emphasizes not only the subjective component of human behaviour but also the evolutionary creativeness of the "social act"• For him, individuals are continually remaking their social environment, and the social order is constantly in the state of becoming, which has been also considered in this dissertation as the main objective for planning practices improvements• Consequently, scientists cannot impose fixed, rigid explanations or prediction upon an ever-changing social world (Blumer-1954); that statement justifies the advantage of planning methodology rather than any simple planning approach• Herbert Blumer, as a proponent of the symbolic interactionist approach, espouses the view that the subject matter and thus the structure of the scientific method in the natural and the social sciences are radically different•

• Whereas, by "predictive understanding" in contrast to the "Verstehen" tradition, the also called logical empiricists take the position that social scientists can attain objective knowledge in the study of the natural as well as in the social world• In other words, the social and the natural sciences are amenable to investigation by the same scientific methodology• In this research the planners are considered both natural and social scientists in order to assure their multi-disciplinary capability of analysis• Consequently, both concepts of "predictive understanding" and "empathic understanding" have been simultaneously applied in this research in order to also assure the comparative analysis, which would promote knowledge•

• According to Parsons and Shils, four levels of theory can be distinctively made up as follows: "ad hoc classificatory systems", "taxonomies", "conceptual frameworks", and "theoretical systems", where "theoretical systems" represent combinations of "taxonomies" and "conceptual frameworks" (Parsons-1962)• Hence, "Axiomatic theory" is an special form of "theoretical systems", and according to Nachmias & Nachmias(1982) should contain basically the following aspects:

1. *A set of concepts and definitions, conceptual and operational...*
2. *A set of existence statements that describes the situations in which the theory can be applied...*
3. *A set of relational statements, divided into; Axioms and Theorems...*

4. *A logical system that is used to; relate all concepts with statements and deduce or combine axioms and heorems...*

• Consequently, with the objective of selecting the necessary theoretical support, a comprehensive review has been done in both professional and academic literature in order to sustain this methodological building up process of research•

• The literature review was essential to define the proposed General System Planning Methodology-G.S.P.M.- in a initial form of Theoretical Model to improve Planning Practices• This review has been orientated by the main aim of this research, which is to improve planning practices with a multi-disciplinary approach, and it has been extensively stated in part **1.1.** of **Chapter 1**• Meanwhile, three specific objectives of planning have been selected to evaluate the G.S.P.M. effectiveness, which will be expressed by their capability in dealing simultaneously with both the Developed Countries N.A.S.P., and the Middle Income and Economically Active Countries N.A.S.P.• Despite the fact that the specific objectives of planning are better described in part **1.5.** of **Chapter 1**, they are as follows:

1. *Planning Adequacy* •
2. *Planning Flexibility* •
3. *Planning Continuity* •

• The proposed G.S.P.M.-Theoretical Model has resulted from the amalgamation of two selected nonconflicting Axiomatic theories, as follows in order to support the three above specific objectives of planning:

1."*Scientific Design Method* " (Christopher Jones-1962)•
2."*Form & Context - Concept of Fitness* " (Christopher Alexander-1964)•

• It is assumed that, the proposed G.S.P.M.-Theoretical Model can be qualified as a "conceptual framework", which has been supported by "Axiomatic theories", and tested within the two different contexts of "understandings" ; i.e. the "empathic understanding" on one side and the "predictive understanding" on the other, as will be seen on a cross examination and comparative analysis•

• It is also assumed that the epistemological qualification for this dissertation can be achieved through the comparative analysis of the results collected within both Planning Contexts, the "empathic understanding" and the "predictive understanding", which are defined by two different samples of countries•

- A bidimensional assessment matrix, which was called Multiple Cross System Analysis Matrix-**M.C.S.A.M.** has been proposed as an operational instrument to test the G.S.P.M.-Theoretical Model within the selected sample• This matrix has been conceived and connected to the G.S.P.M. through a series of flows, which have been designed to allow the necessary information exchange in order to identify the three selected objectives of planning• This identification will justify the proposed G.S.P.M.•

- The tailoring process in planning is the chosen concept to exercise the G.S.P.M.-Theoretical Model within the two different Planning Contexts, through the same operational instrument such as the M.C.S.A.M., under the same specific planning objectives, such as; Adequacy, Flexibility, and Continuity in planning•

1.4. The Exploratory Items:

- Throughout the course of the research, many efforts have been made to formulate questions about the approached issues in order to help with the research design, towards a set of more traditional hypotheses• In many instances the identified hypotheses would remain an interest of the research, including some which could be done beyond the chosen focus area of study• They were excluded from direct use for two reasons mainly; first, this research is exploratory in nature, specially due to the fact that what is being looked for was not known in advance, since the data collection was focused primarily on collecting broad based descriptive information• The second consideration to be made in rejecting research hypotheses as the basis for investigation is that they require a significant narrowing of the focus of the research itself•

- The decision to avoid the strict use of hypotheses results instead in a more exploratory approach• Nevertheless, the output of this research is expected to provide a good basis on which to build up new hypotheses for future work•

- As an alternative to structuring the investigation only around conventional hypotheses, this exploratory research relies on collecting descriptive information on how decisions are made upon planning process, who makes them and what factors were important in the decisions• These major areas of investigation are supplemented with a series of questions about perceptions of effectiveness, the existence of evaluations efforts, and the context were to look for answering the formulated questions•

- The following exploratory items are addressed in this research :

1. "*How to chose the adequate Planning Method at a given set of Planning Field characteristics and within a given set of circumstances of the Planning Context ?*"•

2. "*How to identify the common planning factors and goals at a given set of Planning Field characteristics and within a given set of circumstances of the Planning Context ?*"•

3. "*How to achieve flexibility in Planning Practices without losing the multiple-objective purpose, and preserving the Planning Field characteristics within the circumstances of the Planning Context ?*"•

4. *"How to identify the real boundaries of a comprehensive and multi-disciplinary approach in Planning ?"*•

5. *"How to deal with uncertainty in Planning ?"*•

6. *"How to produce transparency in Planning ?"*•

7. *"How to promote a joint task force in Planning and how to work within it ?"*•

8. *"How to tailor in Planning in order to match the real needs with the real possibilities ?"*•

1.5. Scope of the Study and Research Framework:

• After the Problem Identificatión, which is assumed to be done in this actual **Chapter 1**, the three specific objectives of planning, which have been selected to express the G.S.P.M. effectiveness, will also guide this dissertation towards Planning Practices improvement, and they are now better defined, as follows:

1• G.S.P.M.- Adequacy ; The Methodology should be capable of helping with the selection of appropriate Planning tools as far as the Identified Planning Field within the also identified Context of Planning are concerned, for example: adoption of appropriate Planning Methods, adoption of adequate Level of Technology and adoption of solutions which are adequate to the Stage of Devepopment•

2• G.S.P.M.- Flexibility ; The Methodology should be a flexible instrument in order to assure both important aspects of multi-disciplinarity and participation;i.e., the unbiassed quality of judgement about both the decision making and decision taking process combined with the democratic right of participation to any individual planning actor or organization• The Methodology is expected to be Flexible enough to cope with all types of Planning; Short, Medium, or Long-Term, also called Strategic Planning• Flexible enough to deal with any multi-disciplinary team of Planning actors, within any Planning agency, as well as any Planning organization•

3• G.S.P.M.- Continuity ; The Methodology should be capable to cope with both the continual changes of the Planning Field and natural evolution of the Context of Planning• The Methodology should also allow iterative re-evaluations and changes in the process whenever it may be justifiable, without losing the characteristics of Continuity• This characteristic should be provided by feed-back and looping channels in the G.S.P.M. framework•

• Consequently, a research framework was proposed in FIGURE 1.5.1 from where the following methodological research steps can be identified:

1st. research step - General Theory Support:

• Considering the enormous difficulties in identifying a specific supporting literature to this building up process, a thorough literature review has been done with a consistent multi-disciplinary approach of planning practices• In **Chapter 2** of this dissertation are given the condensed results of the information collection, which was done within both professional and academical literature review in the following four areas of knowledge:

1. **Transportation•**
2. **Air Transport Industry•**
3. **Planning Theory and Practices•**
4. **Systems Theory and Practices•**

2nd. research step: Definition of a General System Planning Methodology - G.S.P.M. Theoretical Model:

• A "conceptual framework" is given to the G.S.P.M. in **Chapter 3** of this research, after the above mentioned literature review and the superposition of two Axiomatic Theories, which have been selected to support the three specific objectives of planning• The two Axiomatic Theories are:

1st. Axiomatic Theory: "*While the mind moves freely within creative thoughts from problem analysis to solution, simultaneously the logical scientific design method should be developed in three distinct stages as follows* :

Analysis
Synthesis
Evaluation"

(Scientific Design Method-Christopher Jones-1962)

2nd. Axiomatic Theory: "*Every design problem is an effort to achieve fitness between two entities* :

The form in question....(A General System Planning Methodology - G.S.P.M.)•

and its context"...(A National Airport System Planning-N.A.S.P.- for

Middle Income and Economically Active Countries-M.I.E.A.C.-, and a N.A.S.P. for Developed Countries)•

(Form & Context-Concept of Fitness-Christopher Alexander-1964)

• The National Airport System Planning-N.A.S.P. was the chosen Planning Field to test the proposed G.S.P.M.-Theoretical Model, and the Middle Income and Economically Active Countries-M.I.E.A.C, and the Developed Countries were the chosen testing Planning Contexts•

3rd. research step - The Investigation Field:

• Or the "empathic understanding"- Is given in **Chapter 3**, and it consists of a Developed Countries sample selection, which are integrated by widely recognized and accepted planning practices countries, as follows;

1. United States of America•
2. United Kingdom•
3. Federal Republic of Germany•
4. Canada•
5. Norway•

4th. research step - The Application Field:

• Or the "predictive understanding"- This definition has also been given in **Chapter 3**, and it consists of a Middle Income and Economically Active Countries sample selection, which are represented by the Actual Brazilian Scenario and by furthermore three hypothetical Brazilian Scenarios, as follows:

1. Brazilian Actual Scenario•
2. Brazilian Low Growth Scenario•
3. Brazilian Medium Growth Scenario•
4. Brazilian High Growth Scenario•

5th. research step - The proposed Multiple Cross System Analysis Matrix-M.C.S.A.M.:

• In **Chapter 4** a bidimensional assessment matrix, which was called M.C.S.A.M., has been proposed in a form of functional model before being applied• The M.C.S.A.M. is an operational testing instrument for the General System Planning Methodology within both the Investigation Field and the Application Field in order to permit a comparative analysis between the "empathical understanding" and the "predictable understanding", as a learning process of knowledge achievement•

6th. research step - The M.C.S.A.M. Application test in the Investigation Field or the develope countries N.A.S.P.:

• In **Chapter 5** the M.C.S.A.M. has been applied and tested in the investigation field of the five selected developed countries, from where the Realist N.A.S.P. methodology model of the developed countries has been identified and analysed• This has been considered an exercise of "emphatical understanding" about their N.A.S.P. methodologies and planning practices•

7th. research step - The M.C.S.A.M. Application test in the M.I.E.A.C. N.A.S.P.:

• In **Chapter 6** the M.C.S.A.M. has been applied and tested in the actual Brazilian N.A.S.P. and in the other three designed Brazilian N.A.S.P. Scenarios, which have been selected to represent the application field of Middle Income and Economically Countries• A Realist N.A.S.P. methodology model of the M.I.E.A.C. expressed by the Brazilian Planned Scenario N.A.S.P. has been identified and analysed• This has been considered an exercise of "predictable understanding" about the hypothetical Brazilian N.A.S.P. methodology and planning practices•

8th. research step - The Tailoring concept and Conclusions:

• In **Chapter 7** a M.C.S.A.M. comparative table has been analysed to identify the three specific objectives of planning• The tailoring process of planning which is the confirmation of the concept of fitness between the "form"(N.A.S.P.) and the "context"(Brazilian Planned Scenario), is an exercise of the G.S.P.M. applicability•

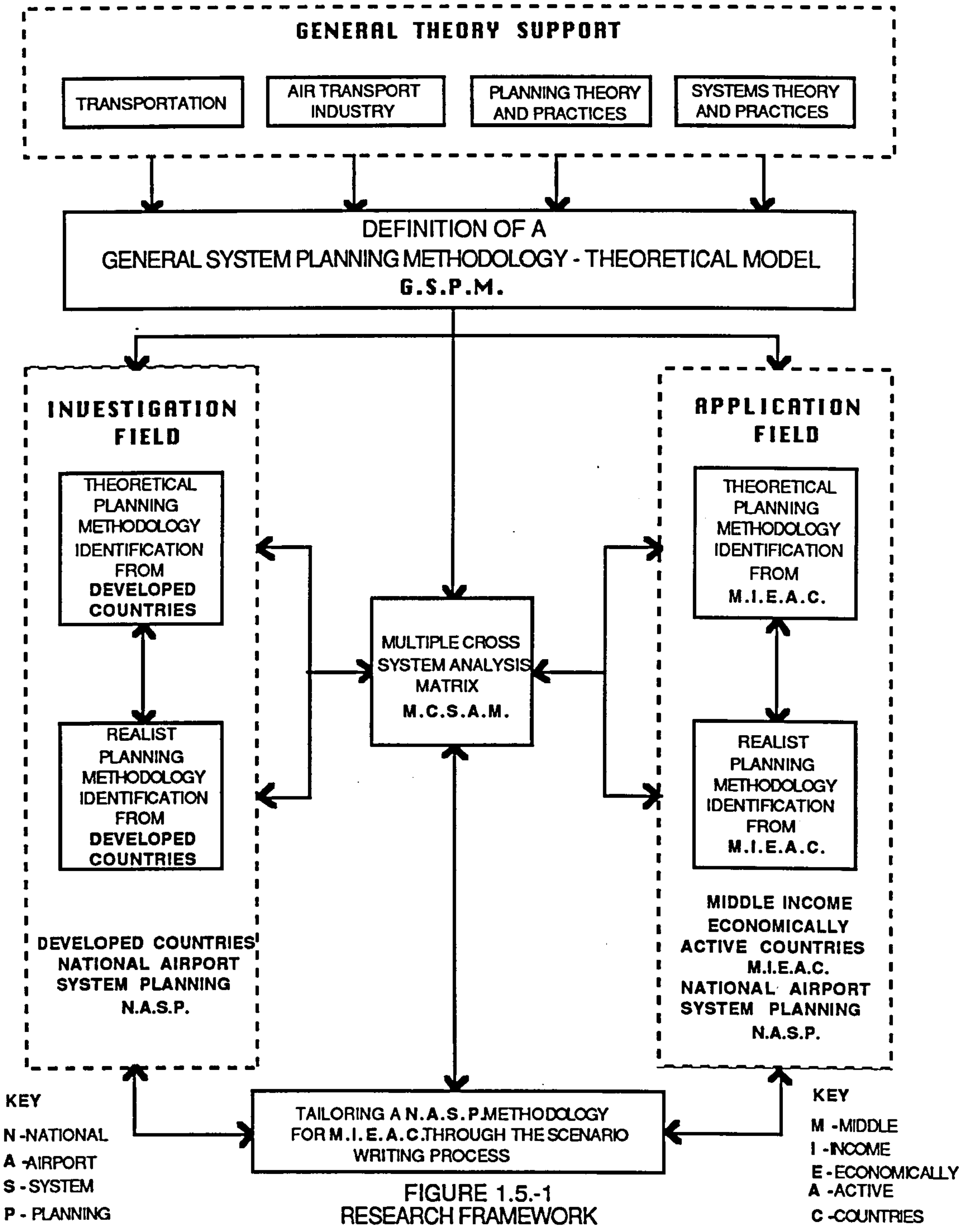


FIGURE 1.5.-1
RESEARCH FRAMEWORK

CHAPTER 2

CHAPTER 2:

2. Theoretical Foundations:

2.1. Introduction:

• It was centuries ago that Leonardo Da Vinci warned that those who practise before they have learned the theory resemble sailors who go to sea without a rudder...•

• Theories provide explanations• Therefore, explanations are responses to a state of tension resulting from observing unexpected events, furthermore, explanations represent efforts to reduce surprise caused by such events, by providing plausible accounts of how they have come about (Toulmin-1960)• The moving force behind the desire to reduce surprise is that there are always challenges and opportunities arising in our environment for which we wish to be prepared (Faludi-1973)•

• For some, theory is an explanatory supposition which can be defined broadly or narrowly (Braithwaite-1962)• For Karl Popper(1959), it is a hypothesis or a conjecture, and he defined a theory, such as: "Theory is a tool which we test by applying it, and which we judge as to its fitness by the results of its applications, although events may prove a theory to be false or to be reasonable, at least for the present moment"•

• According to McConnell(1981): Theory is a word which may be used to mean conjecture or to explain existing phenomena or to prescribe or predict future events or consequences• He said that theorizing is a way to advance knowledge and to change practices• Consequently, theory is impotent unless used in practice• A theory should, if possible, be tested through experience and then revised if it does not seem to be accurate or adequate as an explanatory or predictive device, or acceptable as a prescription• A simple example is that when a person is studying a deficient motor, maybe theorizing: "First, why it will not work?; which is an "*explanatory theory* ", and secondly: What should be done to make it work again?; which is a "*prescriptive theory* ", or "*predictive theory* ", or also yet "*normative theory* "• It is therefore possible to identify the following relationships:

1. **Explanatory theories:** Are concerned with, what is happening, or what has happened•
2. **Prescriptive theories:** Are concerned with what ought to happen•
3. **Predictive theories:** Are concerned with what will happen•

• In a world where technology, economy, and lifestyles are continuously changing, the underlying causes of modal choices of transportation must be analyzed• In the planning of air transportation systems there must be an evaluation of all modes of transportation, air and surface• Planning may involve assessment of large regions, countries or even continents, where certain ground transportation systems may be almost nonexistent or underdeveloped• Analyses of the historical development of ground transportation systems in regions, countries, and cities will aid planners in reaching solutions that can be used specifically where industry, urban development, and mechanized transportation systems are still in the early stages•

• In order to get the necessary theoretical support to answer many different questions, and also to build up the G.S.P.M. - Theoretical Model, an extensive literature review has been carried out within the following both areas of academical and professional knowledge;

- **Transportation •**
- **Air Transport Industry - Airports •**
- **General Systems Theory •**
- **Planning Theory and Planning Practices •**

2.2. Transportation:

• "Mobility is the backbone of the activity system of the human race• Adequate mobility tends to broaden the perspective of an individual• Transportation is a principal component of the economic, social, cultural, and political structures of our society, and thus a vital factor in a civilization• The economic development of any geographic area, whether it is a nation, region, state, or city, will find transportation a very important influence• In social terms, community values must be invoked in the measurement of the performance standard to a particular transportation facility, and its side-effects• Transportation is a major contributor in the exchange of cultural ideas among human beings• Politically speaking the formulation of transportation plans should be laid down by governments and concerned citizens both of whom are working cooperatively toward a set of goals and objectives• Transportation may be viewed as an environmental problem as a result of effects on air, water, land, and other qualities and aspects of human, animal, and plant life• Transportation problems are interdisciplinary in nature• They cannot be analyzed on their individual merits alone and therefore each approach must be seen as an integral portion of a much broader problem"(Yu-1982)•

• Kohr(1981) has explained: "Today, improvements in transportation and communication have made it possible to extend city size limits to perhaps 12 or 15 million• But beyond this, no further technological improvement can match the geometrically multiplying problems of scale setting in• They now turn into diseconomies of scale"•

• Transportation in general, according to Ashford(1982), can be identified by five different modes, these being:

1. Motor vehicles•
2. Railroads•
3. Air transport•
4. Water transport•
5. Pipelines•

• Also according to Yu(1982) the comprehensive system approach is pushing aside the conventional piecemeal process in solving the transportation problem and he has considered six questions to be asked in the process of accomplishing a transportation project as follows:

1. *For whose benefit and for what purpose is the system designed* ?

2. *What are the goals and objectives of the community which will be affected positively or negatively by the system* ?

3. *What alternatives can be considered* ?

4. *How reliable are the estimates of system cost, performance, and use* ?

5. *What are the consequences or impacts of the various alternatives on the community* ?

6. *Are the consequences of the alternatives being measured and easily evaluated for decision-making and implementation* ?

• Yu(1982) also said that ..."the system approach is a process that is applied on a continuous basis and in a consistent way by the engineering and management disciplines in undertaking the following procedures:

A ...identifying the problem,
B ...defining the goals and objectives involved in solving the problem,
C ...searching for alternative methods of meeting the requirement,
D ...selecting the most effective alternative,
E ...developing it in its entirety,
F ...them implementing its operation or use•

• ...the effective management of the system approach requires the synthesis of contributions from the physical sciences and from the social sciences as well, and the interdisciplinary approach is a necessity• Transportation engineers on the team must work closely with a variety of specialists, including planners, economists, architects, sociologists, geographers, political scientists, mathematicians and analytical specialists"•

• Further definitions have been given by Yu(1982), such as: "Transportation planning is a methodological process of preparing physical facilities and services of all modes for future transportation needs• Or "It is a dynamic process to facilitate orderly, progressive development of an integrated transportation system in harmony with overall regional objectives"• As far as transportation planning is concerned Yu(1982), says that: "It can be differently performed in four different levels, either in urban planning areas, or for statewide transportation planning, as follows:

i: in urban areas:

- i.i. Systems Planning•
- i.ii. Corridor Planning•
- i.iii. Project Planning•
- i.iv. Planning for Operations•

ii: for statewide:

- ii.i. Policy Planning•
- ii.ii. Statewide Systems Planning•
- ii.iii. Intrastate Regional Planning•
- ii.iv. Corridor Planning•

• Yu(1982) also has recognized that the main interest in transportation planning methodologies during the past three decades has been at urban and statewide system levels, rather than on urban and statewide multimodal system planning•

• There is a wide divergence of opinion on how to solve urban and rural transportation problems, but the common aim is to search for the best solution given the resources available. Land use and transportation planning studies have been conducted according to more or less standard procedures and methodology in most major cities of the developed world since the 1950s• This remarkably uniform methodology, consisting of the five-step sequential models of land use, trip generation, trip distribution, modal split, and traffic assignment, has been referred to as the conventional transportation planning process (Black-1981)•

• In his effort to build up a National Transportation Planning Methodology, where a system approach was adopted, Kanafani(1982) had pointed out that this effort should be integrated with economic and social planning• Furthermore, he said that a transportation plan does not ensure economic and social development, and that it should depend greatly on inputs provided by the national development plan: also that, a national transportation plan does not involve the feasibility analysis of specific individual transportation projects, although it does provide the basic criteria to be used for such an evaluation•

2.3. Air Transport Industry - Airports:

2.3.1. Airport definitions:

• Within an urban study, done by Reitel(1974), where the roles of airports within urban development had been examined, he said: "The fact that whether or not a city has got its own airport, that makes a tremendous difference for its own development• Furthermore, a metropolitan area which has got its own international airport, is assured a faster development in comparison with any other even bigger metropolitan area"•

• De Neufville(1976) has defined an airport as been part of a complex economic and social system• Like highways and other forms of transport, they constitute important elements of the infrastructure of a nation• To the extent that they influence the pattern and speed of regional development, a purely technical approach to their design is inadequate•

• Bastié(1980), recognized that: "Airports are also responsible for what is called a peripheral urbanization of metropolitan areas"•

• Yu(1982) said that: "The airport is the key element in air transportation• It encompasses a variety of air and ground activities• The growth of aviation and the consequent environmental, land use, and ground access problems of modern air facilities must focus a great deal of attention on the efficiency of the airport system"•

• Horonjeff(1983) said that:"An airport encompasses a wide range of activities which have different and often conflicting requirements• Yet they are interdependent so that a single activity may limit the capacity of the entire complex• In the past airport master plans were developed on the basis of the local aviation needs• In more recent times these plans have been integrated into an airport system plan which assessed not only the needs at a specific airport site, but also the overall needs of the system of airports which service an area, region, state or country• If future airport planning efforts are to be successful, they must be founded on guide-lines established on the basis of comprehensive airport system and master plans•

• According to Ashford(1984a): "The airport forms an essential part of the air transport system, because it is the physical site at which a modal transfer of transport is made from the air mode to land modes, and vice versa• Therefore, it is the point of interaction of the three major components of the air transport system":

1. The airport, including the airway control system•
2. The airline•
3. The user•

• Furthermore, Ashford(1984a), says that: "The planning and operation of airports must, if they are to be successful, take into account the interaction of these above three major components or system actors"•

2.3.2. Origin of Airports:

• Paralleling and preceding the airport development were the first airlines• The basic principles of flight are generally thought to have been stablished by Sir George Cayley• The world's first airline flights were made in Germany in 1910 by the huge airships of the Zeppelin Company• Before World War I, they had carried over 35.000 passengers between Berlin and Lake Constance• The bomber built by Handley-Page in 1918 was perhaps the first large-scale aircraft to be used commercially when it was converted to carry twelve passengers• The first attempt to operate a regular passenger service came in 1914 in Florida with the Tampa-St. Petersburg Airboat Line which flew passengers across Tampa Bay by means of a Benoist flying boat• During four months, a total of 1.200 passengers was carried on two flights a day• Despite proven efficiency of rail and other types of transportation, a small percentage of the traveling population enable subsidized air transport to gain a foothold in the early 1920's• The first airline services were also sustained in spite of low cruising speeds, unreliability, and weather considerations• Novelty, perhaps, was one of the more important aids keeping air transport in motion•

• With the coming of air transportation, new horizons in commerce, communication, leisure, and social contact had been thrown open to large numbers of ordinary people• The years between 1930 and the outbreak of World War II saw the development of a host of primary airports, served mainly by all-metal DC-2s and DC-3s and DH-89s in Europe• Although air transportation networks were rapidly expanding and passenger numbers burgeoning with an increasingly sophisticated public, the requirements and services demanded of the airport interface by the traveling public were modest• In an era when air hostesses were a novelty and carriers and operators fought for economic survival, the airlines did well to provide basic transportation• Because the air-traveling public was a small group, criticism was scarce• Indeed, the local airport, with its airfield laid out along the lines of a wind rose, was a source of pride for a community, in contrast to the NIMBY (not in my back yard) syndrome,which is clearly expressed now by communities (Mc Artor-1988)• It was the smallness of the air transportation industry, coupled with the unforeseen changes in aircraft, which to a great extent obscured the problems that would multiply in the future years with increased traffic to plague major airports and airport environments•

2.3.3. Airport Classification:

• It is important to know the formal classification of Airports from different sources in order to be familiar with the terminology applied within the Air Transport Industry• A classification of airport types for planning purposes will include three basic types, each serving a different need and each bearing a different relationship to the community• According to Blankenship(1974) the basic types are:

A. The community or short-range airport: Designed for movement of light or short-range aircraft• Types of aircraft may be divided by use into public and semi-public, such as those for chartered service, scheduled service, air-taxi, courier, and flight schools, and private such as individual community, pleasure, and business•

B. The metropolitan or intermediate-range airport: Is the most common in use today as it serves feeder, trunk, and regional airlines• A very large metropolitan area may need several intermediate-range airports to service the peculiar requirements of its commercial, industrial, and residential areas•

C. The intercontinental or long-range airport: Is the classification which implies the use of the heaviest, fastest aircraft engaged in long-distance travel• Although this type of airport handles a specific type of traffic, it also is not immediate problems regarding location• Land use in the area adjacent to this type of airport requires careful planning considerations•

• In Ashford(1982) airports were classified in four categories, accordingly to the U.S. National Airport System Planning (NASP), as follows:

1. Air Carrier: Where the airport should be served regularly by an airline holding a certificate of public convenience and necessity•

2. Commuter Service: Where the airport should:

a. Be served regularly by a Civil Aeronautics Board (CAB) registered passenger-carrying commuter air carrier•

b. Annual emplanement of not less than 2.500 passengers by commuter air carriers, taxi operatins, and intrastate carriers•

c. Not be served regularly by a certified carrier•

3. Reliever: The primary function of the reliever airport should be to relieve some air carrier airport from general aviation activity• It should have an activity level of at least 50 based aircraft, 25.000 itinerant operations, or 35.000 local operations• The reliever airport should be operating at 60% of its capacity, at least, and should either serve a standard metropolitan statistical area (SMSA) of 500.000 population or should have 250.000 annual emplanements•

4. General Aviation: These airport must satisfy one of the following itens:

a. Be receiving U.S. mail service•
b. Have significant military activity•
c. Be of significant national interest•
d. Be a general aviation heliport with more than 400 itinerant operations by air taxi, or more than 800 itinerant operations, or have four based aircraft•

• Furthermore, the U.S. Federal Aviation Administration (FAA) has a functional classification of airports as follows:

A. Primary System: Have more than 1.000.000 enplaned passenger/year/:

A.1. High density (**P1**): More than 350.000 aircraft operations/year•
A.2. Medium density (**P2**): 250.000 to 350.000 aircraft operations/year•
A.3. Low density (**P3**): Less than 250.000 aircraft operations/year•

B. Secondary system: Have 50.000 to 1.000.000 enplaned passengers/year:

B.1. High density (**S1**): More than 250.000 aircraft operations/year•
B.2. Medium density (**S2**): 100.000 to 250.000 aircraft operations/year•
B.3. Low density (**S3**): Less than 100.000 aircraft operations/year•

C. Feeder system: Have less than 50.000 enplaned passengers/year:

C.1. High density (**F1**): More than 100.000 aircraft operations/year•
C.2. Medium density (**F2**): 20.000 to 100.000 aircraft operations/year•
C.3. Low density (**F3**): Less than 20.000 aircraft operations/year•

• In Ashford(1984b) the following airport functional classification was given:

1. **Commercial Service Primary Airport:** A public airport that receives scheduled service and enplanes 0.01% or more of total annual emplanements of all commercial service airports• Which, in 1982 was the equivalent to approximately 31.000 emplanements•

2. **Other Commercial Service Airport:** A public airport receiving scheduled service and enplaning 2.500 or more annual passenger emplanments, but less than the 0.01% required for the primary category•

3. **Reliever Airport:** An airport designated as having the function of relieving congestion at a commercial service airport and providing more general aviation access to the overall community•

4. **Public Airport:** Any other public airport• This classification equals basically the old General Aviation Class given by Ashford(1982)•

5. **Reliever Heliport:** A heliport designated as having the function of relieving congestion at a commercial airport by diverting potential fixed-wing enplaned passengers to helicopter carriers•

• As far as operational classification is concerned the airports are classified into **utility** and **transport** airports, accordingly to the size and performance characteristics of aircraft using the facility, and they can be defined, as follows:

1. **Utility Airports:** These airports serve general aviation aircraft and are generally suitable for lightweight airplanes with approach speeds of 120 knots or less:

1.1. **Basic Utility Stage I:** This type of facility accommodates approximately 75% of single-engine and small twin-engine airplanes under 12.500 pounds•

1.2. **Basic Utility Stage II:** This type of airport accommodates the same fleet of aircraft suite to Basic Stage I airports plus a broader array of small business and air-taxi type twin-engine airplanes• Basic utility airports are designed to serve airplanes with wing-spans of less than 49 feet, and precision approach operations are not anticipated for this class of airports•

1.3. General Utility Stage I: They are primarily intended to serve the fringe of metropolitan areas or large, remote communities• They were designed to accommodate all aircraft of less than 12.500 pounds• They are designed for aircraft with wing-spans of less than 49 feet and are not intended to accommodate precision approach operations•

1.4. General Utility Stage II: This class of airports accommodate airplanes with approach speeds up to 120 knots, and are designed to serve airplanes with wing-spans of up to 79 feet• They usually have the capabilities for precision approach operations•

2. Transport Airports: They accommodate or are expected to accommodate, airplanes with approach speeds of more than 120 knots, and are usually capable of accommodating turbojet-powered aircraft• Many of these airports are served by air carriers, while others accommodate only general aviation aircraft•

2.3.4. Airport Functional Structure:

• Airports are part of a system that is not only national but international, and its activities are generally regarded to be composed of systems and subsystems• Airports can be composed of different areas which will receive different denominations depending upon the purpose of the definition, for example; for planning reasons, for operational characteristics identification, and for environmental policy purposes• Definition of Airports functional structure may also depend upon the main point of reference to which the Airport is looked at• According to Hart(1985), for the purpose of identifying the location of functions, an airport can be considered to consist of three areas mainly:

1. **The airside•**
2. **The landside•**
3. **The airspace•**

1. The airside: Comprising the runway and taxiway system• Related to the basic airport types, there are three basic airfield types:

1.1 Single linear runway, or linear parallel runways: In the linear layout the aircraft moves from the surface into the air in the simplest fashion possible, with a minimum of backtracking and recirculation over taxiways• This type of layout usually makes economic use of travel time, as well as requirements of ground space• Runway lengths are approximately 8.000 feet• In this layout if parallel runways with approximately 5.000 to 6.000 feet or more of separation between them are used, independent landings and take-offs are also possible• Although, operationally only 4.300 feet is required for simultaneous independent take-offs and landings under Instrument Flight Rule (IFR) conditions• Nevertheless, the FAA's airport capacity programme, at the moment has been testing the efficacy of quick scan sensor systems to safe simultaneous operations on parallel runways as close as 2.500 feet apart (Mc Artor-1988)• Expansion capability of the terminal complex under this circumstances are almost unlimited, and the airport, when fully completed, will be able to handle large volumes of passengers, perhaps, 25 to 35 million emplanements annually•

1.2. Cross runway: The cross runway airfield configuration, as the name suggests, is composed of two operating runways which intersect at some point depending on a variety of factors• The angle between them may be as obtuse or as acute as meteorological, geological, environmental or other external conditions demand of the configuration• Although this type of airfield configuration is quite common both in Europe an in the United States, the peak hour capacity of the airfield is usually restricted by the very fact that the runways do intersect• Landings on one runway and take-offs on the other are now possible due to heavier, faster jets which are not easily affected by crosswinds• Such operations, however, must alternate and may not be simultaneous as in the linear parallel runways configuration• This airport, given certain traffic characteristics and air traffic control capability, can handle volumes of 5 to 12 million emplanements annually•

1.3. Concentric runway: In this configuration, taxiways emanate from the central area to the runways which usually enclose the terminal area totally or partially• Most airfields which began as simple single or cross runway arrangements evolved into concentric forms as they expanded to accommodate shifts in wind directions or greater coverage• This is done as additional runways are added parallel or intersecting with existing ones, usually forming a ring around the terminal building•

2. The landside: The airport landside is the conglomerate of considerations encompassing everything from the effects of noise and air pollution on local property values to the modes of airport access to the terminal• Arrangement of airside and landside systems can occur in numerous variations• Size and configuration of the runway system are determinant factors• The airport landside is divided into two areas mainly:

2.1. Area 1: Comprising the aircraft apron, terminal, ground transportation systems, and auto parking• During the past 10 years, a general understanding has been reached that the link that connects an aircraft gate configuration with a terminal is the dominant feature by which each terminal concept can be identified, as follows:

2.1.1. Satellite Concept: Aircrafts are parked in a cluster surrounding a structure that is connected to the main terminal by a corridor or concourse positioned below, or above grade•

2.1.2. Pier Concept: Aircraft are parked in a line at either side of a connecting corridor or concourse attached to the main terminal• The Pier Concept can be arranged in various configurations, as follows:

2.1.2.1. "Y" Configuration: This geometry may be used when a terminal complex is surrounded by multidirectional runways/taxiways•

2.1.2.2. "T" or Hammerhead: This geometry is sometimes used to create additional gates at the end of a pier, when maximization of the terminal unit is preferred over the construction of an additional unit•

2.1.2.3. Multiple Parallel or Radial Piers: These solutions are used with the objective of shortening walking distances in the terminal between piers•

2.1.3. Linear Concept: Aircrafts are parked in a single line at a corridor or concourse connecting with other functional elements of the terminal•

2.1.4. Transport Concept: It involves separating aircraft positions from the main terminal and using a connecting vehicle to transport passengers to and from aircraft•

2.2. Area 2: Comprised by basic supporting facilities as follows:

- Air Traffic Control (ATC)
- Hangars
- Airfreight terminals
- Catering
- Air mail
- Fuel farms
- Crash/Fire/Rescue (CFR)
- Fixed-Base Operations (FBO)
- General Aviation (GA)
- Hotel
- Car rental operations

3. The airspace: Used for take-offs and landings extends airport boundaries and can be considered a third area• The use of airspace, composed of routes, holding patterns, and approach and control zones, provides the link so vital in a total air transportation system among airports serving different regions, countries, and continents•

- In Ashford(1982) an airspace are either designated, controlled or uncontrolled areas, as follows:

A. Uncontrolled airspace: Where flights may be conducted without reference to air traffic control although pilots are expected to conform to certain general rules of the air, and to some rules that are dependent on prevailing conditions of visibility and cloud coverage•

B. Controlled airspace: Which has various dimensions depending on whether it is an airway, a terminal control area, or a control zone, and pilots must communicate with the appropriate air traffic control facility in order to receive authorization to fly through their controlled space• Basically, the controlled airspace is extended upward from 700 feet above ground level (AGL), and, in a few areas from 1.200 feet•

• More specifically, in Ashford(1984b) the following definitions for airspace areas have been given:

B.1. Positive Control Areas: Above 18.000 feet mean sea level (MSL), all aircraft are controlled by continuous surveillance and are required to have certain equipment to permit the higher aircraft densities of the higher performance aircraft• As Horonjeff(1983) has defined: "Positive Control Airspace usually encompasses the airspace where high-speed jet aircraft operate• Therefore it can include the airspace in the vicinity or airports, called the terminal control area (TCA)"

B.2. Continental Control Area: That area has been designated above 14.500 feet MSL, and is an area of great airspace utilization and safety• Also called en route controlled areas or airways•

B.3. Terminal Control Areas: Which are designated around major aviation hub areas to impose special operating requirements on all flights in this space•

B.4. Restricted Areas and Warning Areas: Areas designated for caution flight operations due to weapons range, and intense air traffic or student pilot training•

B.5. Control Areas and Transition Areas: Is the area designated between the airway and the approach control area or TCA•

• After approach operation, an aircraft uses the runway, taxiway, and apron prior to docking at a gate position where its payload is processed through the terminal to the access/egress system, according to Ashford(1984a), from where FIGURE 2.3.4.-1 has been produced to represent the Airport System General Flow•

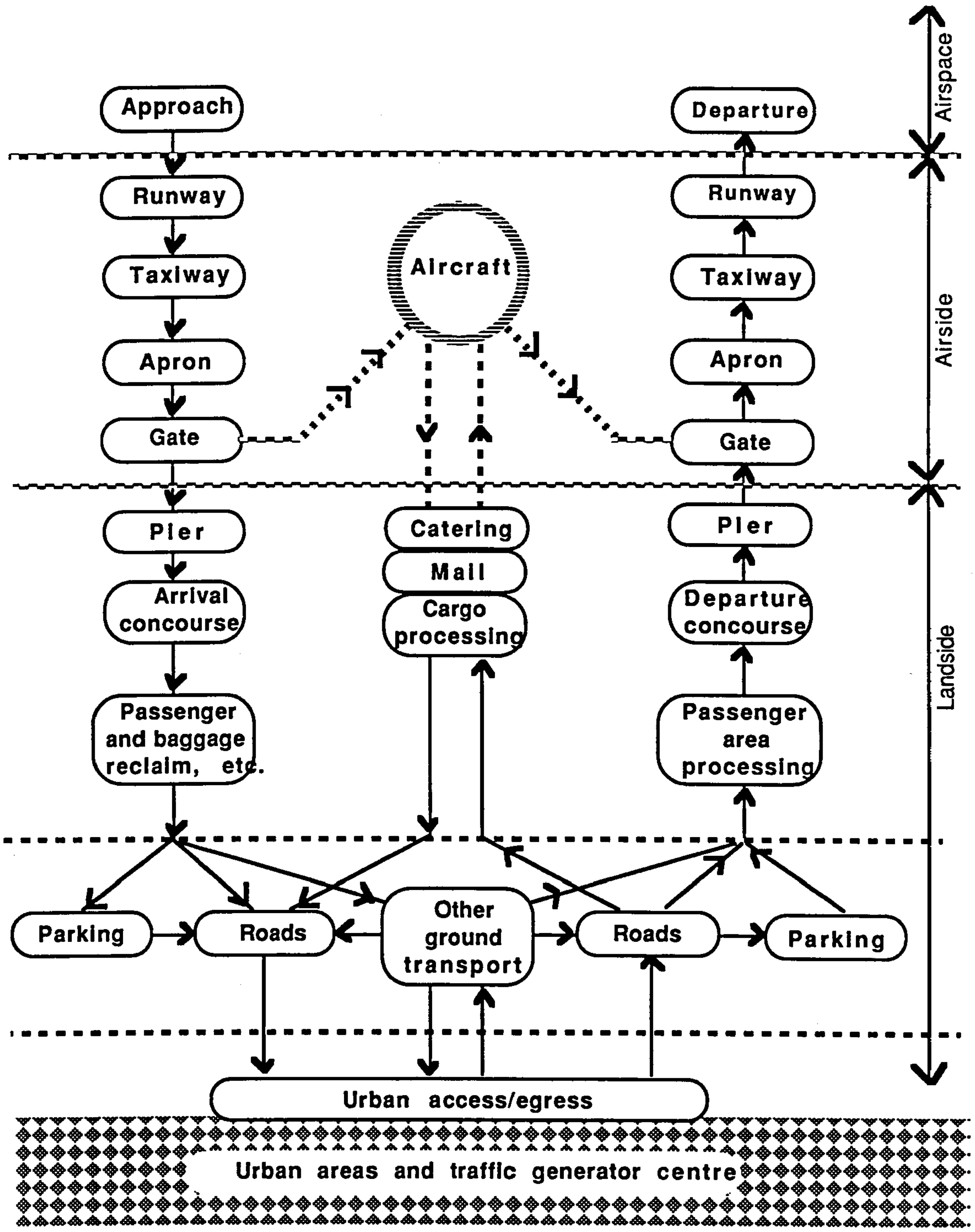


FIGURE 2.3.4.-1
AIRPORT SYSTEM GENERAL FLOW
based on the original
(The airport system-Ashford-1984a)

2.3.5. Airport Planning Boundaries:

- In the past, insensitive approaches to airport expansion following increases in demand for aviation activity have greatly harmed the image of commercial air transportation• Such difficulties have been made manifest in recent years by the inability of experts to resolve the differences of all involved parties in locating new airports• The increasing mobility of persons and goods has tended to disperse residential, manufacturing, and trade activities into the outskirts of metropolitan regions• Major traffic flow in a metropolitan area is between the central urban core and its extending periphery• Ideally, to function as an integral part of the transportation system, the airport should be located near existing or proposed automobile, truck, and rail routes and be directly accessible to them• Theoretically, the airport should also be located as close as possible to its centre of demand, usually the metropolitan area, in order to be easily reached by all the residents of the region• The closer the airport is to the city, however, the greater the problems of successful integration become•

- Because studies of airway traffic patterns and ground-air access routes are important to the success of an airport and the community surrounding it, the planning of an airport facilities network should be an organic part of the regional development plan• A reshaping of the urban structure is needed if the air transportation system is to be meritorious in the metropolitan region• Clearer concepts of the optimum pattern of airports and airways would aid this reshaping• Air terminal land reservation or purchase, plus adequate control over areas within its influence, require effective planning at the regional level•

- According to Blankenship(1974) there are three important steps in the creation of any regional development plan:

1. Collection of all pertinent facts and knowledge•
2. Analysis of the data collected to establish basic interrelationships, future needs, and planning criteria•
3. Application of the data and use of the criteria in preparation of a master plan for the urban area•

- According to Hart(1985) an airport master plan must include basically the following parts:

1. A complete documentation of existing and proposed airport development, supported by traffic forecasts• Plan development, acceptance, and implementation involve all levels of government, aircraft manufactures, airport management, airlines, air travellers, shippers, and very importantly, representatives of surrounding communities•

2. An airport layout plan•

3. A land-use plan incorporating land use compatibility showing effects and consequences on the environment• For aviation purposes, land use plans must show obstruction clearances, areas for industrial, commercial, and agricultural use, and buffer zones within airport boundaries• Outside the airport boundaries, land use plans must show areas for obstruction clearances, areas with noise exposure, and location of navigational aids• Airport compatibility with surrounding communities, like residential, industrial and agricultural, must be analyzed and documented•

4. An airport noise compatibility program• The development of a noise compatibility program is a very complex problem and can be a major undertaking at a large airport•

• Although its problems seem to diverge at many points from those of the area master plan, the planning of the airport cannot be carried on independently• The areas of inter-dependence are too important, and because of their alignment of interests, the area master plan and the airport plan need to be developed collaterally• The comprehensiveness of the final plan will be determined by the scope of information collected• The areas generally covered are population, land use, physical, climatic and economic conditions•

• As Horonjeff(1983) has pointed out: "Planning of an airport is such a complex process that the analysis of one activity without regard to the effect on the other activities will not provide acceptable solutions• An airport encompasses a wide range of activities which have different and often conflicting requirements" FIGURE 2.3.5.-1•

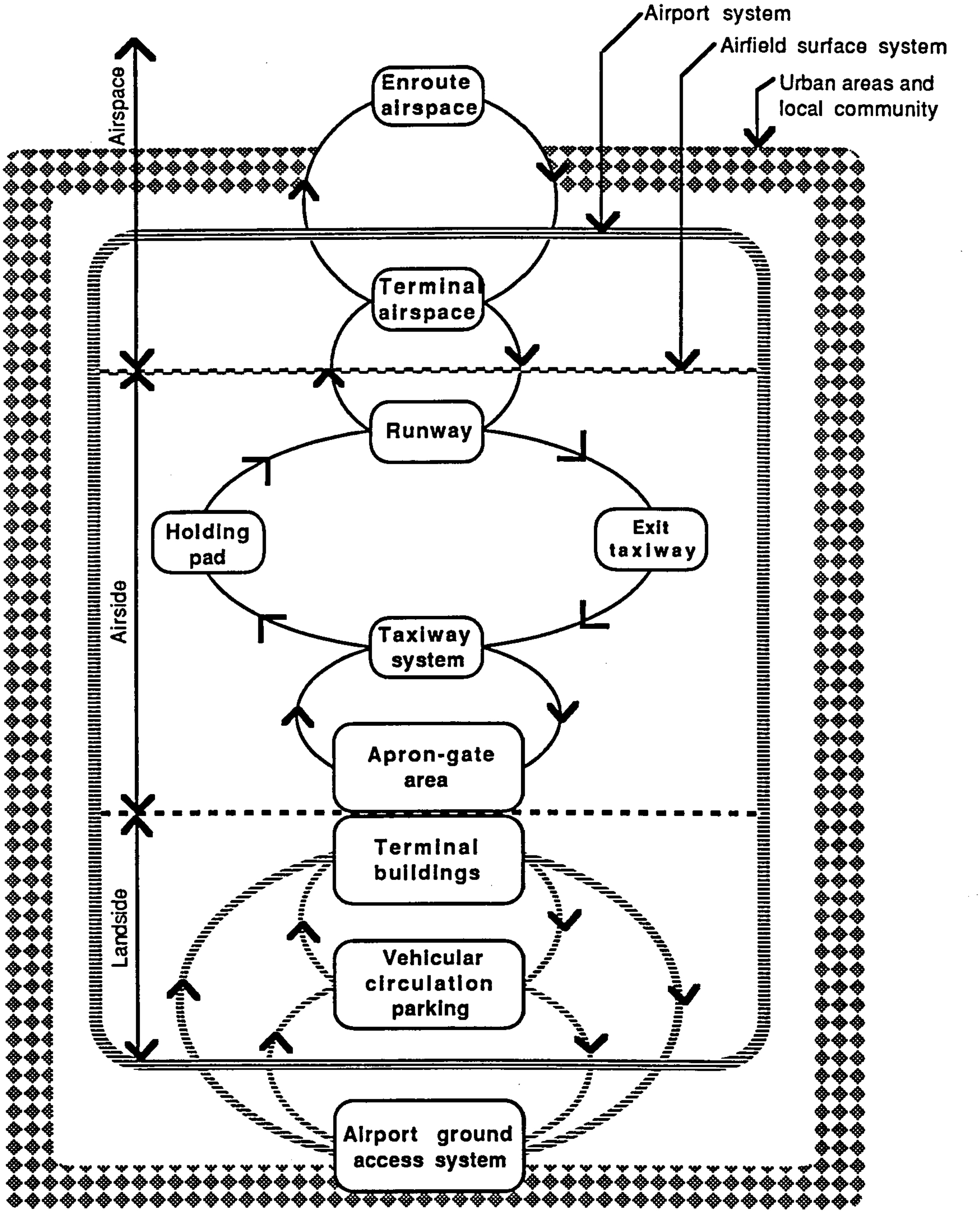


FIGURE 2.3.5.-1
AIRPORT PLANNING BOUNDARIES
Based on the original
(Components of the airport system for a large airport)
(Horonjeff-1983)

• According to Hart(1985), a demand forecast is based on statistical analysis and historical data trends that are projected into the future• The procedure is not simply mathematical, because there are so many variables to be considered• Forces such as demographic, economic, political, and geographic must be reviewed• Past and future influences must be measured• This can be accomplished by using existing economic forecasting models and introducing the results as input for the forecast model• A partial list of subjects to be considered, are as follows:

A. Demographic Growth Forces:

Population-rate of growth
Education
Energy
Fuel sources
Space technology

B. Economic Growth Forces:

Gross national product
Employment
Personal income
Inflation, cost of living
Public policy
Taxes

C. Political Growth Forces:

Government
National priorities
Leisure time-personal travel
Curfews

D. Geography:

Environmental conditions
Resorts, tourist attractions
Travel

E. Market Demand:

Technological
Governmental
Market elasticity

• With the use of different terminology the FAA describes the objectives of the airport master plan as follows:

1. To provide an effective graphical presentation of the ultimate development of the airport and of the anticipated land use adjacent to the airport•

2. To establish a schedule of priorities and phasing for the various improvements proposed in the plan•

3. To present the pertinent back-up information and data which were essential to the development of the master plan•

4. To describe the various concepts and alternatives which were considered in the establishment of the proposed plan•

5. To provide the various concepts and alternatives which were considered in the establishment of the proposed plan•

• The FAA also recommends a planning procedure which consists basically of four separate phases, as follows:

Phase I- Airport Requirements: Essentially, the first phase is an examination of the scale and timing of new facilities with respect to the anticipated demand; the status of existing facilities is described in the context of anticipated environmental implications•

Phase II- Site Selection: Once a prima facie case for the construction of a new airport or the major expansion of existing facilities has been established, the second phase begins• Evaluation of the available sites should include study of airspace requirements, environmental impact, development, access, availability of utilities, land costs and availability, site development costs, and political implications•

Phase III- Airport Plans: After the site for the location of a new airport or the area of expansion of an existing facility has been selected, the proposed facility is represented precisely with respect to the following points:

1. The Airport Layout Plan: Indicates the configuration, location, and size of all physical facilities.

2. The Land Use Plan: Details land use within the proposed airport boundary and shows the land use of areas outside the boundary that are affected by the siting of the airport•

3. Terminal Area Plans: Show the size and location of the various buildings and activity areas within the terminal area complex•

4. Airport Access Plans: Show proposed routings for the various access modes to the transportation infrastructure for the region•

Phase IV- The Financial Plan: The final phase involves collecting data in the four principal areas of financial importance:

1. Schedules of Proposed Development: Indicate the short, intermediate, and long term stagings of development, timed to coincide with demand estimates•

2. Estimates of Development Costs: Staged to conform to the scheduled development strategy•

3. Economic Feasibility Analysis: Examines whether the expected revenue generation will cover the anticipated costs•

4. Financial Feasibility Analysis: Undertaken to determine whether the scale of facility under consideration can be financed within the fiscal capability of the authority involved• A further complete breakdown of the four phases is provided by FAA•

• "To anyone remembering the first airports, a planning criterion for a modern airport must appear excessively complex• Early airports presented few of the problems that concern us today• All that was need was a well-placed landing strip on fairly level ground or a body of water sheltered from the elements, and the physical problem of the airport's planning were for the moment solved• Today, however, detailed discussions of the major effects resulting from a particular terminal configuration or airport location are needed• The extent of present and or future patterns of regional air traffic demand growth, and the subsequent airport location are critical in the development of a "new airport" (Blankenship-1974)•

• Originally, the size of airports was determined primarily by runway lengths, taxiway systems, clear zones and space to accommodate the apron terminal and support facilities• Today, however new airports may require much larger land areas with zoning to protect against noise and future urban encroachment• Many airports have been built in the vicinity of population centres in order to ensure reasonable short distances for ground transportation•

• The procurement of large land areas for new airports and for the expansion of runway/taxiway systems within or beyond existing airport boundaries has become increasingly difficult to achieve• Therefore, existing airport capacity should be considered of precious economic value, and any diminishing of the existing capacity, because of perceived constraints on airport landside elements, should be treated with the greatest of caution•

• The design of an airport landside is not a clearly defined engineering problem• The landside facilities, comprised of the terminal complex including automobile parking, and its design solutions may be capital intensive and the main cause of constraint• The proportions of airside to landside to total airport areas relative to the volumes of originating/terminating and total annual emplanements vary widely among airports• Ground access systems from outside the airport may be constrained by a number of factors, such as tunnels, restrictions in number of traffic lanes and traffic interchanges•

• The design of the airside is basically an engineering problem which requires great professional skills and experience• Analysis of airfield capacity can be complex process, involving capacity delay analysis techniques• Land use requirements for the airside can be well defined, basically, and future needs can be established from well documented criteria published by the International Civil Aviation Organization (ICAO), documented in conventions, annexes, manuals, procedures, digests, and reports, and by the Federal Aviation Administration (FAA), a branch of the U.S. Department of Transportation (DOT), in the form of Federal Aviation Regulations (FAR) and Advisory Circulars (AC)•

Detailed information on airport system planning can also be found in the extensive list of references contained in Blankenship(1974), De Neufville(1976), Horonjeff(1983), Yu(1982), Ashford(1982), Ashford(1984a), Ashford(1984b), and Hart(1985)• To conclude the list, the Air Transport Association of America (ATA) has developed a very useful publication specially for airport planning purposes•

2.3.6. Airport Trend:

• The airport trend is largely dependent upon aircraft technology development and vice versa, but there is a large space for improvements concerning to airports itself• Nevertheless, instead of thinking of an isolated airport to serve a specific city with a variety of aircraft, it is absolutely necessary to begin thinking of airports and airways in systemic terms, assessing each piece in relation to the full range of human needs served by air commerce• To respond to future challenge, it must be thought systematically of the factors - human, equipment and procedural, that must be integrated to enhance the efficiency of several operation•

• According to Blankenship(1974) the air transportation industry has been evaluating the applicability of aircraft STOL "short-take-of(and)-landing" and aircraft VTOL "vertical-take-of(and)-landing"• Rapid, high-density urbanization is propelling the introduction of passenger VTOL aircraft to solve the traditional blocks that a passenger encounters when using rapid transit systems• Whether singly or together, V/STOL seem certain to be linked to the future of air travel, largely because of three features: increased safety in take-off and landing, increased flexibility of operation, improved economics and effectiveness• V/STOL aircraft offer the potential of new flight paths and operation in adverse weather• V/STOL aircraft present the following points as compared to conventional take-off and landing aircraft and facilities:

1. Just to mention in the U.S.A., some 9.000 or more minor airports could have introduced commercial traffic in their operations if V/STO aircraft were used•

2. V/STOL aircraft are potentially the sole vehicle for an entire air trip, eliminating the intermediate journey from airport to centre-city•

3. A new V/STOL port requires, at the outside, three years for construction, while a new jet-port requires five to seven years for completion•

4. Different flight contours for V/STOL will potentially reduce congestion in the air•

5. Due to different flight characteristics at take-off and landing, V/STOL make possible more direct routing between airports•

6. V/STOL offer avoidance of adverse effects on the environmental standards of the community• They offer noise concentration in a more confined area and generate their greatest noise energy output high enough above the area of the community to avoid disturbance•

7. From the economic point of view, V/STOL offer a massive saving in future land use if existing airports are utilized, and in the need for the proliferation of airports around large cities• It is possible that the reduction in investment in conventional take-off and landing airports in the early years of V/STOL operation could pay for V/STOL aircraft development and their associated transport system•

8. Another flexibility characteristic of V/STOL aircraft is the possibility of introducing the aircraft into controlled terminal zone airspace independent of the CTOL networks•

9. Due to their design, V/STOL aircraft allow low velocities in the ground contact phase of landing, the resulting landing task is theoretically much easier•

10. As the majority of aircraft accidents occur in take-off and landing, particularly in bad weather conditions, the jet V/STOL offers the potential of maximal safety and minimal runway accidents•

• In the meanwhile the 1987-version of the U.S.A. National Airspace System Plan included many technologies to improve airport operations in terms of safety as well as efficiency, as for example; the improvement of the airport surface detection equipment(A.S.D.E.-3) to strengthen monitoring of aircraft movements on runways and taxiways; the installation of airport surveillance radar(A.S.R.-9) to improve monitoring of adjacent airspace and enhance communications between the airport traffic control tower and the cockpit; the efficacy of quick scan sensor system to monitor aircraft in order to provide for safe simultaneous operations on parallel runways as close as 2.500ft apart; the microwave landing system(M.L.S.) to increase flexibility for landings and to provide extra margin for safety in the event of simultaneous missed approaches•

• Recognizing the opposition that airport development encounters near densely-populated cities, some people have advocated building remote transfer airports, also known as wayports or superports, in isolated areas• These huge facilities would be designed to serve nearly exclusively as hubs, with a great deal of trading of passengers and cargo between aircraft, but with relatively few originating flights, and even fewer system users treating the airport as a destination• Remote transfer airports could be built in strategic points within places of the continental land or along coasts of different Continental Countries, where landing facilities might be constructed as extensions of the land mass reaching out into the sea• In the United States and Europe, many large cities no longer have an accessible supply of local land on which to develop a remote transfer airport, at least not at a price within the budget of most airport authorities• At the same time, few city-pairs regularly justify a requirement for aircraft carrying more than one hundred passengers each hour• The key to resolving this need for point-to-point service involves developing aircraft that make less demand on space for take-offs, landings, and serving passengers, even while they provide a capacity to serve enough people to cover the cost of operations at prices the passengers are willing to pay•

• The U.S. Department of Defense has been developing a tilt-rotor aircraft to serve military needs, and several branches of the U.S. armed forces are proceeding with procurement of the V-22 Osprey, produced by Bell Textron and the Boeing Corporation• The F.A.A. has received encouraging signals from industry, but they are confronted with the perennial chicken-and-egg question of aviation development, for without a viable aircraft, no one can assess the potential market with precision• At the same time, without a well-defined market, there are very few incentives for dedicating investment to an aircraft that might not have great demand• The F.A.A. will take steps to remove unnecessary obstacles from the path to certification for the tilt-rotor, since they provide one indication of opportunities in aviation services for urban areas, and in many other areas, for example; the tilt-rotor will be able to use different kinds of landing facilities, whether at current airports that are closed to cities, or at special facilities that could be built near central city sites• Assuming that a tilt-rotor carried about thirty passengers, it would not need the baggage facilities designed to accommodate 400 passengers on a wide-bodied jet• More important, it could land on a large helipad, reducing land requirements from several miles of runway and taxiway to less than the size of a city block• Indeed, tilt-rotor-craft, at some future point, might be society's most advantageous link between remote transfer airports and cities that are relatively nearby•

• Socially, then, the opportunities for continued innovation in aviation are there, technically, it has been moved closer to solutions to problems with each passing day• Analytically, the capacity to view the system from many perspectives and to conceive of ways in which new forms of airports and aircraft might enlarge services to the public• What remains are the political, legal, and economic challenges•

2.4. General Systems Theory:

2.4.1. Systems Definitions:

• The Oxford English Dictionary formally defines a system as: "*A complex whole, a set of connected things or parts, a department of knowledge or belief considered as an organized whole* "• Whereas, Hall and Fagen(1956) gave the following system definition:

"*A system is a set of objects together with relationships between the objects and between their attributes* "

• They also define "*objects* ", "*attributes* ", and "*relationships* ", as follows:

Objects: are the parts or components of a system, which are unlimited in variety...admitted are abstract objects such as mathematical variables, equations, rules, laws, and processes•

Attributes: are properties of objects•
Relationships: are those that "tie the system together•

• Optner(1965) has elaborated the above definition somewhat, and filled out some of its apparent vagueness:

Objects: are the parameters of systems: the parameters of systems are input, process, output, feedback control, and a restriction• Each system parameter may take a variety of values to describe a system state•

Attributes: are the properties of object parameters• A property is an external manifestation of the way in which an object is known, observed, or introduced in a process• Attributes characterize the parameters of systems, making possible the assignment of a value and a dimensional description• The attributes of objects may be altered as a result of system operation•

Relationships: are the bonds that link objects and attributes in the system process• Relationships are postulated among all system elements, among systems and sub-systems, and between two or more sub-systems•

• von Bertalanffy, has also defined a system such as: "A complex of elements standing in interaction, within general principles holding for the system, irrespective of nature of the component elements and of the relations or forces between them"•

• Mesarovic(1964), has described a system also as a relation between an input to a process and its output, that is, there is a flow through a system of information, energy, or matter, which can be described as an input-output relationship, according to FIGURE 2.4.1.-1:

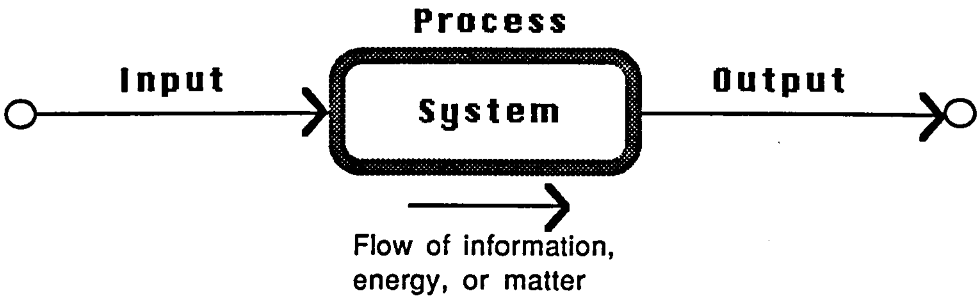


FIGURE 2.4.1.-1
SYSTEM CHARACTERISTICS

• This relationship can be extended to subsystems, for the inputs or outputs associated with one subsystem, which must be constrained to be equal, at a given time, to some of the inputs or outputs of the other subsystems comprising the system, FIGURE 2.4.1.-2 and FIGURE 2.4.1.-3:

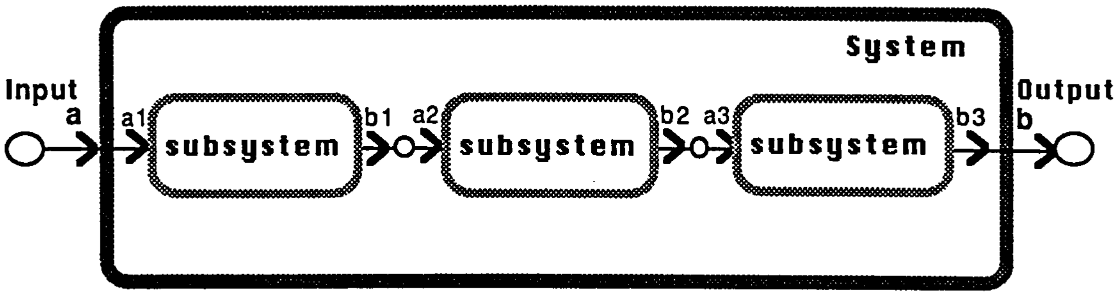


FIGURE 2.4.1.-2
A SIMPLE SYSTEM WITH INPUT (a) AND OUTPUT (b)

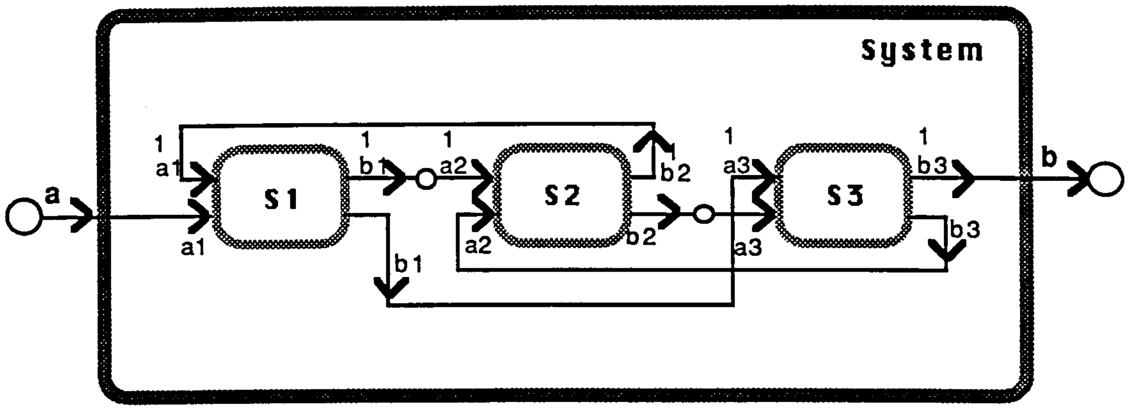


FIGURE 2.4.1.-3
A SYSTEM WITH FEEDBACK LOOPS

• Mesarovic(1964) also said that: "To specify a system, we need; the inputs, the outputs, the system phase, and a description (model) relating inputs, outputs, and system states in time"•

2.4.2. Origin of Systems:

• According to Chadwick(1978): "The idea of system came originally from biological science and from those electronic processes that simulate the interaction of biological organs, and the early development of systems thought is associated with the biologist Ludwig von Bertalanffy, especially that of General System Theory"•

• Quoting von Bertalanffy: "From the statements we have made, a tremendous perspective emerges, a vista towards a hitherto unsuspected unity of the conception of the world• Similar general principles have evolved everywhere, whether we are dealing with inanimate things, organisms, mental or social processes• What is the origin of these correspondences?• We answer this question by the claim for a new realm of science, which we call General System Theory• It is a logical-mathematical field, the subject matter of which is the formulation and derivation of those principles which hold for systems in general"•

• Following Chadwick: "Man is part of the ecology of the earth; a system of relationships between the earth, its atmosphere, its climate, its vegetation, and its inhabitants of all kinds, which is of great and beautiful complexity, and which is yet an everyday experience for all men"•

• Chadwick also expressed the following considerations: "Complex though these relationships are, we are accustomed to think in terms of certain sets of relationships when describing various situations; for example, we speak of celestial system at the largest end of the physical scale which we can conceive; we may also choose to describe an arrangement of very small particles as a system of atoms which make up a particular substance• Similarly, we might describe relationships between groups of animals and ecological system(eco-system), and these may differ in size and complexity, so that there may be sets of relationships, or in mathematical terminology, sub-sets and sets; because we are considering real and living things, rather than mathematical abstractions (although we can use these abstractions, in the right circumstances, to represent qualities of the real things, of course), we prefer to use the terminology of systems and sub-systems• This terminology has developed from origins in electrical engineering, biology and physiology, to a much wider scientific usage"•

• Boulding(1956) has pointed out in arranging systems in an order of hierarchical complexity, a system of systems perhaps, since our knowledge of even the simpler kinds of systems is still rudimentary; "In a form of a skeleton of science or a framework on which to hang the flesh and blood of particular disciplines in an orderly and coherent corpus of knowledge", such as:

1. **First level: The static structure;** of frameworks, by which he appears to mean a level of abstraction from dynamic systems of their structural relationships, e.g. "The Copernican revolution was really the discovery of a new static framework for the solar system which permitted a simpler description of its dynamics"•

2. **Second level: The simple dynamic system;** also called "clockworks", with the predetermined necessary motions; even stochastic dynamic systems leading to equilibria are examples•

3. **Third level: The cybernetics systems;** the province of homeostasis in physiology, mainly differing from the simple equilibrium system in that the transmission and interpretation of information is an essential part of the system•

4. **Fourth level: The self-maintaining structure or open system;** at a cell level•

5. **Fifth level: The genetic-societal level of the plant•**

6. **Sixth level: The animal level;** with increased mobility, teleological behaviour, and self-awareness•

7. **Seventh level: The human being as an individual system;** with self-awareness, and possessed of an image and an ability to produce, absorb, and interpret symbols•

8. **Eighth level: The social organization;** the human society•

9. **Nineth level: Transcendental** systems...perhaps?•

2.4.3. Systems Theory:

• According to Chadwick(1978), the concepts of systems theory are directly linked to the concepts of; "*information* ", "*variety* ", "*entropy* " and "*feedback* ", which make possible a convincing explanation of the growth, maintenance, changes, and possible decline, of those activities of man which go on in, and have caused him to built cities, to solve isolated transportation problems, and they also have helped to explain the relationships between cities and their regions•

1. Information: According to Raisbeck(1964) the development of Information Theory concerns itself with the transmission of information by communication systems• The first requirement of such a system is that there should be an information source; a sender, which sends a message from a transmitter through a channel to a receiver, using a common language• The unit of information is called a "bit", which is the smallest amount of information required for a binary choice, i.e.; "on" an "of" of "heads" and "tails", or "0" and "1"• Information is a property not intrinsic to any one message, but of a set of messages, just in the same way that a probability is derived from a set of occurrences or events and not from one event only•

2. Variety: Quoting Beer(1966), variety is simply the number of distinguishable elements within a set, and it depends entirely on what set the elements are thought to be parts of• Variety is measured conveniently by logarithms to base 2, and is thus expressible in bits• Variety in even a small system may thus be very large indeed, variety proliferating as more information is gained about the system, and thus uncertainty proliferating as well• The concept of variety is useful in comparing the complexity of systems, since "size" of systems is a matter of complexity rather than of physical measure•

3. Entropy: According to Chadwick(1978), from information theory's point of view, entropy is clearly a measure of information, and information is that which removes uncertainty, consequently, entropy is the measurement of the removal of uncertainty• Whereas, in physics, more precisely from thermodynamics's point of view, entropy is a measure of the disbalance of energy in a system, its disorder, or randomness of organization; as systems tend to move from a less to a more probable state, and the rate of its change of state is found to be proportional to the logarithm of the disbalance of probability existing at any one time• Despite the fact that both concepts may have the same mathematical expression (except for the signal), they are not necessarily related• A system gaining in entropy is also losing information, for when the system has reached maximum entropy it is, in fact, dead, and it has no more information to give• The maximum entropy solution to a problem is the most probable solution, in a sense•

4. Feedback: According to Wiener(1961), feedback is of fundamental importance in cybernetics, and essential to the process of control• Feedback can be seen firstly as a simple relationship between two elements of a system; a and **b**, thus: **a ---> b**, but that there is also "*feedback* " from **b** to a, which then can be described for the whole system by a <------> **b**• It is possible to identify deviation-controlling feedback, which is an error-correcting mechanism, and for this reason is called negative feedback (homeostasis)• There is also the deviation-amplifying feedback or positive feedback, where the expansion of the more highly organized parts of an ecosystem are made at the expense of the less organized parts (morphogenesis) FIGURE 2.4.3.-1•

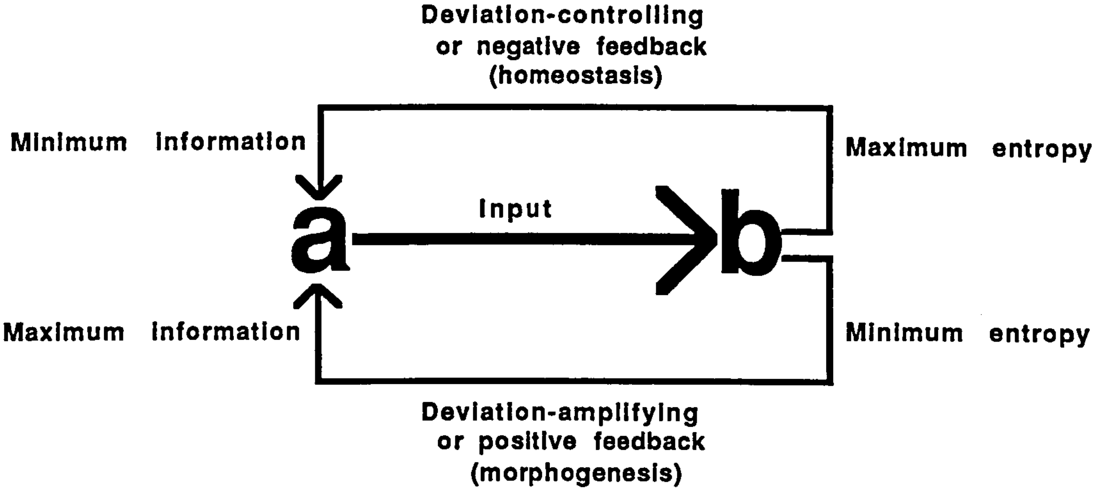


FIGURE 2.4.3.-1
FEEDBACK CONCEPT

2.4.4. Systems Structure:

• Chadwick(1978) gives the following list of "*scale* " of a system in relation to its parts:

1. **The environment of a system:** The set of all systems other than the one in which we are interested• We are never interested in the elements of the environment, otherwise we should have to include them in our defined system•

2. **The system itself:** Defined at a given resolution level•

3. **The subsystems of the system:** Parts of the whole which display a certain richness of intercommunication within which distinguishes them from other parts of the system as a whole, but which nevertheless are clearly part of the "*larger* " system•

4. **Elements of the system or components:** The "*smallest* " parts of the system, the lowest level of detail which is to be considered, since we are interested in their behaviour, but not their structure• In this sense, the elements of a system are "*black boxes* "• A "*black box* " may be regarded as a grouping of detailed matters, a set of operations of some sort is contained by a boundary which we either cannot or do not wish to penetrate•

• Mesarovic(1964) had considered the systems as having both a structure and a behaviour• In Klir and Valach's(1967) notation, a system is a set S made up of set A, which they term the universe of the system, and set **R**; called the characteristic of the system• Set A includes the structural relationships, and set **R** is concerned with the system behaviour• Alternatively, we can define a system by saying that:

"every set S = {A,R} constitutes a system"•

• However, the two aspects of structure and process are not separate, and in particular the structure of a system is not a static concept• In the words of Walter Buckley(1967) commenting upon the views of the anthropologist Evon Zogt, as posing "the primacy of change, considering structure to be the way in which moving reality is translated, for the observer, into an instantaneous and artificial observation• Social and cultural structures are only the intersections in time and space of process in course of change and development"•

• The FIGURE 2.4.4.-1, which was based on the original by Chadwick(1978), will help in the visualization of a system and its parts•

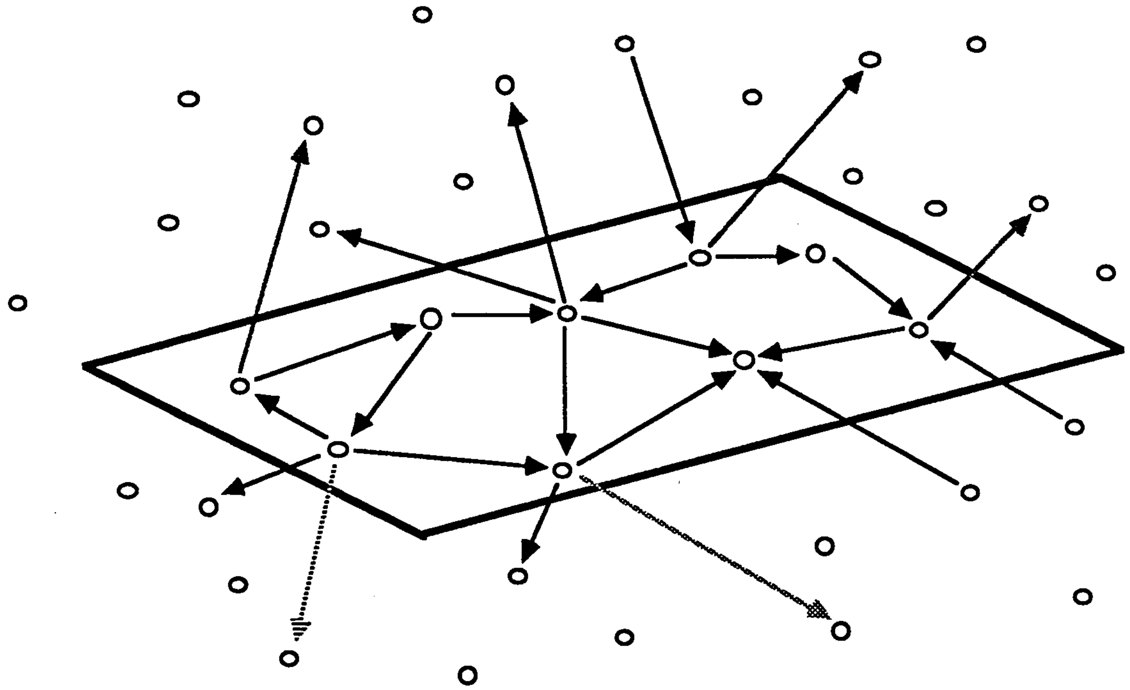


FIGURE 2.4.4.-1
THE DEFINITION OF A SYSTEM
(Based on the original from Chadwick-1978)

• Within the FIGURE 2.4.4.-1 is shown a large set of elements represented by circles, which may be regarded as black boxes• From this set of elements a smaller set, within the bounding line, is selected because of the relevant connections between the elements indicated• The arrows crossing the boundary are inputs to or outputs from the system• The broken arrows are further possible connections of interest but which are not included within the defined system•

2.4.5. Systems Classification:

- Ashby(1956) said that: "We define a system in accordance with our interests, and we can always lower or raise the resolution to define a "*bigger* " system or a "*smaller* " one, except when we are concerned with the largest or the smallest system of all"•

- Chadwick(1978) said that: "The idea of "*process* " is inherent in all systems, process at different levels• A system exists in relation to an environment, and the system may be "*open* " or "*closed* " in relation to that environment; that is, an "*open* " system is not isolated from its environment and its materials or energies or information are exchanged with the environment in a regular manner• A system is "*closed* " if it operates without such interchange, for example: the hydrological cycle in nature, and a nuclear reactor; although, like many systems which can be regarded as "*closed* ", the latter must be "*open* " initially to bring it into being", FIGURE 2.4.5.-1•

- Also quoting Chadwick(1978), systems can be "*real* " or "*conceptual* ", they may include material entities and exist in real space-time, or they may include concepts as components• Systems can be classified also in ways that describe the degree and kind of human involvement in them, such as: from "mechanistic systems, where the human element is confined to the choice of system composition, to "adaptive" or variable-utilization systems which involve humans in an essentially non-mechanical way to make decisions that modify the system operation• The former are largely the province of system engineering, whereas the latter, with their implied decision-making process, are the material of operations analysis or operational research• Whether systems are real or conceptual, though, one can regard them as: having a structure or morphology, i.e. "*being* "; undergoing internal(endogenous) changes in time, i.e. "*behaving* "; and, in the case of open systems, undergoing irreversible external(exogenous) changes in time, i.e. "*becoming* "•

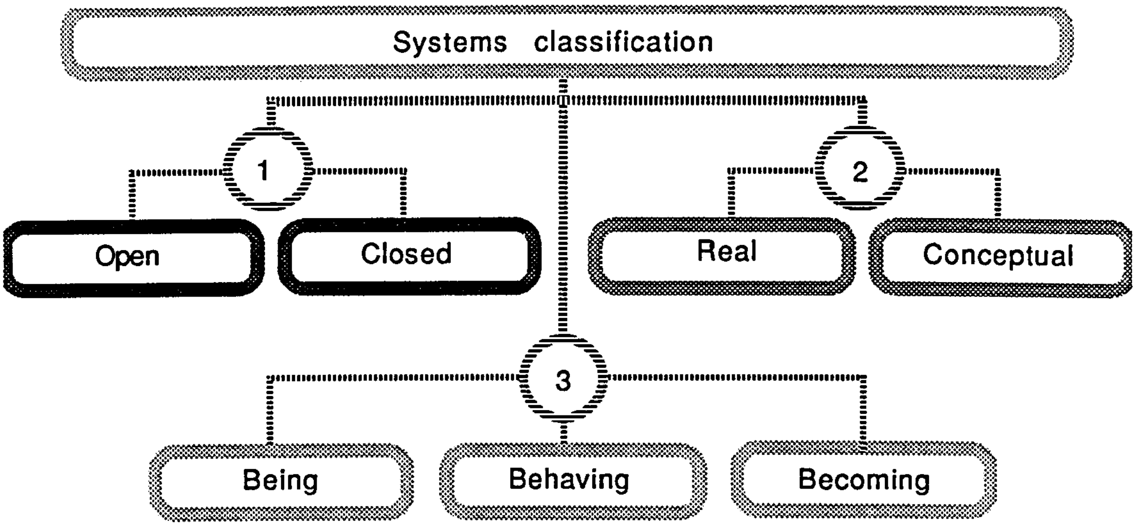


FIGURE 2.4.5.-1
SYSTEMS CLASSIFICATION
(Based on Chadwick-1978)

• The latter point, of irreversible change, applies to all natural systems, including man, but it is true , in a sense, of all systems due to their operation over time: state **P** at time **t1** differs from a return to state **P** at time **t2** simply because time is irreversible•

• Using this knowledge of the behaviour and structure of systems, expressed by Chadwick(1978) we can arrive at a general classification of systems problems, such as:

• **Firstly, the analysis problem:** the system exists in fact, and its structure is, or can be, known; " How will the system behave on the basis of a knowledge of its structure?

• **Secondly, the black box situation:** the system again exists, but nothing is known about it and its structure cannot be determined by direct means: How can we ascertain the behaviour of the system and, if possible, its structure?

• **Thirdly, system synthesis:** the system does not exist in reality: How may we design its structure so that the system when realized has the required behaviour?

• Quoting Chadwick(1978) :It is possible to distinguish three kinds of systems such as:

1. **Engineering or mechanistic systems:**
2. **Ecological or ecosystems:**
3. **Social and economical systems:**

• All the three may involve feedback operations of considerable complexity, but systems of the first kind are such that their behaviour are fairly predictable for they are essentially, not exclusively, deterministic, their guiding criteria being set externally either in the process of their design or as part of their operation• Systems of the other kinds are essentially probabilistic and their behaviour is often counter-intuitive and thus difficult to predict, because of their feedback loop complexity which is of a different order from that of engineering system• There are differences between ecosystems and social systems, in that the response to change within ecosystems occurs as a result of change external to a given animal or plan community, whereas in a social system, individual actors set their own criteria for action• In other words, human beings respond to external change by decision from within and they can also cause external change by their own decision; they are both actor and acted upon•

2.5. Planning Theory and Planning Practices:

2.5.1. Planning Definitions:

- The definitions of planning, that will be considered in this piece of work are the ones which should be dealing specially about "planning methods" as a common instrument to education of all kind of planners; whether educational, industrial, public, private or any other activity which should be directly involved in "process of planning" itself, such as: economics, sociology, politics, psychology, engineering, architecture and design•

- "In the early eighties of the last century Frederick Winslow Taylor was a young man working in the shops of Midvale Steel• Through a series of accidental changes in a life which might normally have followed a routine middle-class course, he become a foreman• He was, however, a new species of that all-important animal• For he did not believe in foremanship, at least of the old-fashioned kind, and almost at once he set out to displace the foreman's rule of thumb with a scientifically arrived at "one-best-way"• He intended to reduce the functions of the shop to clearly and precisely stated locations, quantities of materials, forces applied, motions to be gone through, and output to be expected• These would then be the terms in which a planning office would set out the job to be done• The directions would be precise• And foremen-in the old sense-would be eliminated• He called it, later on, scientific management• Actually it was planning..."•

- Faludi(1973b), said that the effort of building planning theory also includes the search for what planning is about, which is that of promoting human growth•

- Quoting Chadwick(1978): "...planning is a science, but science has its place for intuition and creativity, and there is certainly need of these qualities in the activity of planning"•

- In Christensen(1985), she said that,"By tailoring planning to real world conditions, the planner is acting contingently• In doing so the planner copes rationally with uncertainty"•

- Also quoting Breheny(1986): "Whether looking to tailor methods to contexts or trying to change the context, it is clear that some understanding of the broader environment in which methods are to be used is essential to any serious attempt to develop methods for policy analysis"•

• Within a long search for a clear planning definition Friedmann(1973), still subscribe to the following:" Planning refers to the application of a scientific and techical intelligence to organized actions"•

•The stand-point is simply that planning is a much more general, a commoner, activity than planners have considered it to be: common to all human beings, common to all scientific investigations: "Planning is a general method, quite independent of the field within which it is practised"• The planning process is one of bounded rationality, involving human judgement at all points, as well as rational argument where possible: it is thus both Art and Science, and the more interesting and challenging because of it• Process and Purpose, yes: because the Purpose is worthwhile, the Process may be justified• We must be sure about the Purpose (Chadwick-1978)•

• In a summarized form Hall(1987) gave the following definition: "Planning as a general activity is the making of an orderly sequence of action that will lead to the achievement of a stated goal or goals• Its main techniques will be written statements, supplemented as appropriate by statistical projections, mathematical representations, quantified evaluations and diagrams illustrating relationships between different parts of the plan• It may, but need not necessarily, include exact physical blueprints of objects"•

• Quoting Healey et al(1982), the definition of planning is notoriously problematic• For some, it is a societal guidance, for others all government action• To some again, it is environmental regulations while others deny planning any objective existence• However, from looking at the range of definitions of planning, it can be argued that the following four elements can be identified:

1. An activity of a particular type, such as rational procedures for the identification and selection of policy alternatives•

2. An activity undertaken by a particular type of institution, such as government, as opposed to the market•

3. An activity involving the guidance and, regulation of particular classes of events and objects, as in the regulation of land use•

4. An activity undertaken by people who consider themselves to be planners or to be undertaking planning• The subjective planning is what a planner does, and the objective planning is what people recognize as planners do•

• Following the above elements Healey et al(1982) said:"In this way it is possible to identify planning as a concrete activity undertaken by identifiable actors and institutions, leading to outcomes which can be evaluated against objective criteria"•

2.5.2. Origin of Planning:

• Planning, in its attempt to become more scientific, borrowed methods, concepts, or whole theoretical constructs from various disciplines, with a particular preference for those that belong to the natural sciences, like physics and biology, since they seem to be more exact, objective, and neutral• Borrowing from the natural sciences takes two forms; First, ideas are transferred for explanatory purposes, with indirect or limited applications; Second, various formulas are taken from one discipline to the other, in order to solve practical problems rather than to provide explanations• It can be argued that everything has a similarity with something else, however slight this may be• Analogies abound in many different areas of science, and analogy fulfils two roles; to provide explanations, and to control reality (Camhis-1979)•

• Faludi(1973b), in his model of planning agencies on the basic assumption that, "they may be understood as analogous to the human mind engaging in purposive thought and action"• Faludi gives two reasons for making this analogy; First, that we hold normative views of the way an intelligent mind operates; Second, that much thought in the field of cybernetics has gone into building models of the human mind, and therefore one is able to draw on shared ideas and on carefully constructed models explaining the human mind• He goes further saying that, "...man and society are not related, they are simply analogous", and also states that, "...many of the existing barriers to further human growth...must be sought in our ways of doing things...to remove some of the barriers to human growth means to change ourselves...such self-awareness one calls one's consciousness..."•

• The whole concept of analogy was adopted to better understand the changes in planning theory and their consequences over planning practices in urban planning, regional planning, and all areas of transportation planning•

• Planning, both in the form of designing new settlements and as the regulation of piecemeal urban development, is an activity which is as old as civilization• However, there has always been some regulation of at least the realignment of transport routes and of the location of new traffic, water and drainage systems and of major buildings and land uses• Indeed by the late 1940s or early 1950s the growth of most settlements in the developed world was subject to some form of regulation by "*planning officers* " who believed that they were acting on behalf of the community• Post-1945 war-damaged cities in Europe, in a period of population and economic growth, where the subject of major plans• Urban planners have thus been concerned with prescribing for the overal urban structure of settlements and also with explaining and prescribing for the relationships of land uses and activities• Some planners have also been involved with the detailed layout, or control of layout, of small parts of settlements, and thus with the functional and synthetic relationships of the constructed and the natural components of sites•

• In existing cities, proposals for restructuring were a major part of spatial planning between 1920 and 1960• This was the era when "blue-print" comprehensive master plans were the rule• They represented architectural and engineering design at a settlement scale• Many towns and most of the orbital cities in the developed world have been treated to a theoretical restructuring exercise, some from ancient times• Rome may be the world's most planned city• Leonardo Da Vinci advised on the rebuilding of Milan after 1485• Christopher Wren and others prepared plans for restructuring the city of London after 1666• Abercrombie's much later Greater London plan in 1944, was a classic• Haussmann restructured central Paris between 1854 and 1871• Vienna's ringstrasse plans were arousing the criticisms of Camillo Sitte in 1889• Stockholm's 1866 plan was updated in 1928 and 1946• In the U.S.A., City Beautiful Planning, after the 1893 World's Fair in Chicago, was promoted by competitive chambers of commerce• In the United Kingdom, H. Alker Tripp's Town Planning and Road Traffic in1942, was followed by the Buchanan report, Traffic in Towns, 1963, which was a major contribution to urban structure and transportation theory, as was Colin Buchanan and Partners' South Hampshire Study in 1966• Since his Urbanisme, 1924, Le Corbusier has been a major theorist for urban structure, as an example Chandigah, capital of Punjab• Others of international stature were C.A. Doxiadis (1913-1975), Frank Lloyd Wright (1869-1959), Tony Garnier, Patrick Guedes, Elbenezar Howard and Lewis Mumford and many others• Theirs was the age when cities were replanned on drawing boards as if they were private property, finance was inexhaustible, and planners seemed to know best•

• By the 1960s the success of the planning systems in the developed world was being questioned• A new generation of planning theorists emerged• They were more interested in the contents and the processes of planning and decision-making than with the plans• Some were systems theorists• Others were interested in decision-making theories• Some paid regard to the political nature of planning, while others seemed to ignore it•

2.5.3. Planning Theory:

• Considering that planning is concerned with the future, planners have to "*prescribe* ", as well as to regulate and to control in accordance with a plan, if they are to be perceived• Indeed all regulation implies the existence of agreement about what constitutes a problem and what, instead, "*should be* "• The act of controlling implies the existence of at least an implicit theory about what "*ought to be* "• However, it is usually easier and safer for a planning theorist to criticize than to prescribe• Explanatory theorizing is less hazardous in academia than is prescribing• Nevertheless, planning theory has to be "*prescriptive* " as well as "*explanatory* " (McConnell-1981)•

• From the later 1960s a distinction has been made between planning theories according to FIGURE 2.5.3.-1, as follows:

1. The **substantive theories** used **"in" planning:** Which are derived from many disciplines and help planners to better understand whatever their area of concern may be•

2. The **procedural theories "of" planning:** In which the problems and operations of planning are analysed and explained, i.e. how planning should be operated and organized, one at least helps planners to better understand themselves and the ways in which they operate•

3. The **social theories "for" planning:** Which explain why society and planning is at it is and how it should be in future• This third category is related to political and moral theory and helps planners to better understand the context within which the decisions are taken•

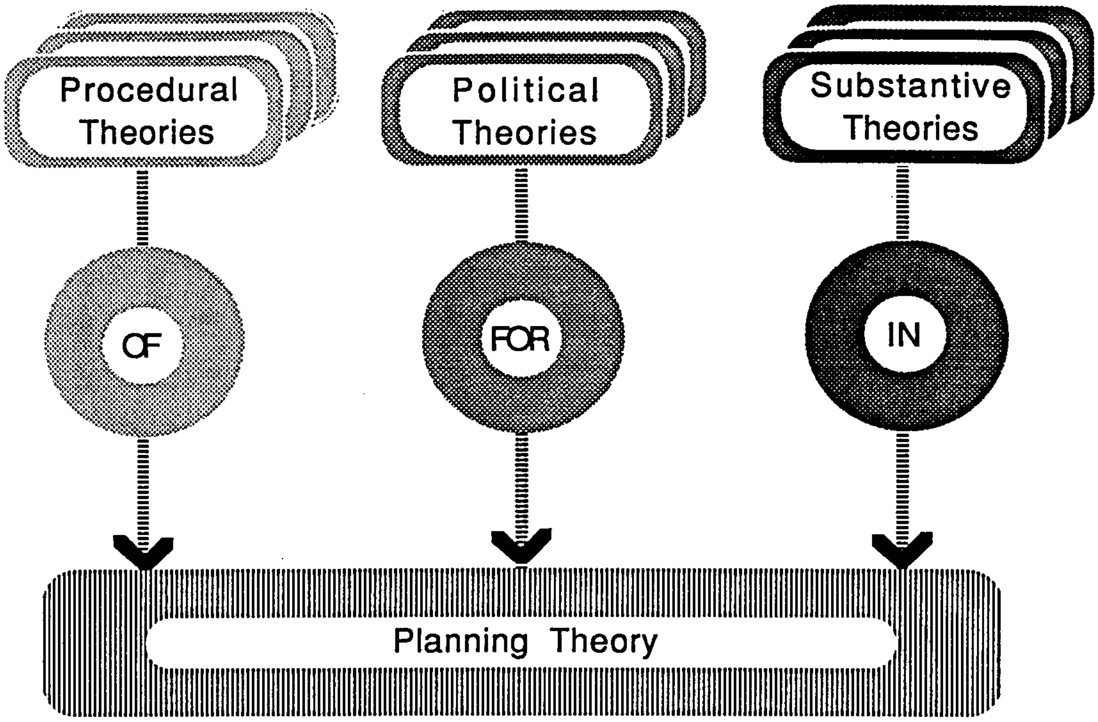


FIGURE 2.5.3.-1
THE PROPOSED PLANNING THEORIES
Based on Faludi(1972)

- Faludi(1972) , argued that procedural rather than substantive theory should be regarded as planning theory proper•

- McConnell(1981), said that all these planning theories categories, such as; "in", "of", "for", can be divided into at least two groups, as follows:

1. **The explanatory theories:** Which explain the economic, geographical and social phenomena•

2. **The prescriptive , predictive or normative theories:** Which are concerned with making plans, proposals or strategies•

- The proper structure and evolutionary process of urban planning theory for example, should be given according to FIGURE 2.5.3.-2, as follows:

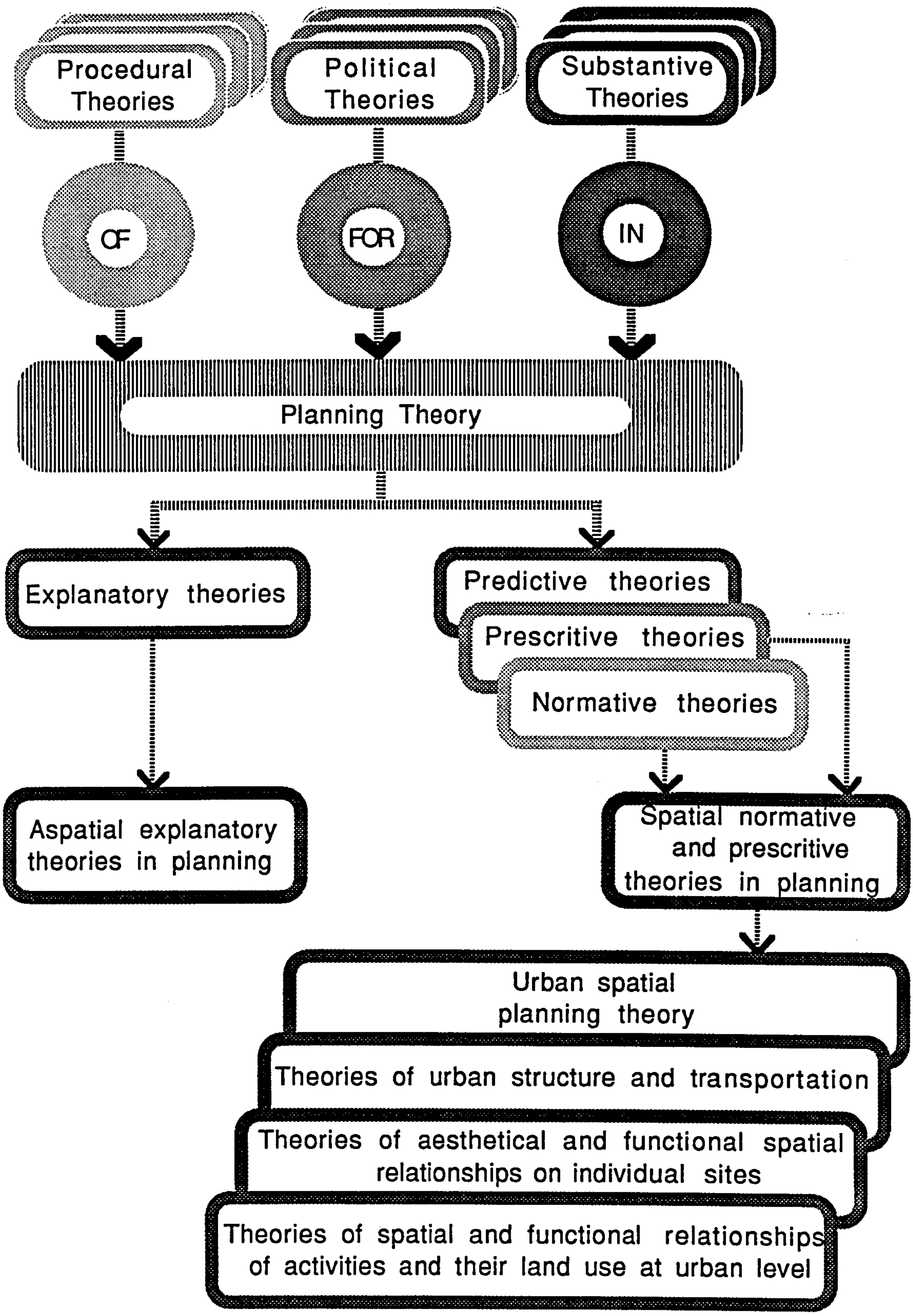


FIGURE 2.5.3.-2
EVOLUTION OF PLANNING THEORY

• Urban planning theory divided into spatial and aspatial categories, which although interdependent are different:

1. The spatial theories: Where concerned, usually implicitly, with land, buildings, transport routes and their use and relationships• Some regard was paid to economic and social factors; i.e., to employment, to aspects of population, and to social or community needs and circumstances• These were back-up considerations for the preparation of layout plans for urban spaces and routes• However, gradually it was recognized that was a need for more specific and reliable information about the people who were to be accommodated in the new buildings and space• The following questions were formulated: "Who were these persons to be?", "What sort of jobs, homes and other facilities would they need or demand?", "What employment and social facilities were or should be available?"•

2. The aspatial theories: To provide such socio-economic data to respond the above questions, the social scientists were brought into planning offices to serve the designers and land-use planners• They brought with them an understanding of was called "aspatial theorising"•

• The "*aspatial explanatory* " theorizing has become part of theories "*in planning* "• By contrast the "*spatial* " theories "*in planning* " are predominantly "*normative and prescriptive* "• Nevertheless, there is a conceptual gulf between "*explanatory* " and "*normative* " theories which is:

A. The "*aspatial explanatory* " theory is drawn from the social and mathematical sciences•

B. The "*spatial* " and "*aspatial prescriptive normative* " theory has roots in the design disciplines and in social utopia thought•

• Following that, urban spatial planning theory includes:

1. Theories of urban structure and transportation: Which are about proposals for alternative transportation modes, networks and adapted spaces•

2. Theories of the spatial and functional relationships of activities and their land use at urban level•

3. Theories of aesthetic and functional spatial relationships on individual sites•

4. Urban renewal theories•

5. Subregional planning theories•

•One way to proceed in learning more about the nature of planning as a general process, is by referring to one of the main methods of scientific enquiry, which is the method of analogy• Such an analogy is therefore a kind of conceptual system: a conceptual system which replicates the process of a system in the real world• This, in fact, is what planning aims at doing, and planning is a conceptual general system•

2.5.4. Forms and Styles of Planning:

- An analytical distinction has been made by Friedmann(1973), between the behaviour of planners and planning agencies• The first, relates to the *"forms of planning "*, considering the ways in which scientific and technical knowledge are related to organized actions that help to:

1. *Maintain a given system in a state of equilibrium or balance •*

2. *Induce major changes in its performance •*

- The second major distinction refers to *"styles of planning "* and explores the ways in which planning is influenced by the instruments and methods of control available to planners as well as by the social and institutional environment to which it must adapt itself to be effective• This discussion is somewhat technical and abstract, but it is necessary to equip us with a useful set of concepts and vocabulary that will be used throughout this work•

- Societal guidance encompasses both the maintenance and the change of social systems• National planners, for example, may be concerned with holding to a given rate of growth in production, or with keeping unemployment down to politically tolerable levels• Central planners may be equally interested in changing the overal economic performance of the system, accelerating its long-term rate of growth, for example, or altering the proportions of income received by different sectors of the population• These changes can be accomplished on an enduring basis only by appropriate changes in the institutions that generate a given growth rate or a particular distribution of income• The need for these qualitative changes may derive from an accumulative inability to keep, for example, public services abreast of urban expansion, or from a change in values that renders earlier performance standards obsolete, or from demands for new services, such as mass transit, public housing, and pollution management• To respond to these demands, planners will have to think of altogether different ways of guiding the city's development; they will have to innovate on a substantial scale•

- These two faces of societal guidance-maintaining a complex social system in balance and, simultaneously, inducing new performance characteristics through changes in some of its structural relations-interpenetrate in many ways• In spite of the difficulty of distinguishing actions aimed at maintaining systems from those designed to change them, two foms of planning have evolved, one addressing itself primarily to maintenance, the other to change• Friedmann(1973) has chosen to call them "*allocative* " and "*innovative* " forms of planning, FIGURE 2.5.4.-1•

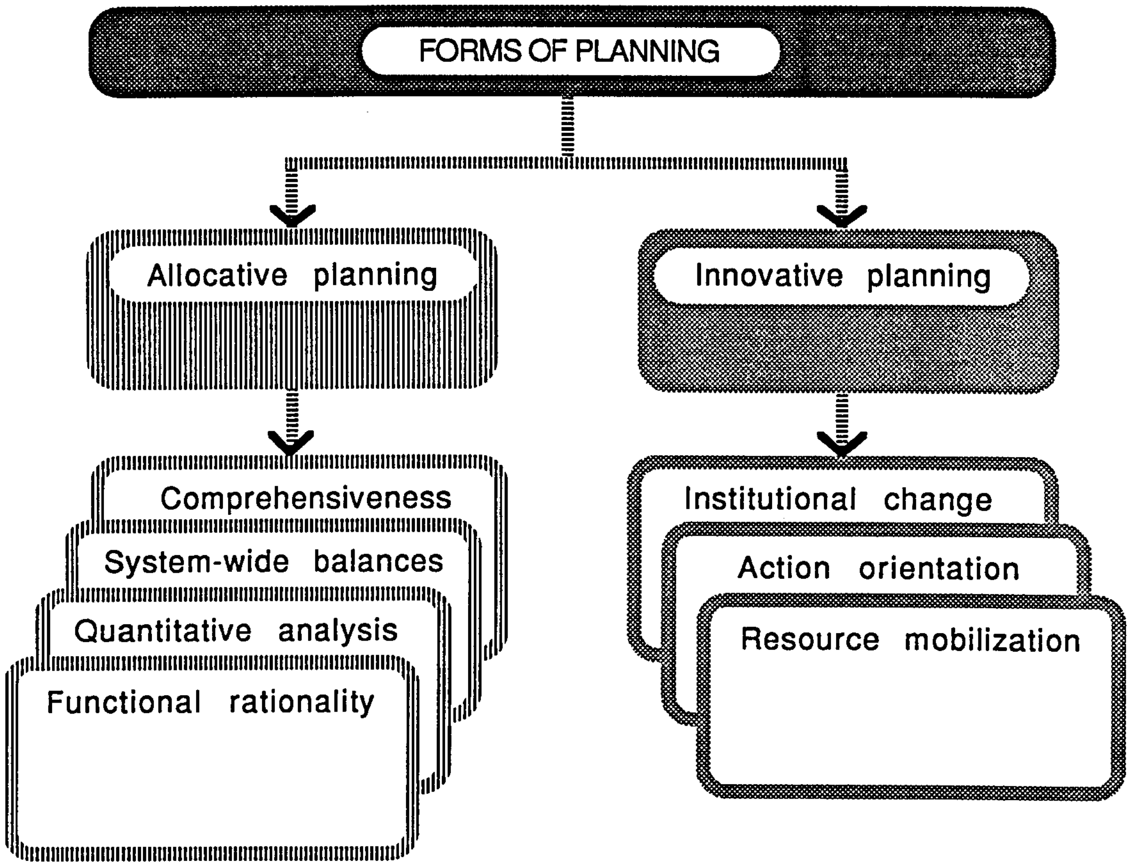


FIGURE 2.5.4.-1
FORMS OF PLANNING
(Based on Friedmann-1973)

• **Allocative planning:** It means the distribution of limited resources among a number of competing users• This is typically regarded as the major task of central planners and, for many people, it is planning's only proper function•

• Allocative planning shows certain distinctive characteristics, and four of these have been described, such as:

1. Comprehensiveness: Allocative planning must be comprehensive with respect to at least the following sets of interdependencies;

a. All explicitly state objectives•

b. Major alternative uses for the resources available•

c. Projected external conditions that may modify the setting of intermediate targets•

2. System-wide balances: The criterion of optmal choice, which is the intellectual foundation for allocative planning, requires a balance among the various components of the system, to permit the precise calculation of the results of incremental change•

3. Quantitative analysis: Neither a comprehensive account of major variables nor system-wide balances can be achieved without the help of quantitative models• These models allow for a study of the system under quasi-experimental conditions and are capable of leading, through a process of trial and error, to logically consistent solutions• The most frequently used models of this type include national economic accounts, input-output matrices, simulated systems, and linear programming•

4. Functional rationality: Allocative planning is an attempt to make decisions functionally rational•

• Allocative planning cannot be based on rational grounds alone• It inevitably includes a major normative component, reflecting someone's, not necessarily the public's interests• Central allocative planning, has not lived up to its initial promises• The desire to be comprehensive has produced the illusion of an omnipotent intelligence; the method of system-wide balances had led to an overemphasis on stability; quantitative modeling has encouraged the neglect of the actual conditions governing policy and program implementation; and the claim to functional rationality has made planners insensitive to the value implications of their work•

• **Innovative planning:** Has proved to be considerably better• It may be regarded as an approach to institutional development that is expected to produce a limited, but significant change in the structural relations of an existing system of societal guidance• To underline the distinctions between innovative and allocative planning, three salient aspects of the former have been described; a predominant concern with institutional change; a basic orientation towards action, and a special emphasis on the mobilization of needed resources•

1. Institutional change: Innovative planning is fundamentally concerned with translating general value propositions into new institutional arrangements•

2. Action orientation: Purpose and the realization of purpose are indistinguishable in innovative planning• It is true, that the invention of a program may be regarded, in purely instrumental terms, as a means in relation to an explicitly formulated end (e.g., reducing unemployment)•

3. Resource mobilization: Innovative planners perform an entrepreneurial function in mobilizing and organizing the use of institutional resources• Allocative planners, by contrast, are almost exclusively dedicated to the task of distributing resources among competing users•

• Exemplifying the applicability for both innovative and allocative planning, Friedmann(1973) has described the following circumstances: "Imagine a country where nothing ever happens• From year to year, public resources are allocated in roughly the same proportion to the same users• Small adjustments may be made from time to time, correcting random errors in the system, but these do not produce significant changes in the country's economy• Imagine now the opposite extreme, a country so overwhelmed by change that the whole system becomes wildly unbalanced• Clearly, one would argue, it is precisely under these conditions that some form of central guidance is needed• Summarizing, Friedmann(1973) arrived at the following conclusion: "Where allocative planning is most feasible, it is superfluous, and, where it is most needed, it is unfeasible• Innovative planning, on the other hand, is both needed and feasible in the two cases described; in the first, to get the country moving, and in the second, to build up the new structures without which the country would fall into chaos• Relations between allocative and innovative planning are thus inevitably in a state of tension• System balances must be maintained, but change in desired directions is also needed• Although both forms of planning are generally required, innovative planning tends to be relatively independent of central allocative mechanisms"•

• The second major distinction mentioned by Friedmann was "*styles of planning* ", which deals with how much power a system has or is willing to use, which will determine both the choice of implementing strategies and the probable outcomes• "If one has money, one can hire a contractor and built whatever housing suits his needs"• "If one do not have money, one may be able to borrow some, but then the banker may wish to impose certain restrictions on the quality of the design"• And if one cannot even borrow the amount he needs, he will be forced to keep on living where he lives• The relation between effective power and the kind of results that may be obtained from using it would seem an obvious one, yet it is rarely acknowledged to exist in allocative planning• Where it is heeded, so that the capacity to plan is linked directly with implementing processes, taking into account all existing limitations on the uses of power, a unique stylle of allocative planning results• Implementing processes are, to a large extent, determined by the distribution of power in a system• Theoretically, Friedmann said it is possible to distinguish among systems where power is strongly centralized, weakly centralized, fragmented, and dispersed• Associated with each type of system is a particular method of implementation and style of allocative planning• These relations do not completely characterize any existing system, but the typology, which is shown in TABLE 2.5.4.-1, is useful for exploring the interconnections among planning styles that give rise to the complex systems of societal guidance, that can be observed•

TABLE 2.5.4.-1
TYPOLOGY OF ALLOCATIVE PLANNING STYLES
(Based on Friedmann-1973)

A Typology of Allocative Planning Styles

Distribution of power	**Strongly centralized**	**Weakly centralized**	**Fragmented**	**Dispersed**
Method of Implementation	compulsory targets	mixed field controls: •general rules •inducements •information	bargaining: (few negotiators: corporate structure)	participation in decision processes: (many participants community structure)
Predominant Forms of Control	sanctions	restructuring of the decision environment	normative compliance	voluntary compliance
Predominant Orientation Toward	plans	policies	processes	processes
Characteristic Role of Technical Experts	bureaucratic specialist	advisor	negociator and broker	organizer and advocate
Style of Allocative Planning	**command planning**	**policies planning**	**corporate planning**	**participant planning**

• Four major planning styles emerge from this typology; command, policies, corporate, and participant planning, shown in FIGURE 2.5.4.-2, as follows:

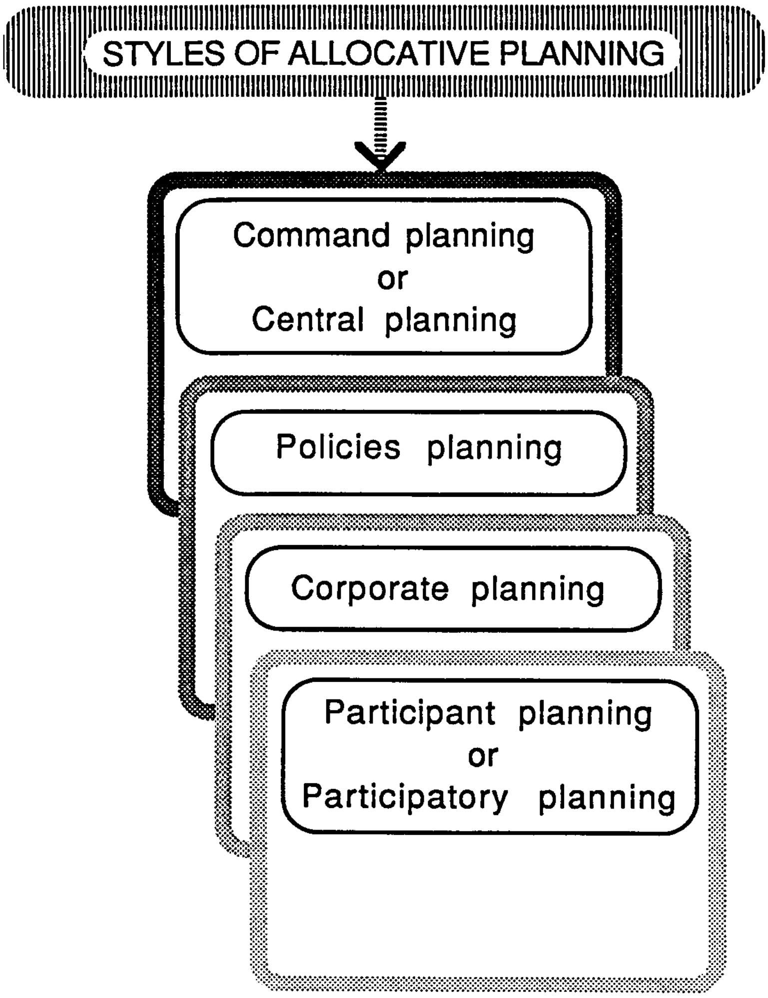


FIGURE 2.5.4.-2
STYLES OF ALLOCATIVE PLANNING
(Based on Friedmann-1973)

1. Command planning: Which is associated with strongly centralized systems of governmental power• In such systems, a bureaucracy exists for the purpose of meeting compulsory targets, and appropriate performance is required of its members• Sanctions, such as fines and prison terms, may be imposed to secure compliance with the plan, but various forms of moral pressure and persuasion may also be applied• The command system comes closest to the formal decision model of allocative planning•

2. Policies planning: Is less demanding in its requirements for information, organization, and control• Associated with weakly centralized systems of government, its method is to induce appropriate actions through statements of general guidelines and criteria for choice, the provision of material incentives, and the dissemination of information for decentralized planning• Policy announcements, inducements, and information have the primary purpose of restructuring the environment for decisions of the relevant actors• Policies are meant to make some allocative choices impossible while increasing the probability of other, more desirable ones• The use of policies planning frequently requires some form of direct controls to reset the boundaries of choice• Policies planning is often the prelude to a concerted effort at innovation•

3. Corporate planning: The process tends to be stressed more than the ultimate product and may even come to be valued in its own right• More specifically, the results of negotiations through which corporate planning is sustained are not determined in advance; they crucially depend on the distribution of effective power among all the participants in the bargaining process and on their comparative skill in using this power• Participation is limited, however, to a small number of powerful actors, each of whom represents an important sector of the social economy• Corporate planning may be organized formally, or infomally through systems of mutual consultation• The subjects to be negotiated are generally introduced by the central planning office in the form of draft documents, backed by detailed technical analyses and projections•

4. Participant planning: Occurs under conditions where power to implement decisions requires community forms of social organization and, consequently is dispersed• Organizations of this type may be groups of neighbours(village, commune, neighbourhood, housing estate), groups of workers(workshops, cooperatives, agricultural settlements), and groups of students and faculty(departments, colleges)• In every case, the group must be spatially contiguous and capable of aggregating, formulating, and expressing the interests of its members• Corporate groups are traditionally controlled from the top; community groups, on the other hand, located at the base of the organizational pyramid, usually share decisions•

Procedures will be democratic, and decisions will be made, in small groups, on the basis of consensual agreement and, in larger groups on the basis of majority voting•

2.5.5. Planning Methodologies:

• Model building and methodology are fundamental to policy analysis• Orderliness, predictability, controllability and reduction of allowance for error are some of the hallmarks of methodology• Because methods are the outcome of complex social demands, it is obvious that one can predict what will happen to methods if one can predict what will happen to society• There is yet a deeper aspect to method• A knowledge of methods shapes the perception and ultimately the organization of the world by those who possess it• In this sense, method becomes the organizing basis for a world view (Teitz-1974)•

• Methods originate, modify, and change over time because of the environment in which they are applied, and the methodological development is naturally a dynamic process with a feedback element• Four phases of the development of methodology can be identified, these are: definition, formalization, maturity (and diffusion), and decline(Teitz-1974)•

• It is possible to distinguish three quite separate stages in the evolution of planning theory, and consequently, on their planning processes or planning methodologies, as follows:

1. The first stage: Developed from the earliest times down to the mid-1960's, well exemplified in the early development plans coming after the 1947 Town and Country Planning Act, in U.K.• This could be called the Master Plan or Blueprint Era•

2. The second stage: Was ushered in from about 1960, and replaced the first approach through the Planning Advisory Group (PAG) of 1965 and the 1968 Town and Country Planning Act, in U.K.• It could be called the systems view of planning•

3. The third stage: Which began to evolve in the late 1960's and the 1970's, in more heterogeneous and more diffuse, and may be labeled the idea of planning as continuous participation in conflict•

• Three leading exponents of the systematic planning approach can be quoted, these are: Brian McLoughlin, George Chadwick and Alan Wilson• They have produced three different planning processes, which were heavily drawn from the sciences of cybernetics and system analysis•

1. The simplest one, based on McLoughlin(1969) FIGURE 2.5.5.-1, which proceeds in a straight line through a sequence of processes, which are then constantly reiterated through a return loop• Having taken a basic decision to adopt planning and to set up a particular system, the planner then formulates broad goals and identifies more detailed objectives which logically follow from these goals• He then tries to follow the consequences of possible courses of action which he might take, with the aid of models which simplify the operation of the system• Then he evaluates the alternatives in relation to his objectives and the resources available• Finally he takes action (through public investment or controls on private investment, as already described) to implement the preferred alternative• After an interval he reviews the state of the system to see how far it is departing from the assumed course, and on the basis of this he begins to go through the process again•

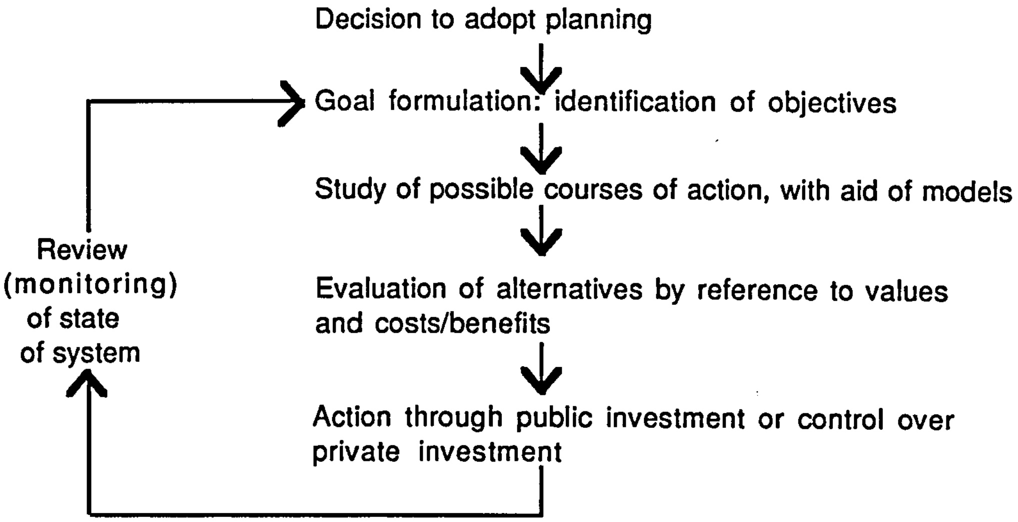


FIGURE 2.5.5.-1
PLANNING PROCESS
(Based on McLoughlin-1969)

2. The next is an essentially more complex process from Chadwick (1978), FIGURE 2.5.5.-2• Here, a clear distinction is made between the observation of the system under control (the right-hand side of the diagram) and the planner's actions in devising and testing his control measures (the left-hand side)• Appropriately, there are return loops on both sides of the diagram, indicating again that the whole process is cyclical• But at each stage of the process, in addiction, the planner has to interrelate his observations of the system with the development of the control measures he intends to apply to it•

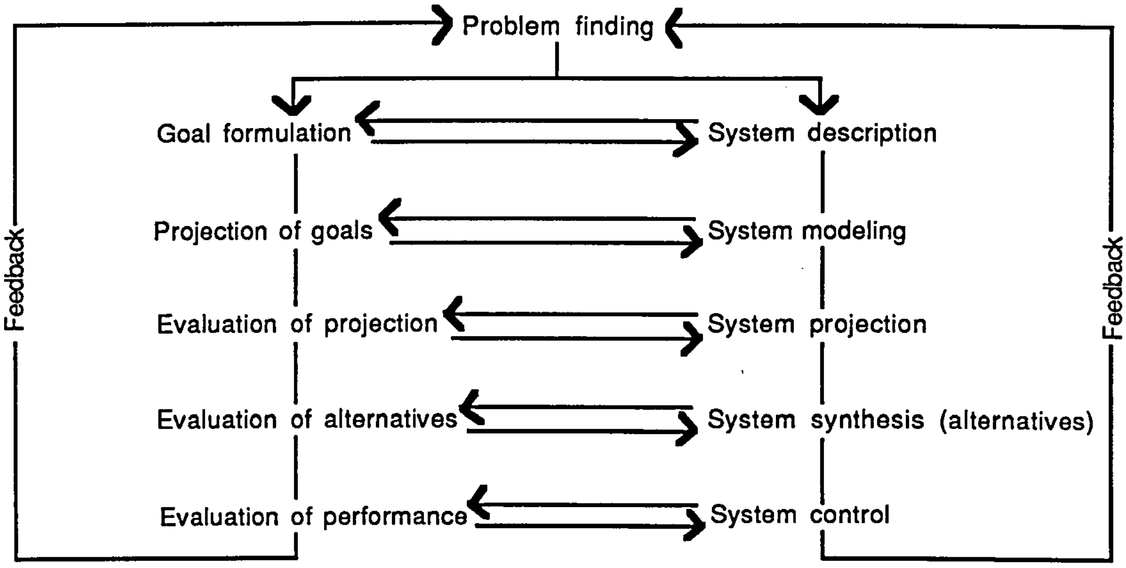
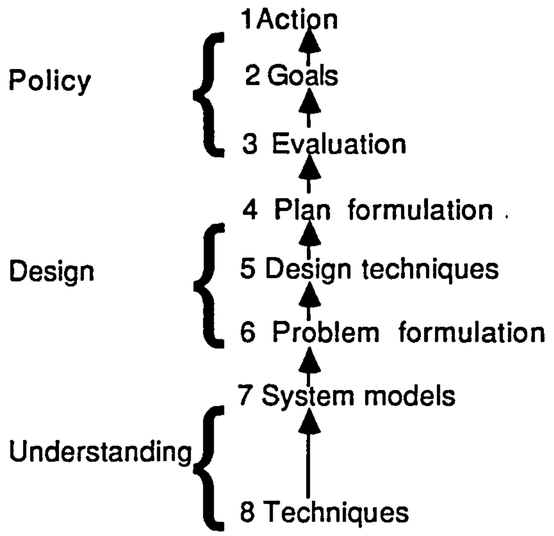


FIGURE 2.5.5.-2
PLANNING PROCESS
(Based on Chadwick-1978)

3. The process defined by Wilson(1987), according to FIGURE 2.5.5.-3, is even more theoretically complex, but again it can be related to Chadwick's• In it, there are not two sides of the process which interact, but three levels presented vertically• The most basic level, corresponding to part of Chadwick's right-hand sequence, is simply called "understanding"• It is concerned wholly with devising the working tools, in the form of techniques and models, which are needed for the analysis of the system under control• The intermediate level, corresponding to another part of Chadwick's right-hand side, is concerned with the further use of these techniques in analysing problems and synthesizing alternatives which will be internally consistent• The upper level, corresponding roughly to the left-hand side of the Chadwick diagram, is essentially concerned with the positive actions which the planner takes to regulate or control the system: goal formulation, evaluation of alternatives, and actual implementation of the preferred alternative•



N.B. The diagram is to be read upwards; but constant interaction takes place between all eight levels

FIGURE 2.5.5.-3
PLANNING PROCESS
(Based on Wilson-1987)

•According to Chadwick(1978) it is possible to identify three different kinds of planning process problems, which appear to require a somewhat different treatment from each other, these are:

1. The improvement (whether we call it "optimisation" or "satisfaction") of the behaviour of a system which exists at present•

2. The satisfactory behaviour of a present system to the structure of which modifications are anticipated, whether additions or subtractions, due to either a public action, or market action, or both•

3. The design of a new system in such a way that its future behaviour is satisfactory•

• There are two important questions that the planner needs to resolve about the modeling process, according to Hall(1987) such as:

1. First question: *"What aspects of the planning system he wishes to model• That question is normally related to the relationship between social, economic and* *operational aspects of the system• Secondly, the planner will need to know the elements that will define the interrelationships between activities of the system"* •

2. Second question: *"What sorts of model are available, and suitable for the planning system• The answer to this question, will again depend on the object of the planning exercise"* •

• Models, whether simple or complex, are capable of being classified in a number of different ways• They may be "*deterministic* " in character, or "*probabilistic* " (i.e. incorporating an element of chance)• They may be "*static* " in character, or "*dynamic* "• Another separate but related question is whether the model chosen is to be simply "*descriptive* " of the present (or recent past) situation, or "*predictive* " of the future, or even "*prescriptive* " in the sense that it contains some element of built-in evaluation• Yet another question is the choice between "*spatially aggregated* " models and "*spatially disaggregated* " models, as shown in FIGURE 2.5.5.-4•

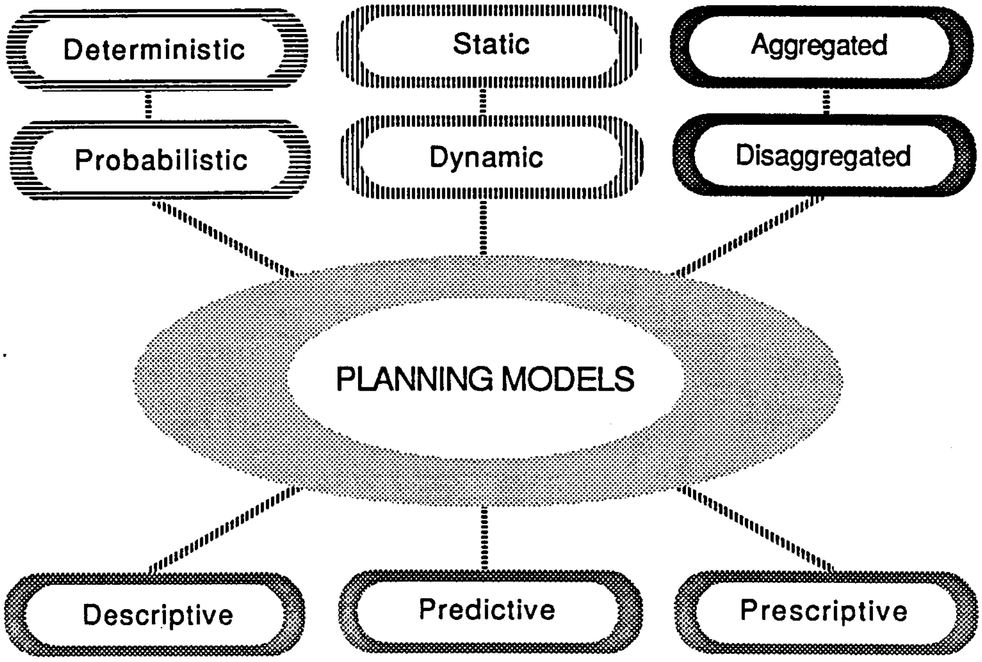


FIGURE 2.5.5.-4
PLANNING MODELS

• Accorging to Breheny(1976) the above planning models may be identified within the following examples:

1. Descriptive Models: When provides a simple description of the present or the recent past;

1.1. Goals Achievement Matrix(G.A.M.) - Hill(1968)
1.2. Planning Balance Sheet - Lichfield(1969)

2. Predictive Models: When is a prediction of the future;

2.1. Scenario Writing - Thornley(1974)
2.2. Accessibility Spatial Opportunity - Breheny(1974)

3. Prescriptive Models: When it contains some element of built-in evaluation;

3.1. A.I.D.A. - Friend & Jessop(1969)
3.2. Community Preference Surveys - Homville(1971)

• In order to try making plan evaluation more rigorous, since about 1955 at least four techniques have gained widespread currency in the planning world, as follows:

1. Cost-Benefit Analysis: Is originated in the 19th. century social philosophy of Jeremy Bentham concerning the need for pursuing a course of action that would provide the greatest happiness for the greatest number in any public decision• Bentham's model, like cost-benefit analysis, was consensus seeking and thus ignored distributional issues by concentrating on net aggregate benefits• Cost-benefit analysis, when used for assessing net aggregate benefits for purposes of evaluating alternative courses of action, makes use of the Pareto optimality conditions, which states that if one person gains and nobody else loses, there is a net gain in welfare•

• Cost-benefit analysis is explicitly economic in its approach, and it assumes that the best plan will be the one which delivers the greatest quantity of economic benefits in relation to economic costs• Essentially, it is useful in situations where decision-makers want to know which of several alternatives represents the best economic value, but where normal market measures are not available• But public decision-makers have no market as a guide; they are producing services which are not sold at a price• Cost-benefit analysis, therefore, works by trying to create "shadow prices" for items outside the market (Hall-1987)•

• This approach, however, thaws up many problems, some so intractable that critics claim cost-benefit analysis to be very limited use, and positively harmful, in planning decisions• Valuing people's time, or the risk of accidents, in terms of wage rates may mean that poor people(and housewives, and children) are valuated less than rich people, especially businessmen• Many important elements in planning, such as the value of a fine landscape or of an old building, are almost literally imponderables (Hall-1987)•

• Another way perhaps, to look at cost-benefit analysis is that it enables a comparison to be made with the resources which are available, with a potential feedback to the programme if the resources are insufficient to make a full allocation to the programme, or if other commitments are potentially more needed or more attractive• Such a general testing process leads on to the idea of testing alternatives,i.e. alternative programmes, by cost and budget-comparison characteristics• This is the basis of what has come to be known as the Planning-Programming-Budgeting System(PPBS), recently introduced into various organizations, and originally devised by the RAND Corporation in America (Chadwick-1978)•

• PPBS, briefly, requires the statement of objectives, the identification of alternative programmes for accomplishing these objectives, the estimation of the costs of each alternative programme, the measurement of the effectiveness of each programme, and the selection of a preferred programme upon the basis of a knowledge of the alternative judgement of programme costs and effectiveness• In turn, a consideration of the effectiveness of spending alternative programmes engendered by PPBS may lead on to a consideration of cost-benefit analysis (Chadwick-1978)•

2. Planning Balance Sheet (PBS): The second best-known evaluative device in planning was proposed by Nathaniel Lichfield• It is essentially a modified cost-benefit analysis, which tries to render in economic terms those items which are capable of being treated in this way, but which resorts to simpler devices for the imponderables• Unlike cost-benefit analysis in the strict sense, it makes no attempt to render all values in a common metric; it does not produce a rate of economic return, as cost-benefit analysis does, and it is not, therefore, very suitable for comparing a range of different investments• Its merits are that it is highly disaggregative, stressing advantages and disadvantages of alternative plans for different groups in the population, when dealing with urban planning• Its disadvantage lies in its inevitable complexity, which means that the decision-maker needs a strong effort of will to question each successive weighting that is made in the course of the exercise (Hall-1987)•

	Producers								
	Plan A				Plan B				Reduction
	Benefits		Costs		Benefits		Costs		
	Cap.	Ann.	Cap.	Ann.	Cap.	Ann.	Cap.	Ann.	
X	$£^a$	$£^b$	—	$£^d$	—	—	$£^b$	$£^c$	
Y	i_1	i_2	—	—	i_3	i_4	—	—	
Z	M^1	—	M^2	—	M^3	—	M^4	—	
Reduction	Plan A			Consumers		Plan B			Reduction
	Benefits		Costs		Benefits		Costs		
	Cap.	Ann.	Cap.	Ann.	Cap.	Ann.	Cap.	Ann.	
X^1	—	£e	—	£f	—	£g	—	£h	
Y^1	i_5	i_6	—	—	i_7	i_8	—	—	
Z^1	M^1	—	M^3	—	M^2	—	M^4	—	
Reduction									

FIGURE 2.5.5.-5
A PLANNING BALANCE SHEET
(Lichfield-1969)

3. Goals Achievement Matrix (GAM): Hill's own method, appears to have some similarity to the balance sheet in that goals and interest groups affected are included as the columns and rows of the matrix respectively• However, both goals and groups are given a relative value or weight in the matrix, and it is this weighting which raises the fundamental difficulty• Hill states that "the set of goals is known and the relative value to be attached to each goal is established", which is theoretically impossible, according to Chadwick in view of Arrow's Theorem, unless, that is some kind of process of registering choice and agreement to the emendation of choice is available• According to Faludi(1973), the GAM assume that a plan serves a multitude of ends which are sought by a multitude of interest groups and that the incidences of goal achievement as related to these interest groups carry different weights• Furthermore, in this version, evaluation is limited to determining whether goal achievement is advanced, whether it is hampered, or whether it remains unaffected by any particular strategy• A value of (+1), (0), or (-1) is inserted into the matrix and this value multiplied by the weight allocated to that particular incident of goal achievement• The results are then aggregated to one overall score for the plan as a whole•

Goal description Relative value		å 2		ß 3		∂ 4		f 5	
Incidence		Costs	Ben.	Costs	Ben.	Costs	Ben.	Costs	Ben.
Group affected	Relative weight								
Group a	1	A	D	E	-		N	Q	R
Group b	3	H		-	R		-	S	T
Group c	1	L	►J	-	S	►M	-	V	W
Group d	2	-		►I	-		-	-	-
Group e	1	-	K		U		P	-	-
		Σ	Σ			Σ	Σ		

FIGURE 2.5.5.-6
A GOALS-ACHIEVEMENT MATRIX (GAM)
(Morris Hill-1966)

4. The Minimal Requirements Approach(M.R.A.) to Plan Evaluation in Participatory Planning: Morris Hill and Carlos Lomovasky from the Centre for Urban and Regional Studies, Technion, Israel Institute of Technology, have presented the above planning method, at the First World Regional Science Congress, Cambridge, Massachussets in 1980, which has been tested in "A Case Study of Yad Hatisha"• The results was presented by the authors at the European Regional Science Meetings, Barcelona in 1981•

• The authors of the M.R.A. have described their considerations about multiple-objective evaluation methods, within their own views about urban planning process, as follows:

• "The planning process, especially of urban communities is by its nature many-facetted and calls for decisions concerning many and diverse elements• Attempts at a comprehensive approach to planning by public authorities have generated various methodologies which are intended to facilitate rational decisions concerning these multiple facets and issues• In order to reflect the political reality within which urban planning usually takes place these methods have to recognize the existence of multiple interests and groups, seeking multiple objectives which may be in conflict• The resolution of these conflicting interaction in an explicit manner without resorting to value-laden and frequently pseudo-scientific procedures presents a severe problem"•

• "Another aspect of planning decision is that it relates to the determination of policy for an uncertain future in which values and the state of the world are subject to constant change• The main issues of this method are:

1. "*How to develop a method which will enable the decision- taker to resolve the conflicting interests of the various parties involved concerning the multiple issues under consideration* ?"•

2. "*How to enable the participation in the process of the various interested parties involved* ?"•

3. "*How to take the uncertain future into account in the process* ?"•

• "A rule of logic leading from individual to community values has been defined as follows:

A. An alternative will be acceptable for the community, if it is acceptable for all the individuals•

B. It will be unacceptable if it has been found unacceptable by at least one of the individuals"•

• "In this approach the conflicts between the majority and the minority have not been dealt with, therefore, preference ordering and majority rule, in this case are not egalitarian decision-making rules, and do not take into account conflict situations"•

• The M.R.A. is described graphically in FIGURE 2.5.5.-7, and this planning method was produced within the following considerations, made by Hill(1985a):

1. This approach to plan evaluation is intended to facilitate the resolution of planning conflicts• It is intended to facilitate rational decisions in the face of the existence of multiple interest groups seeking multiple and conflicting objectives• The approach is intended to enable the resolution of conflicts using an explicit procedure• It is addressed primarily to the fourth planning mode, small-group participatory planning, with a possibility of its adaptation to the third mode of planning, corporate planning, with the planner as arbiter• The method thus explicitly and rationally incorporates procedures for public participation•

2. A characteristic of the approach is that, instead of attempting to achieve an optimal solution in terms of a set of weighted multiple criteria, it adopts a satisficing state in order to achieve a compromise which satisfies at least minimally the interests of all participants• This point of view is reflected in the nomenclature-the minimal requirements approach(M.R.A.)• Instead of attempting to aim at an optimal solution in terms of the achievement of the objectives, it adopts a satisficing state which is assumed to more accurately reflect the manner in which decisions are taken in the real world• Once again this point of view is reflected in their nomenclature "the minimal requirements approach", which is based on the identification of values of the individual or groups of individuals• Since Kenneth Arrow(1951) in his General Impossibility Theorem casts doubt on the possibility of arriving at social choice on the basis of individual values, they have accepted that by assuming that the ultimate decision making authority is that of a planning authority•

3. This methodology assumes the identification of the major actors in the planning process and their initial requirements• These requirements reflect the value preferences of the various parties and provide the basis for subsequent negotiations• As a result of the initial interactive process, the definitions of all the requirements will be similar levels of specificity• Alternative courses of action are identified and are classified according to various categories which relate to the extent to which conflicts can ostensibly be resolved• Coalitions of actors, based on their overlapping minimum requirements, are identified so as to facilitate the understanding of the conflict situations and their resolution• The basis for conflict resolution is established through a continuing dialogue among the actors, in coalition or otherwise, and their negotiations concerning their minimum requirements• With this sort of approach, a structured form of evaluation is incorporated into the political decisionmaking process, to enable more rational decisions based on the sharing of information and reasoned dialogue among the interested parties•

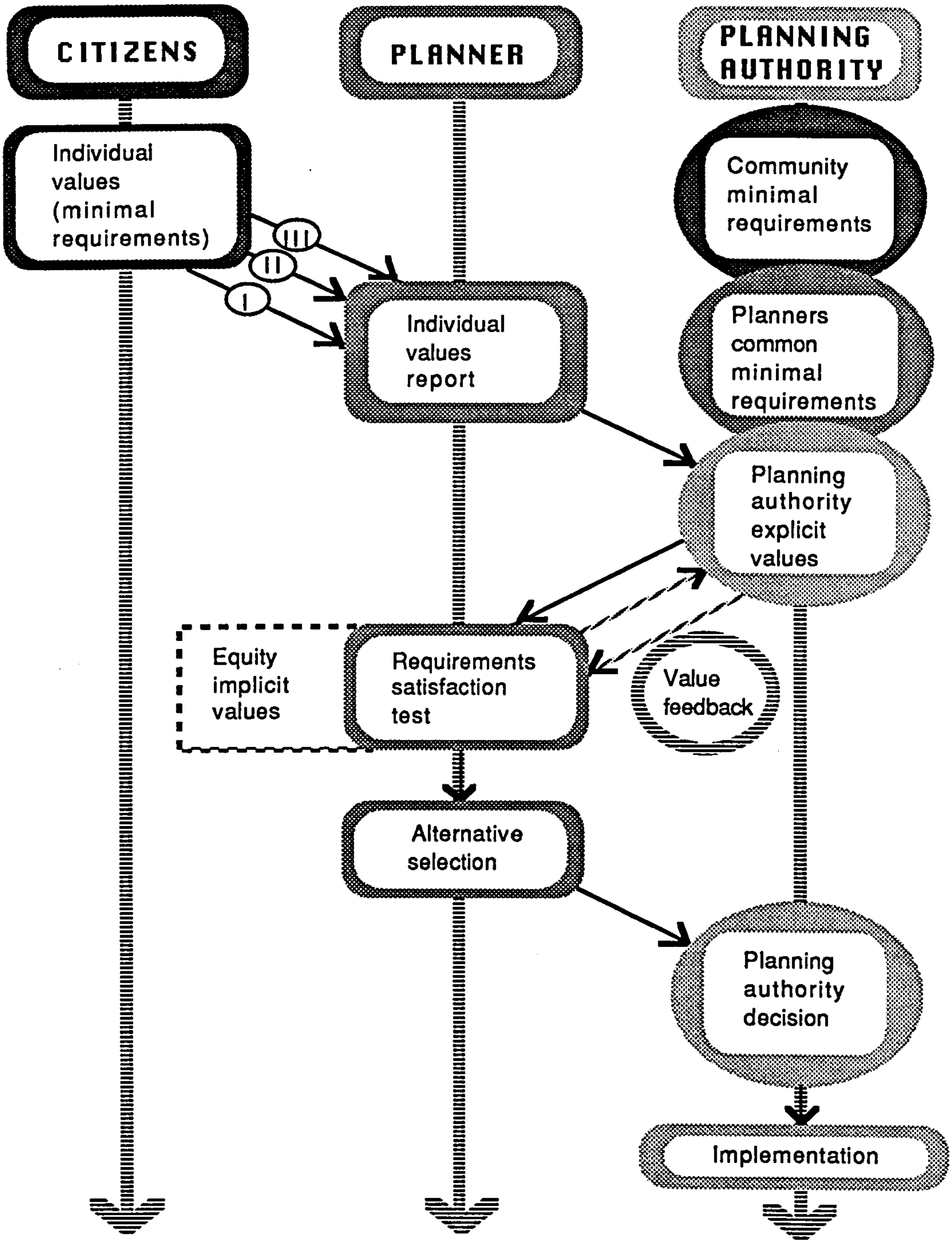


FIGURE 2.5.5.-7
MINIMAL REQUIREMENTS APPROACH (M.R.A.) IN PARTICIPATORY PLANNING
(Based on Hill-1980)

2.6. Airports System Planning-A.S.P.:

2.6.1. Definitions:

• Quoting De Neufville(1976), where he says that:"Airports fulfil a complex role in the transport network• The industry, concentrating on the problems of the airfields, has tended to ignore this fact• But we can never really design an airport in insolation; it is inevitably an intermediate destination in a larger trip or movement• We really need to develop plans for the airports as part of a system•...our focus should not be on airport planning, narrowly conceived, but on airport systems planning"•

• Also quoting Caves(1986), were he says that to understand Airport System Planning(A.S.P.), it is necessary to have a minimum knowledge about "Airports", "Systems" and "Planning" individually, even before considering the way in which many countries have attempted to develop airport systems plans•

• This work has adopted the expression Air Transport System(A.T.S.) to define a major system with the aim of providing air transport• The A.T.S. is a large collection of technical, economic, and institutional subsystems, such as: Airports, Airlines, Airways, Air Traffic Control(A.T.C.), Aerospace Industry, their operators and users, and any other possible derivative•

• The expression Airport System defines both the endogenous activities within the physical and operational boundaries of airports, and the exogenous activities outside the physical boundaries of the airports, which includes all possible environmental issues, such as: physical, ecological, cultural, economic and social environment• The expression Airport System has been applied in different contexts, which depend upon the referential point of its operation, not necessarily to its size or relative importance• Airport systems are not just local facilities, they are part of the entire air transport network• Therefore, they potentially serve a much wider market than the metropolitan area in which they are located• Airport systems have both desirable and undesirable environmental impacts•

• The Airport Systems Planning deals with the analysis and planning of the activities which are included in the Air Transport System(A.T.S.) on a coordenated way• The main objective is to preserve the total workability of the A.T.S. as a large system by providing an effective planning for Airports as an important subsystem or element of this major system•

2.6.2. A.S.P.-Functional Structure:

• The A.T.S. is a large collection of technical, economic, and institutional subsystems with the aim to providing air transportation• As already said, these institutional subsystems are; Airports, Airlines, Airways, Air Traffic Control(A.T.C.), Aerospace Industry, their operators and users, and any other possible derivative•

• According to Kanafani(1988) the A.T.S. is made of two components; a physical components, including the airways, airports, and aircraft; and of an institutional components comprising the operators and users• It functions within an operating environment which includes the government agencies that have a regulatory or their influence on the system, as well as the physical, ecological and social environment, such as:

1. Airports: The airports from the A.S.P. point of view represent the major fixed facility of the A.T.S, and perhaps the largest single investment component in it•

2. Airlines: Air carriers are firms dealing with the organization, the operation, and sales of transportation services using the A.T.S.• There are predominantly two types of air carriers; common carriers and contract carriers• The first are established carriers providing transportation to the public with published fares; the latter are firms that perform transportation under specific contractual arrangements with shippers or travellers• Air carriers can also be distinguished on the basis of whether they provide scheduled service or non-scheduled services (charter)•

3. General Aviation(G.A.): They constitute a second important category of users of the air transport system• General aviation refers to all aviation activities of a private or corporate nature, in which the shipper or traveller provide their transportation by private or rented aircraft• Most common general aviation activities are recreational and corporate flying• Others include industrial, agricultural use, environmental and fire protection, as well as instruction flying• General aviation activities place heavy demands on the air transport system both in terms of airport needs and air traffic control activities• While the total transportation output, in terms of say passenger-kms flown is considerably lower than that for air carriers, the number of flight activities is normally very high• For example, in the U.S. in 1975 the G.A. was 5 times larger than by air carriers (30 million versus 6 million); the total output in terms of passenger-kms flown was only a fifth of that for air carriers (15 billion versus 75 billion)• The increased utilization of general aviation for corporate flying is resulting in increased G.A. demand at the larger metropolitan airports• This creates a further heterogeneity in the mix of aircraft using airport facilities and requires additional care in planning and capacity analysis•

4. Airways: They represent the track within which air transportation vehicle move• While in air transportation this part of the system constitutes a much smaller cost component that for other modes, the nature and structure of the airways system plays an important role in shaping the air transportation network• An important component of the A.T.S. deals with the planning of a navigation aid system for the delineation and "marking" of the airways• The airways system is divided into two levels:

a. The first is the Enroute airspace which provides the airways connecting between the various airport areas in the system•

b. The second is the Terminal airspace providing a space where airways converge to provide access to a particular airport• In most cases, the Terminal airspace is likely to constitute a capacity constraint on the total system long before the Enroute airspace• Sophisticated technology is required to provide for air traffic control in both airspaces, but the Terminal airspace requires more advanced technology in order to cope with the increased number of operations converting on or diverging from a given airport• In many cases, significant increases in system capacity can be achieved simply by investing in navigational aids or air traffic control systems that permit operations into an airport at closer spacing during the night, or during poor visibility conditions•

5. Other Users: Are those whose requirements should be considered in air transport systems planning include the military and the law enforcement• These activities are vital and the planning process should be sensitive to their needs• An important aspect of planning in this regard is the coordination of airspace activities and air traffic control activities between civil and military aviation• In many countries the military exercise their own traffic control and in such cases this coordination is important• Furthermore, military considerations often enter into the design and location of navigable air routes•

6. Operating Environment: Air transportation is one of the systems that are highly regulated and in which government plays an important development and operational role• Air transportation in most countries is predominantly an international transportation system and thus requires government regulation and control• In some regions, government policies are to encourage air transport and to develop national flag carriers, becoming an instrument of national policy• In addition to Government, the air transport system operates within an environment in which many different interest groups and segments of industry are involved• Local community groups are concerned about the socioeconomic and environmental impacts of the system• Airline industry groups are interested in seeing that the common objectives of airlines are sought in the planning process• Aircraft and engine manufacturers are concerned about planning the evolution of aircraft technology and meeting the fleet requirements of the air transport system• All these groups must be involved in the air transport systems planning process, which makes it a multifaceted process where optimal solutions and clear-cut answers are rare, and where good judgement must prevail•

2.6.3. A.S.P.-Planning Boundaries:

• Airport systems planning requires an approach which helps us examine the broad aspects of the problem• We need to develop the capability to identify the salient forces acting upon the system, and to trace out their implications for its performance• We need to acquire the ability to use analytical techniques which permit us to evaluate efficiently the enormous range of alternative designs, operating policies, and schedules of implementation that we should consider• And we need to foster the wisdom to integrate the analysis effectively with social preferences and cultural values (De Neufville-1976)•

• By their technical nature, airports require large amounts of land, particularly for the development of the airfield• Therefore, the location of the airport in a metropolitan area will have significant impacts on the shaping of further land use developments, and traffic patterns• To move airports farther and farther away from the areas they serve may not always be the best solution, for the increased transportation to and from the airport could add up to a significant cost in energy, time and possible pollution• Airports often constitute the major capacity constraints in the aviation system• This is to be expected since airports represent the points of confluence of sometimes large networks of air routes• However, this phenomenon occurs only at a few major hub airports• Usually, there is a few large airports and a large number of smaller airports• For example, in the U.S.A. of the 500 airports served by air carrier service the top 10 account for over 50% of all traffic, and the top 5 account for about 33% of the total traffic• The concentration of the traffic and service patterns of the aviation system in the U.S. can be further highlighted by considering that the top 1.000 of the some 58.000 city-pairs with air service account for 70% of the total traffic•

• Within the usual working hypothesis among airport planners is that they share common goals and problems, since the airlines use only a small variety of aircraft, almost all of which come from a few major manufacturers• The aircraft using the airports thus tend to be alike, and impose similar requirements for the length, width, slope and thickness of the runways, taxiways and parking areas• Passengers are also about the same size and have the same physical needs• It is therefore plausible for airport designers to feel that they all share the same difficulties and should work together toward their solutions•

• There is a large number of international organizations to actively sustain this sense of community, which is really unique among transport planners• The explicit purpose of these groups is to promote collaboration and the dissemination of solutions to problems of mutual interest• The International Civil Aviation Organization (ICAO), the only specialized agency of the United Nations devoted to air transport, works among other things, towards developing international standards and recommended practices for civil airports world-wide• There are three other international organizations that work together world-wide, such as; the Airport Operators Council International (AOCI) in the United States, the Western European Airports Association (WEAA) in Western Europe, and also the International Civil Airports Association (ICAA) in Western Europe • All the three now come together in a joint organization known as the Airports Association Coordinating Council (AACC)•

• The idea that airport planners face the same kind of problems infers that similar solutions should be universally appropriate• Standard reference manuals on airport planning and design have been developed, so it would seem that there is and ought to be substantial agreement among professional planners as to the role, nature, and proper design of airports•

• Nevertheless, there seems to be little agreement about how airports should be planned• When the motivations of designers are considered, it appears that airport planning can only be rationally considered within the context of the cultural and historical values of a society (De Neufville-1976)•

• Aviation Systems Planning, which is another expression for Air Transport System Planning, is a process aimed at translating goals and policies into programs that would guide the evolution of the aviation system• The process is a continuing one and includes the monitoring of the development of the system and the replanning of its evolution (Kanafani-1988)•

• The concept of Aviation Systems Planning process can be applied for national and statewide aviation systems as well as components of such systems as in the case of airport planning•

2.6.4. A.S.P.-Planning Methodologies:

• According to Kanafani(1988) there are many levels at which planning can be undertaken depending on the policy level involved, and the purposes of the process• Most commonly, three such levels are identified in airport systems planning, as follows:

1. **Strategic level:** Which is concerned with the overall interaction of the A.T.S. with the sociotechnical, and the economic systems of the region• At this level policies are made regarding the desired contribution of the system, to the fulfilment of national goals and objectives, particularly in the areas of economic development and social mobility• At this level planning tends to be normative in nature and to be concerned with overall system structure, overall budgeting level, and with options for investment in air transport vis a vis other transportation systems• An important result of this planning level is the assessment of a national, or state air transport system policy• Such a policy would provide the basic guide-lines and criteria for the second planning level•

2. **Tactical level:** Here the specific objectives and goals of the air transport system are taken as given and used to develop alternative paths for its development• The overall development of the system is dealt with at this level and options for network structure, or the location of major growth airports are analyzed• This planning level is not as normative as the strategic and options for system development are looked at in a more exploratory manner• At this level, guide-lines and criteria that will serve as inputs for the third planning level are deal with•

3. **Project level:** Here the concern is with analyzing alternatives for the development of a single project, such as an airport, an airport facility or a navigational aid system• This planning level is more oriented towards the design of air transport projects, and towards costs and feasibility analysis•

• According to Kanafani(1988), within the concept of National Airport System Planning(N.A.S.P.) it is possible to define what he called the Air Transport Systems Planning(A.T.S.P.) process, which can be divided into four major phases, according to FIGURE 2.6.4.-1, as follows:

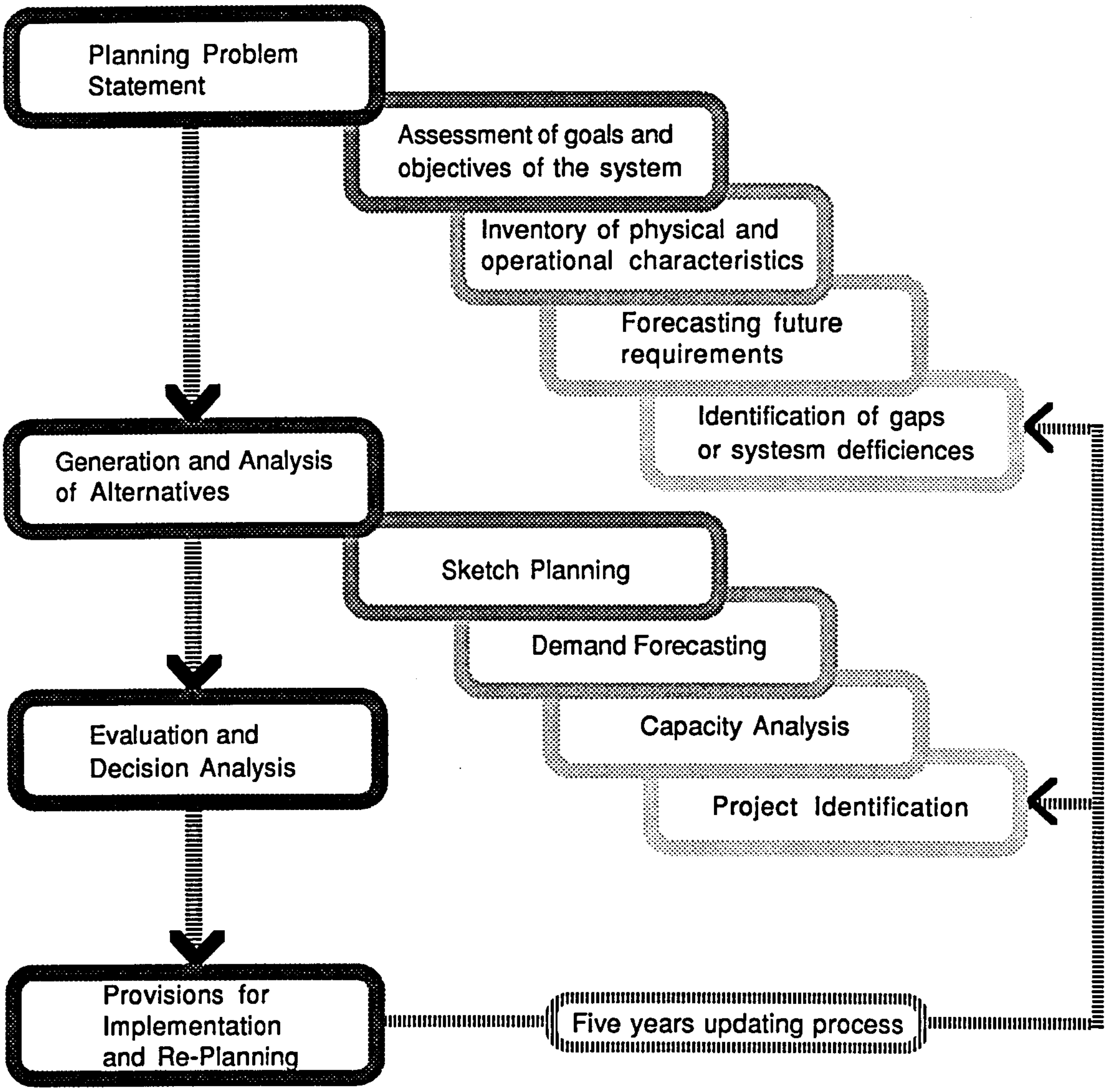


FIGURE 2.6.4.-1
AIR TRANSPORT SYSTEMS PLANNING PROCESS
(Based on Kanafani-1988)

1. Planning Problem Statement: This phase involves assessing the goals and objectives of the system, and making a synthesis of these into clear planning criteria• In this phase the planning problem is to be defined• This definition is often clear and relatively easy to arrive at• However, sometimes it is not as obvious what the planning problem is involved in and some analysis needs to be made• It is desirable that the following four analyses be performed in all planning studies:

a. Assessment of goals and objectives of the system•

b. An inventory of the physical and operational characteristics of the A.T.S.: Traffic activities, technology characteristics, economic and institutional effects are included• A complete data base for planning is to be developed in this step• This data base will serve as both a source of information on the current system, as well as a base for forecasting future system characteristics and requirements•

c. Forecasting Future Requirements: Which involves forecasting system traffics activities and patterns, and facility requirements• Traffic activities result from interaction of demand and supply• Thus in order to forecast traffic, it is necessary to forecast the air transport demands by forecasting socioeconomic activities and transportation activities related to them, and it is necessary to make statement about the supply system• Since one of the purposes of the planning process is to elaborate the supply system, it follows that a feedback process is necessary for forecasting• A supply system must be postulated, and a forecast based on that•

d. Gap identification: The juxtaposition of the air transport activity forecasts with the inventory of actual air transport system capabilities should lead to the identification of system deficiencies and gaps• The gaps are not always necessarily of a physical nature• Often the gaps are identified as inefficiencies in the operation of the system or the allocation of resources within it• This identification should be made on time dimension, so that the gaps as well as the times of their occurrence are defined•

2. Generation and Analysis of Alternatives: In this phase a number of alternative solutions to the planning problem as defined earlier is developed• These alternatives are elaborated, and analyzed so that an evaluation can be made of their relative merits• The results of this phase should provide all the necessary parameters and analyses necessary for the evaluation of the plans and for a rational selection among them• The following analytical steps are normally followed in generating and analyzing alternatives:

a. Sketch Planning: Alternative system configurations are sketched for the purpose of postulating a supply system• Such a postulation is needed for forecasting traffic• At this level it is not necessary to define the details of alternative plans• Nor would this be possible without further analysis• Most importantly would be the location of facilities such airports, and the level of service on the connections between them•

b. Demand Forecasting: To further elaborate the plans for each alternative, it is necessary to forecast traffic and other facility requirements• This is done by applying a demand forecasting method• Traffic forecasts provide the basis for determining facility requirements in terms of airports, aircraft fleets, and navigation systems• Forecasts for passenger and cargo traffic should be made• Some level of detail should be sought in order to facilitate further analysis•

c. Capacity Analysis: The purpose of capacity analysis is to assess the ability of existing and planned facilities to handle traffic• The assessment is used to determine the facility requirements as part of the elaboration of the alternative plans• The scope of capacity analysis includes all the physical components of the air transport system; airport, airspace, and networks• An assessment should be made of airport needs, aircraft fleet requirements, and airspace constraints on network development•

d. Project Identification: After analyzing capacities and delay potential for the various components of the system, the analyst can now elaborate each planning alternative more specifically• By adopting a set of facility requirements for each alternative plan and comparing these with the existing system it is possible to identify specific projects that will be included in each• At this state, it is important to exercise some feedback control• Capacity and Delay analyses are re-checked, and the project specification either confirmed or modified• Feedback is essential if the plan is to represent a coherent set of projects consistent with a demand forecast and a policy regarding the extent to which demands are matched• Another important aspect of this process is policy input• Policy input from decision makers, as well as other participants in the air transport system should be sought at this stage•

3. Evaluation and Decision Analysis: The main thrust of the evaluation process at this stage is to develop a relative assessment of the alternative plans• This is done by preparing for each alternative a ranking or prioritization of projects, which is based on the cost and benefit analysis results performed earlier for each project• The ranking of alternative and prioritization is done at more than one level• In assessing the implications of different choices among plan alternatives, it is important to acknowledge the uncertainties that enter into the evaluations of plans• Uncertainties stem from less than perfect knowledge of the current system, and from inability to predict its future environment• The decision maker may wish to have an evaluation of plans under alternative scenarios varying in the degree of optimism, or pessimism, with regards to the materialization of the basic assumptions made•

4. Implementation and Replanning: The role of the air transport systems planner does not end with the preparation and documentation of a plan, or alternative plans• The planner must also provide guidance for the organization of the institutional requirements for implementing the plan, and for monitoring and modifying the planning activities• It is a dynamic guiding force that directs the evolution of the air transport system, and helps decision makers in making rational decisions concerning the provision and operations of air transport facilities• Consequently, there has to be an indication of best to implement the ideas of the plan and how these might should change the environment within which the system functions change• The air transport systems plan should be updated at regular intervals of, at most, five years• During the updating activity, all the assumptions, criteria and analyses of the plans should be re-examined• Particularly, the forecasts should be re-evaluated on the basis of new activity statistics• This re-planning activity should be a continuing one and should become part of the day-to-day operation of the agency responsible for the planning of air transport•

2.6.5. National Airport System Planning-N.A.S.P.:

• Airports are gateways of the region they serve• Regions with major concentration of population and economy need big airports, whereas regions of minor economic importance can be served adequately by smaller regional airports• This leads to the assumption that the airport system of a country depends highly on the national economic structure, i.e. the location and distribution of population and economy•

• Exploring the consequences of national attitudes on airport planning, De Neufville(1976) has examined in 1976 the current practice in several countries• This examination has enabled us to understand eventually the potential biases more specifically, and the comparison of this sort can only illustrate this possibilities• Looking at airport design in the United States, Britain and France, which are quite similar, at least on a global scale; they are rich, highly developed, and endowed with traditions of democracy and Western patterns of culture• They are also "capitalists" in contrast to the "socialist/communist" nations of Eastern Europe and the "third world" of Asia, Africa, and Latin America• De Neufville also excludes the effects of fundamentally different economic structures and stage of development, in order to focus more squarely on the implications of different national attitudes concerning air transport systems planning•

• Caves(1986) has presented an international analysis of National Airport Systems practices, which included; U.S. State System Plan in Alaska, United Kingdom, Canada, France, Germany, Italy, Japan, Norway, and Brazil• In this analysis he has included a terminological exam of the words "airport", "systems" and "planning" where their applicability and adequacy to N.A.S.P.is explored• A three dimensional graph, was produced to identify what was called "The problem of system boundaries", according to FIGURE 2.6.5.-1, where the following factors were considered:

1. Number of Airports (spatial scale)•

2. Transport System•

3. Sectors of the Economy•

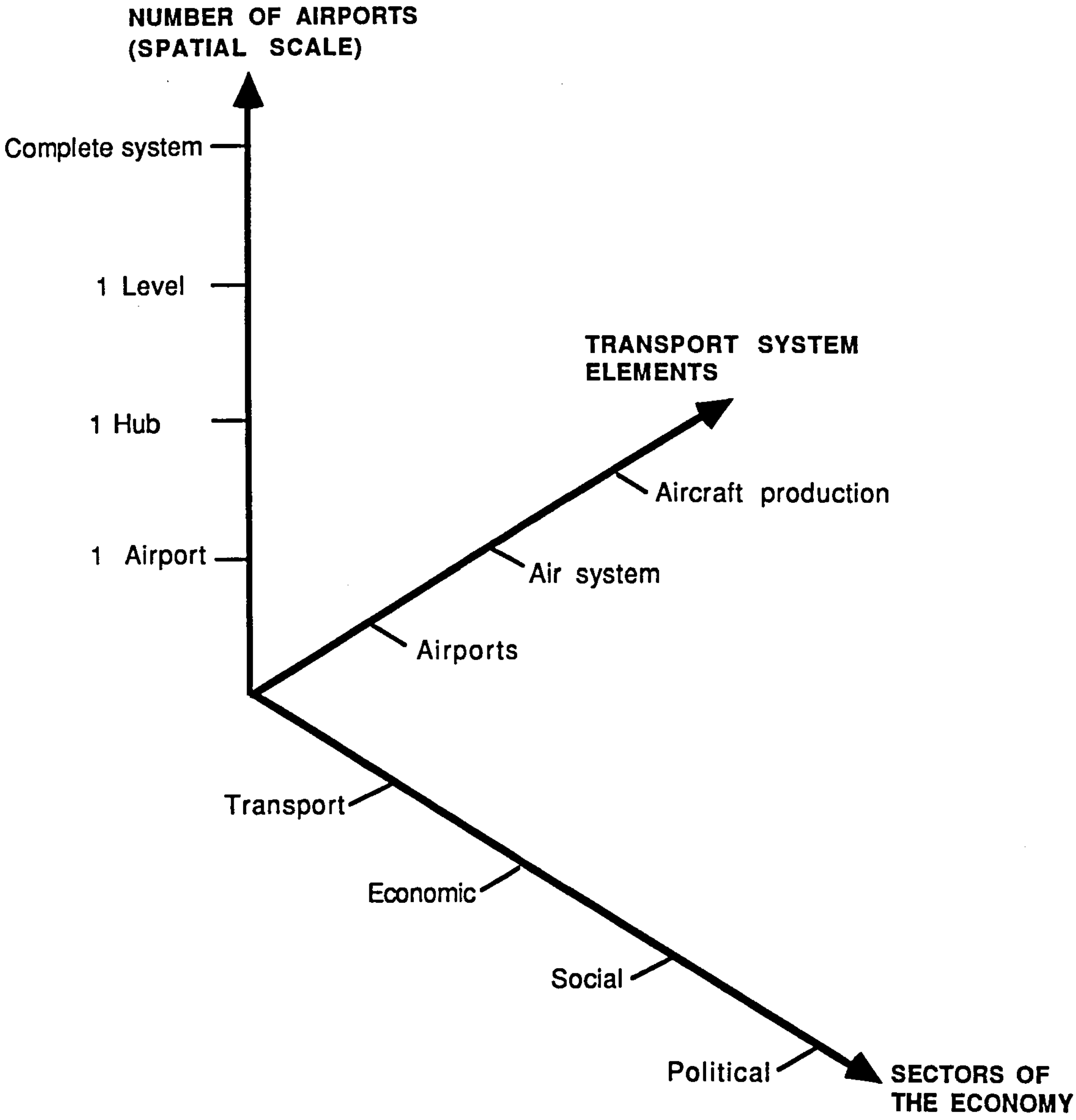


FIGURE 2.6.5.-1
THE PROBLEM OF SYSTEM BOUNDARIES
(Base on Caves-1986)

• Just to mention the U.S.A. dynamic example of N.A.S.P., quoting De Neufville(1976);"In the U.S.A. the National Airport System Plan, is a compendium of supposed aeronautical requirements that the national government compiles from local data• It grows out of a variety of ambitions and makes little effort to reconcile conflicting interests, to determine the most efficient use of resources, or even to ensure that the proposals are logically consistent• The U.S. National Airports System Plan is basically a "wish list" of aviation enthusiasts• Projects become part of the Plan if they pass certain minimal tests concerning their suitability for airports of a particular size• There is little assurance that the Government can or will do much to implement the Plan; in fact, it explicitly denies any such commitment• The practical significance of the US Plan is that it provides a list of the projects eligible to fight for the privilege of receiving funds from the National Airport Development Program"•

• According to Caves(1986), in 1984 the FAA produced the National Plan of Integrated Airport System(NPIAS) to replace the earlier National Airport System Plan(NASP) of 1978• The main target for the NPIAS is to ensure that each community has an adequate access to a safe and efficient airport service• It has been included 3.219 existing airports from a total of 16.029 airfields• The main characteristics of the NPIAS are as follows:

1. Its role is to support the needs of civil air transport, defense and postal service with a safe, efficient and integrated system•

2. The federal goal is to provide public access to national air transport, at a level of a 30 minute road time to an adequate airport, paying attention to the diverse needs across the nation•

3. The FAA provides financial support for the planning function as well as the implementation from NPIAS through the Planning Grant Program•

2.7. CONCLUSIONS:

• After this round of literature review over the four selected areas of both academical and professional knowledge, i.e.; Transportation, Air Transport Industry-Airports, General Systems Theory and Planning Theory and Planning Practices, the conclusions are as follows:

1. The Air Transport Industry(A.T.I.) has been identified as a system with the following characteristics:

1.1. The A.T.I. is a "*real* " system because it has material entities and does exist in real space-time•

1.2. The A.T.I. is a "*open* " system in relation to its environment, because its material entities, energies or information have been exchanged with the environment in a regular manner•

1.3. The A.T.I. is an "*adaptive* " or variable-utilization system which involves humans in a essentially non-mechanical way to make decisions that modify the system operation•

1.4. The A.T.I. has a morphology of "*being* " with an undergoing irreversible external(exogenous) changes in time, i.e., "*becoming* " characteristics•

1.5. After using both the behavioural and the structural knowledge about systems theory it is possible to say that the A.T.I. can be include and consequently be examined within a general classification of systems problems•

2. The Evolutionary aspect of The Planning Context which has been described by The Air Transport System Planning Field is a normal characteristic of any other plannable activity or System•

3. The Dynamic aspect of The Air Transport Industry which is described by its Unpredictable Factors is a normal set of components which does exist in any other plannable activity or System•

4. The permanent "State of Tension" of The Air Transport System is not a specific situation of the identified Planning Field but a "Sine Qua Non" factor of any Planning Field from the Systems Planning point of view•

5. From the Systems Planning point of view it is possible to came up with another conclusion, i.e.: "The three above specific characteristics of The Air Transport System may be composed as follows:

5.1. The System Dynamics,

5.2. The Evolutionary Context of Systems, and

5.3. The Permanent State of Tension, are the indication of The Level of Entropy of any System Planning Field•

6. Consequently, any Planning Practices Improvement should take into account the identification of both the specific characteristics of the selected System Planning Field and its specific level of Entropy, within the concept that The Real World is a Common Planning Context for any System Planning Field•

7. Any Planning Practices Improvement should preserve the specific system characteristics and promote the adequate level of Entropy of The System Planning Field• From the System Planning point of view these aims can be obtained by promoting both the common Goals and Objective identification and also by improving the Common Ends and Means Selection Process, i.e., Common Planning Methods and Common Planning Values•

8. The Identification of Common Goals & Objectives, and the selection of Common Means & Ends can be achieved through the adequate level of Communication and Information Exchange among the Sub-systems and Elements of the system, and also between themselves and The Planning Context• In other words, through the achievement of the adequate level of Entropy to The Selected Planning Field•

9. Planning thus involves man closely with Nature and Life• Planning is done by human beings for human beings• Planning is a human activity and a systems view of planning is concerned with making the most and best use of human abilities: it is a human conception and seeks human decision and participation•

10. Because systems are in continual evolution, the phenomena of change will demand close attention; the focus will move from description to understanding, and from understanding to prediction(scenario writing)•

11. Within the systems approach to planning and design, we should not hope to find definitive answers to the whole or portions of airport system planning or any other transport problem• The fact that airports exists in a competitive environment underscores the idea that we should plan for systems of airports rather than individual airports alone• As Webber(1973) succinctly put it;"There are no set solutions• There is no way to find out what is right• Indeed, there is no one right to be found, and therefore, since there are no technically valid answers to systems designs that affect social systems, no science can define human welfare...there can be only politically derived answers• The task of the systems designer is therefore to contribute better information, better forecasts, better analyses...such that more enlightened...bargaining can be engaged among the several competing publics"•

12. Despite the holistic idea of system approach which is clearly implied within the concept of N.A.S.P., we should be aware that the future performance of the air transport system is still inherently uncertain•

13. Quoting De Neufville(1976); "Since definitive monographs can, after all, only be written after all the results are in; because they are the epitaphs for activities that have ceased to change, which definitely is not the case for N.A.S.P.s• We may proceed on the premise that a good question is half the answer, by suggesting some of them, as follows:

1. *What are the elements that limit the transfer of technology and its applicability between different cultures* ?

2. *What combination of methods will be most effective for developing procedures and strategies for uncertain futures* ?

3. *How do the different elements of the air and groundtransport interact, and how do people choose between them* ?

4. *How should we pragmatically balance fairness to all elements of the community and economic rationality in paying for airports* ?

CHAPTER 3

CHAPTER 3:

3. The Proposed General System Planning Methodology-G.S.P.M.:

3.1. Introduction:

• Model building and methodology are fundamental to policy analysis as for instance; orderliness, predictability, controllability, and reduction of and allowance for error are some of the hallmarks of methodology• Because methods are the outcome of complex social demands, it is obvious that one can predict what will happen to methods if one can predict what will happen to society (Khisty-1985)• There is yet a deeper aspect to method, since a knowledge of method shapes the perception and ultimately the organization of the world by those who posses it• In this sense, method becomes the organizing basis for a world view• Methods originate, modify, and change over time because of the environment in which they are applied• According to Teitz(1974) there are four distinct phases of the development of methodology: definition, formalization, maturity (and diffusion), and decline, following the aspect that Methodological development is naturally a dynamic process with an essential feedback element (Khisty-1985)•

• When Gillingwater(1975), made his analysis about "processess of planning", he started by formulating two questions; "What do we mean by theory?", and "Why do we need a theory to explain the processes of planning?"• The first of these questions can be tackled with few problems, he said, by arguing that any "good" theory provides an orientation to the subject under study and thereby makes a further contribution to the level and body of existing knowledge, quoting Deutsch(1971), who has stated that: "...a theory is not a simple proposition but a configuration of interrelated propositions...progress in knowledge changes our knowledge of single facts or propositions, leaving the larger...configurations of thought substantially unchanged• There are two components which need to be considered in dealing with the second question, said Gillingwater(1975); the first strand stems from the discussion concerning the use, of existing formal theories, and in particular theories of government and democracy• In other words; "...the sum total of those theories which are of use in and which impinge upon the study and practice of planning do not add up to a satisfactory fully worked-out theory of public planning" Faludi(1973a)• The corollary to this "grand conspiracy theory", said Gillingwater, is that such a theory has not been allowed to develop because these doubts and criticisms have had a very powerful formal historical, political and theoretical base, which is; the philosophy and practice of "laissez-faire" Self(1972a)• The second strand , said Gillingwater, came in presenting the three relational components of a theory for planning, such as; internal, internal-external and external• It was argued that the internal component could be considered as a problem of methodology, and in particular a problem of the philosophy of method, by quoting Faludi(1973a), where he says that; "...the problem is more than one of method but rather the application of scientific method"•

• From the point of view of the internal component of planning, the importance of this conclusion concerns the way in which the idea of theory can be moulded with the idea of methodology Gillingwater(1975)• He follows this up by saying that;"... here is the departing point to develop a sketch for a theory of planning substantively different from them...; the starting point for this departure is the manner in which the two strands outlined, theory and methodology relate to one another"• He said that; "This methodology assumes that a sequence of clearly identifiable stages are systematically worked through, stages which accord with the manner in which rational decisions are made", and according to Hart(1974) these stages are as follows:

1. A clearly formulated problem exists;

2. the objectives of the policymakers are known and it is possible to at least approximately determine whether they are being achieved;

3. an "envelope" defining the action space available is both known and well-defined with regard to all possible alternatives;

4. there also an outcome envelope containing all possible consequences of all the available options;

5. the policymakers have a preference function with regard to the outcome envelope which allows them to select and rank preferred alternatives•

• In the next stage of Gillingwater's considerations about philosophies of scientific method he said that; "If it is accepted that a concern of planning is with the theory of method, then it is possible to opt for one of two approaches; either to consider the less developed philosophies of social method or to consider the more highly developed philosophies of scientific method"• With this he said; "Subject to the caveat that public planning is not necessarily solely concerned with the application of scientific method to social problems, for the purposes of the processes of planning it is proposed to opt for the more refined approach, which means the philosophy of scientific method• Furthermore, he said that;..."this is not to argue that planning is scientific method; rather planning can learn much from the debate and discussion concerning the development of scientific discovery"•

• According to Gillingwater(1975), and Medawar(1969); "There is no such thing as the philosophy of the scientific method, but rather a series of competing philosophies of what might constitute scientific methods", among them he describes the following two; First "the inductivists" (those philosophies, chiefly positivism which regard scientific method as corresponding to the process of verification by inducing "facts" from observed phenomena); Second "the deductivists" (those philosophies, chiefly indeterminism which regard scientific method as corresponding to a process of theorizing (conjecture) and theory testing (refutation)• In between these two gargantuans are the emergent philosophies which attempt a crude synthesis between induction and deduction, which are referred to as the hypothetico-deductive approaches to the logic of scientific method Medawar(1969)• Of these three philosophies the hypothetico-deductive approaches are the least well-formulated and therefore the most tentative, and the two competing giants remain; induction versus deduction, determinism versus indeterminism, empiricism versus theorizing, quoting Gillingwater•

• In his considerations about scientific methods Gillingwater(1975), said that; "The process of deduction is very much the antithesis of the process of inductive logic"• Furthermore; "The essence of the deductive method is the bringing together of theories and their evaluation by the mutual interaction between conjecture and refutation"• According to the deductive school it is impossible and therefore undesirable to attempt to prove or verify anything Popper(1972)• The principle of deduction is therefore based on the critical assertion that both the philosopher and the scientist are concerned with problems, and in particular with the problem of the development of knowledge, in this case scientific knowledge• The problem is therefore to focus attention on the weaknesses, the ambiguities, the gaps in our knowledge...with problems per si Gillingwater(1975)• Or, as Popper(1963) succinctly puts it: "We are not students of some subject matter but students of problems"• Gillingwater has quoted Hart(1974), saying that; "The crux of scientific discovery involves two dual notions about the rôle of scientific method:

1. that the logic of scientific method involves the constant formulation and reformulation of ideas and theories (problems) via the process of continuous conjecture and refutation (between problems and tentative solutions);

2. that the logic of scientific method is characterized by the qualities of continuous mutual interaction and constant interaction between the impact of existing problems and intentions to solve them; conjecture and refutation, resulting in the gradual extrusion of revised ideas, principles and theories"•

- In the discussion about deductive-indeterminism and the process of planning, Gillingwater(1975) has stated that its principal argument was given by Sir Karl Popper(1974)• He goes further saying that Popper's approach to the problem of deduction rests on the assertion that the growth and development of "objective knowledge" is based on the continuous search for knowledge and the solving of problems• Popper argues that "all societal action is a continuous engagement in problem-solving", and Gillingwater(1975) said that Popper has characterized the underlying pattern of this process in terms of a simple and elegant logical construct, as follows:

$$P_1 \longrightarrow TT \longrightarrow EE \longrightarrow P_2$$

- Gillingwater has used Popper's terminology in saying that;"A deductive approach to the problem of scientific method is concerned with the interrelationships between "problems", "tentative theories", and the "elimination of error" between concepts of theories matched with perceptions of problems"• Whereas Popper said that; "...all scientific discussions start with a problem (**P_1**), to which we offer some sort of tentative solution - a tentative theory (**TT**); this theory is then criticized, in an attempt at error elimination (**EE**); and as in the case of dialectic, this process renews itself: the theory and its critical revision give rise to new problems (**P_2**). In other words,...science begins with problems and ends with problems•

- Based on Popper's deductive-indeterminism approach in planning, this research has proposed the G.S.P.M. as a flexible planning instrument to promote planning practices improvement in a continual planning process, through two of the most important planning aspects; adequate planning methods and appropriate technology within a multiobjective planning context•

3.2. The G.S.P.M. Justification:

• The general problems and specific failures of modern planning methodologies and the application of technology in developing countries prompted Schumacher to advocate appropriate technology as a means of improving the condition of the nonindustrialized world•

• Recent interest in appropriate planning methods stems from the general dissatisfaction with the planning and development process expressed by the public in developing countries• Planners dealing with the planning process in these countries have also expressed frustration with applying the conventional sophisticated planning methods• The main objective of this research is to clarify the issues concerning appropriate planning methodology applicable to middle income and economically active countries, and to identify areas where further research is needed to improve policymaking in the choice of planning methodology•

• Very little systematic research has been conducted into appropriate planning methodologies applicable to developing countries• The reasons for this situation are not difficult to find• First, innovation in planning is almost always induced as a response to a perceived need• Second, there appear to be economies of scale in the research and development field for evolving such techniques• Third, the existing examples of planning adaptations of Western techniques in developing countries have been erratic• Little is known about their success• It could be generally concluded that major planning adaptations falling in the category of appropriate planning will not be forthcoming if research and development is left solely to private researchers (Westphal-1978)•

• Equity, is another important factor affecting developing countries using traditional planning and technology borrowed from the West• Environmental factors, including a focus on energy use, is yet another problem in these countries• The choice and application of appropriate planning methods in developing countries is one of the most important collective decisions confronting any country• It is a choice that determines, among other things, how, when, and where improvements should be made to the infrastructure in keeping with community goals and objectives, and this decision in turn affects the whole quality of peoples' lives (McRobie-1981)•

• There is naturally a lot of controversy regarding appropriate planning and technology• The advocates of current planning and technology believe strongly that greater economic growth through capital-intensive and energy-intensive plans is the way to go, whereas proponents of appropriate technology claim that current planning and technology have resulted in negative impacts to the environment and the quality of life• Indeed, it is claimed that in countries where high technology is practiced, a point of diminishing and even negative returns to scale has been reached•

• The term "appropriate" is itself one of the general terms that has come from the literature on planning, technology, and development• Most authors agree that the fundamental requirement of appropriate technology is that it make optimum use of the available resources in a given economics environment (Porter-1980)• Schumacher, the originator of the idea and philosophy of appropriate technology, illustrates the value dependence of economics by comparing two economic systems embodying entirely different values and goals• In one system the quality of life is measured by the amount of annual consumption, in the other system, the aim is to achieve a maximum of human well-being with the minimum of consumption (Schumacher-1973)• Leopold Kohr has answered several questions raised in connection with the meaning of the term "appropriate", which implies the existence of limits• Beyond certain limits technology not only ceases to be a solution but is actually the most intractable obstacle to it• Planning and technology are most efficient when they provide humanity with the cultural, political, economic, and convivial ingredients that make up the good life (Kohr-1981)•

• Planning and technology are described by their input requirements, such as; labour, capital, and materials along with the expertise required to plan• The solution in attending to these requirements lies in reducing and or in balancing the input requirements to dimensions where "appropriate" tools for human improvements can be furnished through simpler, cheaper, and transparent methods• Modern methods of planning and the application of the latest technology as used in the developed industrial world have traditionally been recognized by developing countries as the driving force behind the apparent growth and prosperity of the Western world• This prosperity and growth is reflected in the quality of life and again the apparent well-being of the people inhabiting the developed industrial world•

3.3. The - G.S.P.M. - Theoretical Model:

• At this stage it is necessary to state that by General System Planning Methodology(G.S.P.M.) we mean the normative framework for the procedural planning process with a system approach• The G.S.P.M. is supposed to be applicable to any planning field• This meaning also includes the assumptions and values that serve as a rationale for planning and the recommended standards or criteria the planners should use for interpreting data and reaching conclusions in terms of goals and objectives identification• The proposed G.S.P.M. determines such factors as how the planners should write alternatives and what level of evidence is necessary to make the decision whether or not to reject an alternative• Although the initial focus of this research is directed toward land use, transportation and environmental planning, the idea is to have the results extended for general application to the planning of the urban, rural, educational and socioeconomic infrastructure•

• The methodological process of planning can be stated very shortly; a problem is complex, and also spatially extensive• The sheer amount of data which has to be shifted around, collected, analysed, digested, projected, is considerable, so that physical effort together with great mental effort is involved in the understanding, let alone the manipulation, of specific situations• Indeed many specific plans scarcely get beyond the assembly of data, much of it unused and unusable• The case is a classic one in cybernetic terms; the high variety system which resists piecemeal attempts at understanding and manipulation, and demands a level of requisite variety reduction through modelling; from analogy, to homorphism, and then to isomorphism; their control is possible through the opposite process of variety generation in the controlling system from the firm basis of the modeled system• Even so, the process of modelling systems is difficult and laborious, but there is one important aid to the appreciation and manipulation of such systems; the human eye, and the brain which controls it• It is fortunate that the subject of planning is extensive, and that the number of planning actors are great and there are also multiple objectives to be achieved• The human eye and mind can thus appreciate and manipulate problems of either spatial or aspatial data with considerable speed and dexterity, both in matters of understanding what exists and of creating what may exist• We must not despise the commonplace and yet beautifully, wonderfully complex attributes of planners as human beings, for planning is essentially a man-machine system, and man as operator as well as decision-maker is an essential component•

• The design method and its practice distinguish the engineer from the scientist• Each is a problem-solver, but has different kinds of problems to deal with• Put simply, the scientific method is a pattern of problem-solving behaviour employed in finding out the nature of what exists, whereas the design method is a pattern of behaviour employed in inventing things of value which do not yet exist• Science is analytic; design is constructive (Gregory-1966)•

•In Gillingwater(1975) an alternative approach, based on deductive-indeterminism, was developed and related to the particular demands of planning, by pulling together its various strands, and so submit it as a basic organizing framework for an outline of a theory to account for the internal processes of planning• This framework is therefore characterized by at least seven amorphous attributes as follows:

1. it is a problem-solving framework,

2. it is a theory-incorporating framework,

3. it is a framework which gives explicit recognition to the idea that planning is concerned with dynamics,

4. it is a framework which explicitly incorporates the idea that planning is process-oriented,

5. it is a framework which explicitly recognizes that planning operates in an environment of relative if not total uncertainty,

6. it is a framework characterized by the idea that planning is concerned with the continuous and mutual interaction between problems and solutions, theory and practice, impact and intent,

7. it is a framework characterized by the idea that planning is concerned with the notion of constant interaction between problems and solutions, theory and practice, impact and intent•

• The Systematic Design method which is explained by Christopher Jones(1962) is primarily a means of resolving a conflict that exists between logical analysis and creative thought• The difficulty is that the imagination does not work well unless it is free to alternate between all aspects of the problem, in any order, and at any time, whereas logical analysis breaks down if there is the least departure from a systematic step-by-step sequence• It follows that any design method must permit both kinds of thought to proceed together if any process is to be made• Existing methods depend largely on keeping logic and imagination, problem and solution, apart only by an effort of will, and their failures can be ascribed largely to the difficulty of keeping both these processes going separately in the mind of one person• Systematic Design is primarily a means of keeping logic and imagination separate by external rather internal means as follows:

1. *To leave the mind free to produce ideas, solutions, hunches, guesswork, at any time without being inhibited by practical limitations and without confusing the processes of analysis •*

2. *To provide a system of notation which records every item of design information outside the memory, keeps design requirements and solutions completely separate from each other, and provides a systematic means of relating solutions to requirements with the least possible compromise • This means that while the mind moves from problem analysis to solution seeking whenever it feels the need, the recording develops in three distinct stages :*

I. Analysis: Listing of all design requirements and the reduction of these to a complete set of logically related performance specifications•

II. Synthesis: Finding possible solutions for each performance specification and building up complete designs from these with least possible compromise•

III. Evaluation: Evaluating the accuracy with which alternative designs fulfil performance requirements for operation, manufacture and sales before the final design is selected•

• Systematic Design Method as seen by Jones is, therefore, an attempt to adapt the normal stages of scientific method within a procedural context which aims at providing the greatest freedom for the creative abilities of the designer•

• Scientific Method begins by stating the problem, or in our system version, by describing the system in question• In Christopher Alexander's discussion of design, the ultimate object of which, he says, is "form", he suggests that every design problem is an effort to achieves "fitness" between two entities; the "form in question" and "its context"; "The form is the solution to the problem; the context defines the problem" Christopher Alexander(1964)• We must define the context, therefore, in order to find the form that will fit it• Alexander points out that there will be, in fact, several boundaries, a number of nested, overlapped form-context boundaries at which fit will be needed, and sensitive designers are aware of this property of good fit, although there is no reason to suppose that any one form-context boundary which we choose to examine is significantly different from any other• The analogy here, perhaps, is with the level of resolution at which we choose to define a system: all systems may be different in one sense, but in another sense all systems can be defined in exactly the same way in the concepts and language of General Systems Theory, according to Klir and Valach(1967)•

• The form must fit the context: if we assume "good fit", then the form is complementary to the context: the form is defined by definition of the context• This should not surprise us for we commonly recognize situations as "problems", but a problem implies a goal, a desire state, plus an impediment to the achievement of that state: if we recognize a problem we are therefore, in a sense, recognizing its solution in the state desired, for the impediment can be seen simply as lack of "fit"• Alexander points out that it is the context which is often obscure, so that we cannot give a fully coherent criterion for the fit we are trying to achieve• We must therefore define the context in appropriate ways so that we can establish the kind of fit required, and thus implicitly define the "form" which will fit the "context"•

• The General System Planning Methodology(G.S.P.M.) is expected to provide the basic characteristics of the planning "context" and a set of preferred planning factors to define the suitable "form" of planning• Nevertheless, the G.S.P.M. effectiveness can be represented by the three selected objectives of Planning Improvement expressed by; **PI(Planning Improvement) = PA(Planning Adequacy) + PF(Planning Flexibility) + PC(Planning Continuity)** as shown in FIGURE 3.3.-1• Furthermore, the General System Planning Methodology(G.S.P.M.) has been also proposed with the objective to promote the following aspects of planning:

1. To promote economic development•
2. To promote social equity•
3. To promote environmental protection•
4. To promote the multi-disciplinary balance within;

Transportation,

Land use, and

Environmental issues•

5. To promote a joint planning within the decision making process•

6. To help with the production of a transparent planning process for the decision takers•

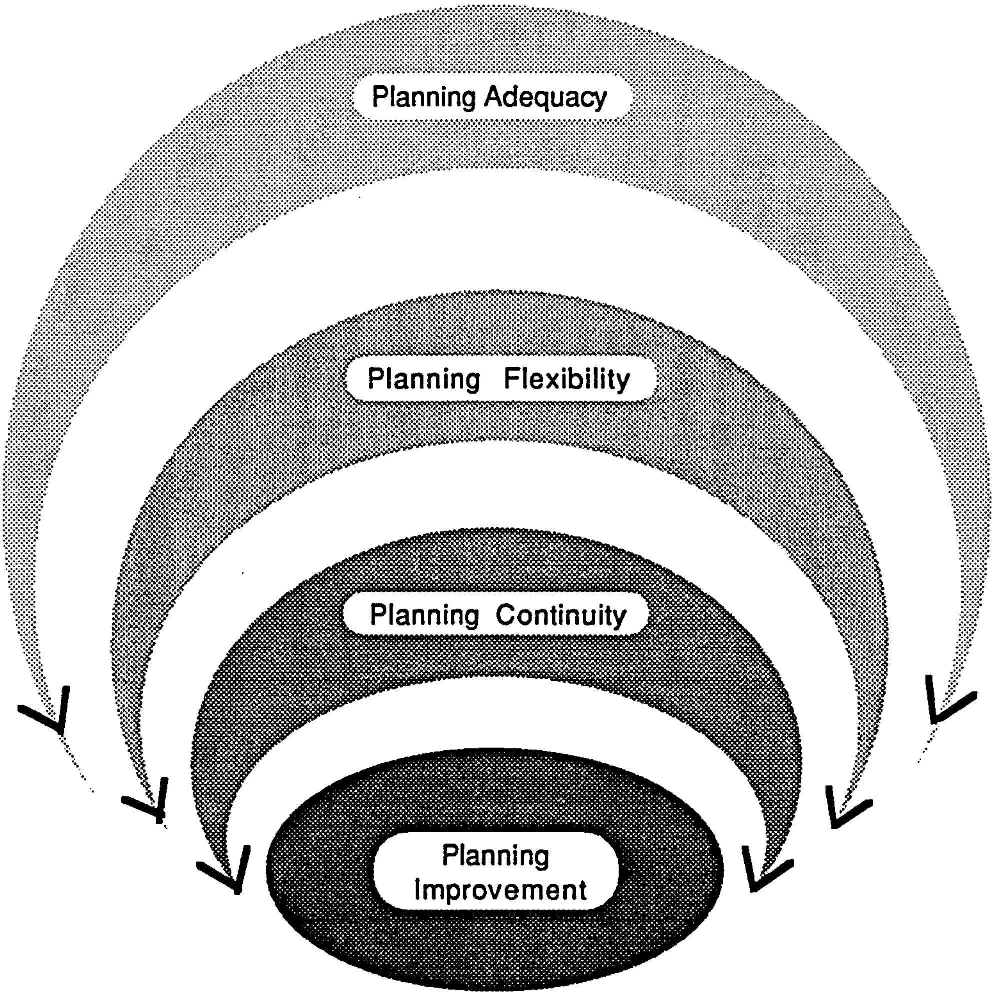


FIGURE 3.3.-1
PI = PA + PF + PC

•The G.S.P.M. has been proposed as a superposition of two Axiomatic Theories which were selected from the literature review in Chapter 2, and they are as follows:

1st. Axiomatic Theory

" While the mind moves freely within creative thoughts from problem analysis to solution, simultaneously the logical scientific design method should be developed in three distinct stages as follows:

Analysis

Synthesis

Evaluation "

"Scientific Design Method"
(Christopher Jones-1962)

2nd. Axiomatic Theory

" Every design problem is an effort to achieve fitness between two entities, as follows:

The form in question...(A General System Planning Methodology - G.S.P.M.)

And its context..."(Theoretically to any planning field, within any context)
(Tested at a National Airport System Planning - N.A.S.P. for Developed Countries and Middle Income and Economically Active Countries - M.I.E.A.C.)

"Form & Context - Concept of Fitness"
(Christopher Alexander-1964)

- A "conceptual framework" has been given to the General System Planning Methodology(G.S.P.M.) in terms of Theoretical Model at this stage of the writing process• The diagrammatic result of this "conceptual framework" is given by FIGURE 3.3.-2 which was called General System Planning Methodology - Theoretical Model• The G.S.P.M. is composed by five basic steps as follows:

1.st. Step: Definition of the Context: Starts with the common sense understanding of the planning environment by the multi-disciplinary planning actors involved in the planning process; second, the multi-disciplinary planning actors should have a deep and thorough information concerning to the specific characteristics of the planning context such as: socioeconomic, geographic, ecological, technical, cultural, and political issues; third, the multi-disciplinary planning actors should be able to identify the preferred objectives within the planning context•

2.nd. Step: Analysis: The multi-disciplinary planning actors should have an effective and sensitive instrument of system analysis• This research has proposed the Multiple Cross System Analysis Matrix(M.C.S.A.M.) for multi-disciplinary planning teams acting within multiobjective planning contexts•

3.rd. Step: Synthesis: The multi-disciplinary planning actors should have an effective and sensitive instrument of synthesis in planning• This research has proposed the M.C.S.A.M. as an instrument designed to identify the planning context and planning environment through their preferred planning aspects and preferred planning factors and goals• This identification will help with the selection of the adequate planning method, and appropriate technology in a multiobjective planning context•

4.th. Step: Evaluation: The multi-disciplinary planning actors should have an effective and sensitive instrument of planning evaluation• This research has proposed the M.C.S.A.M. as an instrument to help with the selection of the adequate planning evaluation method for the multiobjective planning context, by providing the common factors and goals rank, as the potentially most effective planning variables•

5.th. Step: Definition of the Form: By the end of the G.S.P.M. application process the planning actors should have an effective identification of the resulting "form" given by the preferred planning factors and goals, which will indicate the adequate planning process• Therefore, supported by the concepts of "form & context" and "fitness" in planning this research has proposed the iterative process of multiple-feedback flow, with the idea of "tailoring" the "form" given by the adequate planning process to the multiobjective planning "context"•

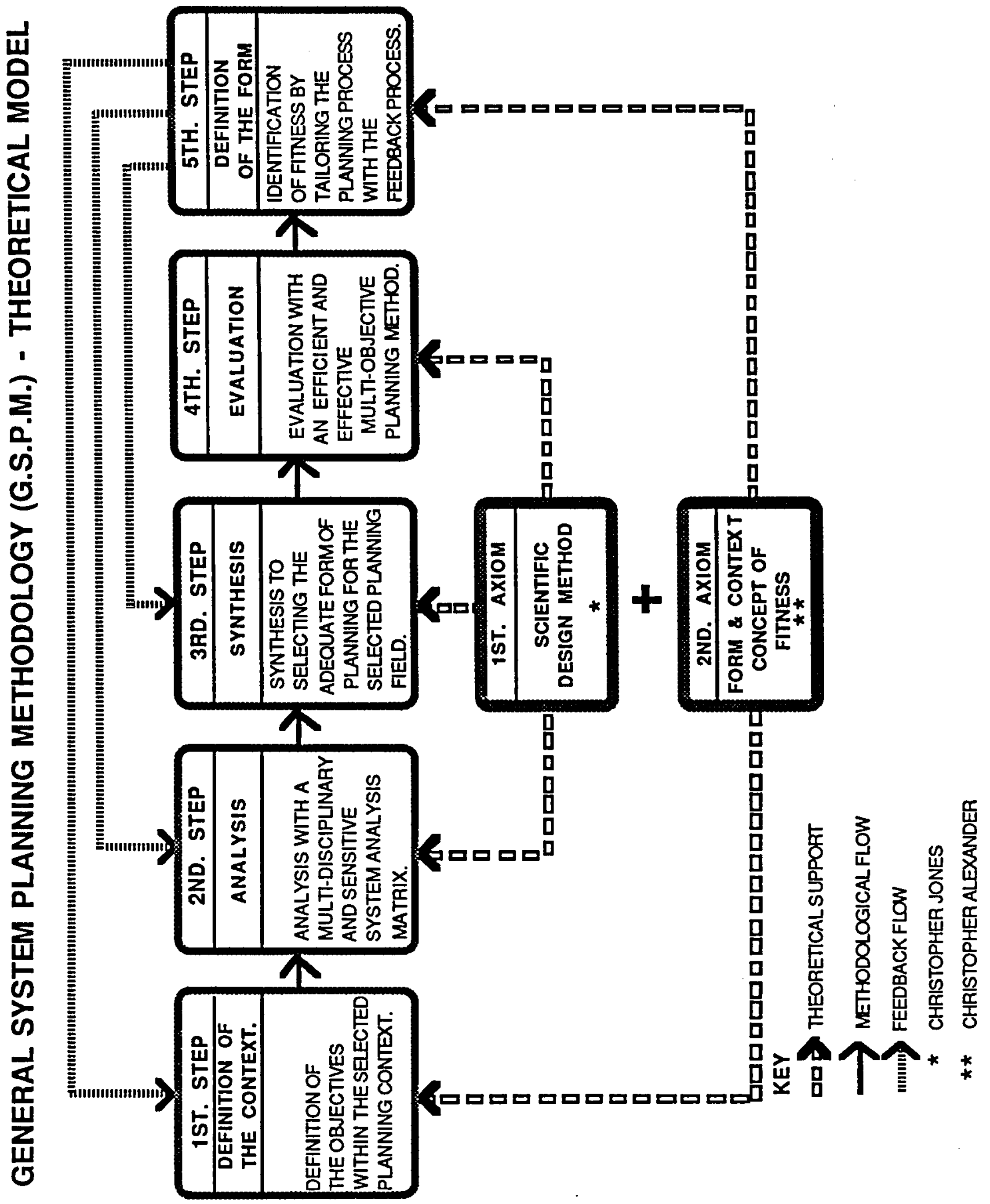


FIGURE 3.3.-2
G.S.P.M. - THEORETICAL MODEL (RESEARCH PROPOSAL)

• In order to test the G.S.P.M. applicability this research has proposed an operational process, which is composed by a Multiple Cross System Analysis Matrix(M.C.S.A.M.), presented in Chapter 4 and a set of three interdependent flows called respectively; operational flow, methodological flow and feedback flow• Each one of the flows are responsible for at least one of the sequential steps of the G.S.P.M. theoretical model• The G.S.P.M. operational process is diagrammatically shown in FIGURE 3.3.-3 and the description of the process is as follows:

1. Operational Flow: Composed by Input 1, Input 2, Output 1 and Output 2• Input 1 and Input 2 are the feeders of the M.C.S.A.M. and responsible for the 1st. methodological step of the G.S.P.M. or more specifically for the initiation of the operational process• Output 1 and Output 2 are the results from the M.C.S.A.M.• The operational flow components can be described as follows:

Input 1. Is the definition of the needs and requirements of the planning context• This has been called of the 1st. operational step of the G.S.P.M.•

Input 2. Is the definition of the values of the planning context• This has been also called of the 1st. operational step of the G.S.P.M.•

Output 1. Are the preferred common values of the planning context•

Output 2. Are the preferred needs and specific characteristics of the planning context•

2. Methodological Flow: Composed by three methodological steps such as; the **Analysis** which is also called the 2nd. methodological step of the G.S.P.M.; the **Synthesis** which is called the 3rd. step of the G.S.P.M.; finally, by the **Evaluation** which is the 4th. step of the G.S.P.M.• The methodological flow can be described as follows:

Analysis or 2nd. step: Is the result of interaction between the two initial inputs•

Synthesis or 3rd. step: Is the result of the interaction between the output 2 and input 2•

Evaluation or 4th. step: Is the result of the interaction
between the output1 and output 2•

3. Feedback Flow: Composed by two feedbacks which are responsible for the 5th. methodological step of the G.S.P.M.• The feedback 1 will interact with the initial input 1 and promote new patterns to feed the M.C.S.A.M. for the next G.S.P.M. operational round• The feedback 2 will interact with the initial input 2 and promote new patterns to feed the M.C.S.A.M. for the next G.S.P.M. operational round• Both feedback 1 and feedback 2 are responsible for the definition of "fitness" of the operational process, i.e., the level of adequacy of the resulting "form" to the planning "context"•

G.S.P.M. OPERATIONAL PROCESS

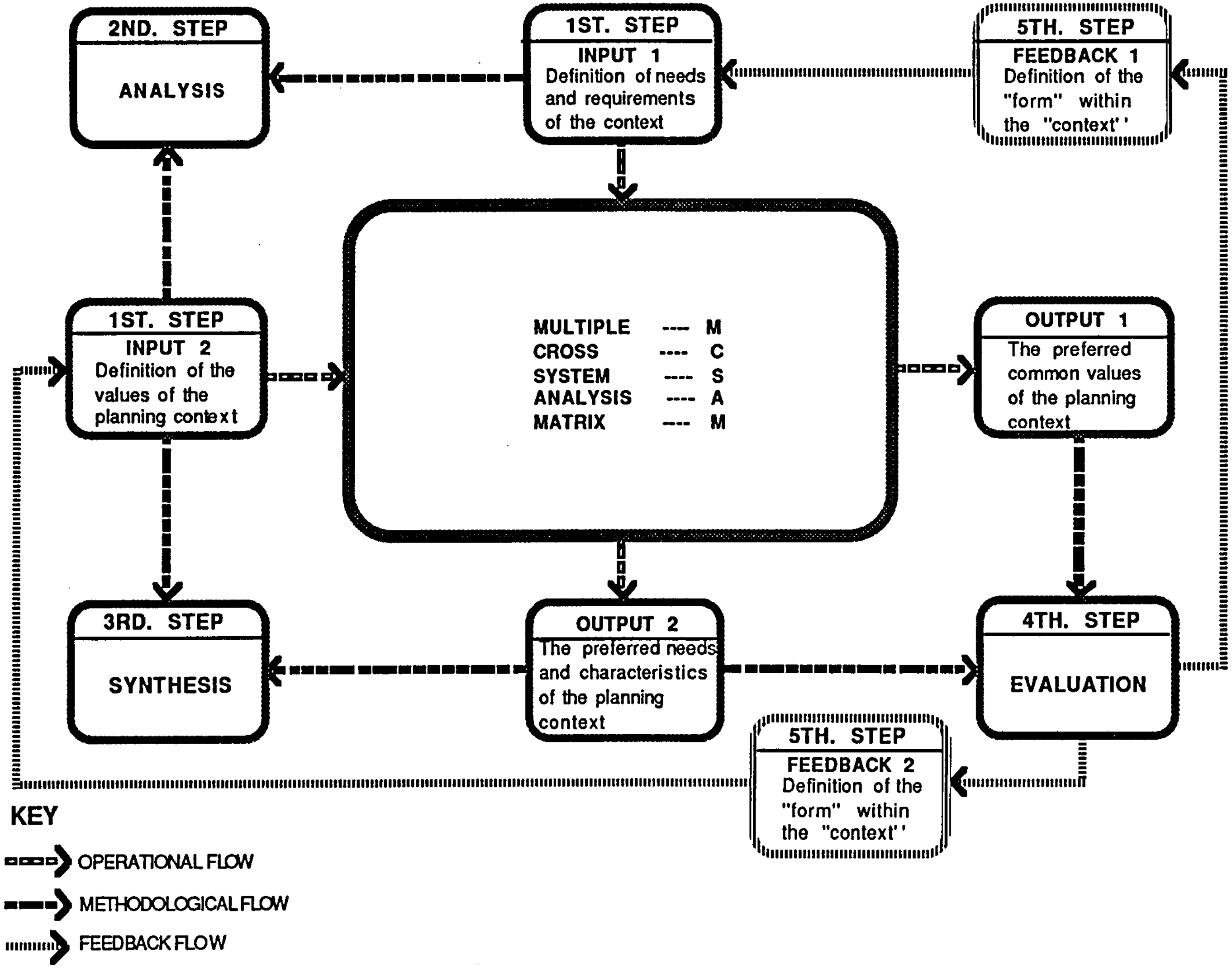


FIGURE 3.3-3
G.S.P.M. - OPERATIONAL PROCESS
(RESEARCH PROPOSAL)

3.4. The Investigation Field and The Application Field:

3.4.1. Introduction:

• The G.S.P.M. has been tested in National Airport System Planning(N.A.S.P.) within two different contexts called the "Investigation Field" and the "Application Field"; the former has been considered as the learning context, the latter has been considered the addressed context, where the results of this research are expected to "fit"• The main objective is to compare the results and have the conclusions designed from two totally different contexts, which will per se represent a considerable level of flexibility, which is also one of our target, i.e., to promote planning practices improvement by providing a flexible planning method•

• The "Investigation Field" is composed of a sample of developed countries, selected among the group of countries classified by the World Bank(1986) as "Industrial marked economies"• This sample is also called the "emphatic understanding"(Weber-1964) which is composed by evidences and information collected from real circumstances and real facts within the available literature•

• The "Application Field" was expected to be composed of a sample of developing countries, but due to the total impossibility to collect data information and literature from different countries within the undeveloped world, this research has decided to select one developing country and build up the complementary sample with the help of the Scenario Writing Process• The selected country has been chosen among the group of countries classified by the World Bank(1986) as "Upper middle-income" or "Middle Income and Economically Active Countries"(M.I.E.A.C.)• This sample is called the "predictive understanding"(Weber-1964), which is composed by evidences and information collected from the available literature, and real facts and circumstances from the actual scenario of the selected country and from the different future scenarios designed for this country•

• The World Bank has produced the World Development Report(1986) from where most of the information to this part of the research has been collected• The mentioned report contains a set of tables where the member countries with more than 1million inhabitants have been classified according to a large number of subjects which have been taken into consideration, such as; geography, economy, population, education, trade, potentialities, health and sociological issues•

• The countries are given a number based mainly on its G.N.P. value, which represents its classification among the 128 members countries• The tables contain a list of the 128 members countries divided into five main groups and two subgroups, as follows:

1. **Low Income Economies:** This group includes 36 countries•

2. **Middle Income Economies:** This group includes 60 countries which are subdivided into two other groups called:

    2.1. **Lower Middle Income Economies:** This subgroup includes 40 countries•

    2.2. **Upper Middle Income Economies:** This subgroup includes 20 countries•

3. **High Income Oil Exporters Economies:** This group includes 5 countries•

4. **Industrial Market Economies:** This group includes 19 countries•

5. **East European Nonmarket Economies:** This group includes 8 countries•

3.4.2. The Developed World and The M.I.E.A.C.:

• This research has decided to test the proposed G.S.P.M. Theoretical Model in the planning field of N.A.S.P. within two economically different groups of countries, which have been selected respectively within subgroup **2.2.** and group **4.** from previous part, and they are as follows:

Investigation Field - Industrial Market Economies: After innumerous selecting analysis which included mostly; data and literature availability, significant planning tradition and experience in planning specifically in N.A.S.P., the following countries have been selected within group **4.** of The World Bank Report(1986) to integrate the sample:

1. **United States of America** - (W.B.nº119)•
2. **United Kingdom** - (W.B.nº106)•
3. **Federal Republic of Germany** - (W.B.nº113)•
4. **Canada** - (W.B.nº117)•
5. **Norway** - (W.B.nº119)•

Application Field - Upper Middle Income Economies or Middle Income Economically Active Countries(M.I.E.A.C.): This was one of the most difficult part of the research, due to the almost total lack of data and literature about developing countries, which would permit one to select an expressive sample• Although these are the countries where the need for adequate planning and appropriate technology are the challenge•

•One of the chosen country was Brazil from where it was possible to collect a considerable amount of literature and information• Assuming the impossibility to select other countries within the developing world which would permit to have a reasonable amount of literature and information, this research has decided to work with the help of Scenario Writing Techniques• The solution was to assume Brazil within the actual circumstances as one of the elements of the sample and have others future Scenarios written for Brazil• That decision would help also with the G.S.P.M. evaluation stage, more precisely with the tailor process of planning "fitness"•

• According to Schnaars(1987), there seems to be a consensus in the literature that three scenarios are the best, for some propose only two, and some propose more than three, but the general feeling is that two tend to be classified as "good-and-bad", while more than three become unmanageable in the hands of users, resulting in their attending to only a subset anyway• In order to have a sample of M.I.E.A. countries with a significant number of different comparable circumstances where to test the G.S.P.M., this research has decided to work with the Developmental Approach of Scenario Writing techniques(Hirschhorn-1980), which will be more examined in Chapter 6•

• The available literature and information collected about Brazil, inclusive the ones from The World Bank Report(1986) have defined the first element of the M.I.E.A.C. sample and it was called:

1. **Brazil Actual Growth Scenario** - (W.B. nº 78)•

• The three scenarios built on Brazil's present circumstances are the followings:

2. **Brazil Low Growth Scenario•**
3. **Brazil Medium Growth Scenario•**
4. **Brazil High Growth Scenario•**

• A comparable table for the G.S.P.M. test has been prepared and shown in TABLE 3.4.2.-1•

TABLE 3.4.2.-1
COMPARATIVE TABLE OF THE SELECTED SAMPLE OF COUNTRIES
(WORLD BANK REPORT-1986)

G.S.P.M. COMPARATIVE TABLE

		INVESTIGATION FIELD					APPLICATION FIELD			
		1 W.B.N° 119	2 W.B.N° 106	3 W.B.N° 113	4 W.B.N° 117	5 W.B.N° 118	6 W.B.N° 78	7 W.B.N°	8 W.B.N°	9 W.B.N°
		U.S.A.	U.K.	FEDERAL REP. OF GERMANY	CANADA	NORWAY	BRAZIL ACTUAL GROWTH SCENARIO	BRAZIL LOW GROWTH SCENARIO 25 Y.	BRAZIL MEDIUM GROWTH SCENARIO 25 Y.	BRAZIL HIGH GROWTH SCENARIO 25 Y.
1	POPULATION MILLION - 1984	237.0	56.4	61.2	25.1	4.1	132.6	(+ 2.0%) 240.1	(+ 2.3%) 258.0	(+ 2.5%) 270.9
2	AREA THOUSANDS OF SQUARE KILOMETERS	9.363	245	249	9.976	324	8.512	8.512	8.512	8.512
3	GNP DOLLARS PER CAPITA - 1984	15.390	8.570	11.130	13.280	13.940	1.720	(+ 2.0%) 3.114	(+ 5.0%) 6.423	(+ 8.0%) 12.990
4	GNP GROWTH AVERAGE ANNUAL RATE % 1965-1984	1.7	1.6	2.7	2.4	3.3	4.6	2.0	5.0	8.0
5	GDP GROWTH ANNUAL RATE % 1973-1984	3.2 - 2.3	2.8 -1.0	4.6 - 2.0	5.2 - 2.5	4.0 - 3.7	9.8 - 4.4	5.0	8.0	10.0
6	GDP MILLIONS OF DOLLARS 1965-1984	688.600 3.634.600	99.530 425.370	114.830 613.160	51.840 334.110	7.080 54.720	19.260 187.130	(+ 5.0%) 807.871	(+ 8.0%) 1.633.796	(+ 10.0%) 2.583.558
7	INDUSTRY MACHINERY AND TRANSPORT %- 1980 PRICES 1970-1983	30 - 33	34 - 33	37 - 41	19 - 22	27 - 28	16 - 17	15	25	30
8	ENERGY CONSUMPTION KILOGRAMS OF OIL PER CAPITA 1965-1984	6.535 7.302	3.481 3.441	3.197 4.238	6.007 9.148	4.650 8.575	286 753	(+ 5.0%) 3.082	(+ 8.0%) 6.238	(+ 12.0%) 15.495
9	TRADE EXPORTS-IMPORTS 1984 MILLIONS OF DOLLARS	216.008 338.189	94.306 105.688	171.014 152.872	84.938 73.230	18.914 13.885	27.005 15.209	(+ 8.0%) 271.437 (- 3.0%) 11.389	(+ 9.0%) 341.462 (+ 10.0%) 264.965	(+ 10.0%) 429.230 (+ 18.0%) 1.532.464
10	CENTRAL GOVERNMENT EXPENDITURE % OVER SERVICES 1972-1983	10.6 - 8.8.	11.1 - --	11.3 - 7.0	-- - 16.7	20.2 - 20.5	24.6 - 23.8	15	20	25
11	POPULATION GROWTH MILLIONS 1984-1990-2000	237 248 263	56 57 58	61 60 60	25 27 29	4 4 4	133 150 179	----	----	----
12	EDUCATION PRIMARY-1983 HIGHER EDUC.-1983 AS % OF AGE GROUP	100 - 56	101 - 20	100 - 30	103 - 42	98 - 28	102 - 11	100 - 11	102 - 20	102 - 30
13	LABOR FORCE % TOTAL POPULATION 1965-1984	60 - 66	65 - 65	65 - 69	59 - 68	63 - 64	53 - 58	(+ 0.25%) 60	(+ 0.5%) 64	(+ 1.0%) 72
14	URBANIZATION % TOTAL POPULATION IN URBAN AREAS 1965-1984	72 - 74	87 - 92	79 - 86	73 - 75	37 - 77	51- 72	(+ 0.25%) 77	(+ 0.5%) 82	(+ 1.0%) 93

CHAPTER 4

Chapter 4:

4. The Proposed Multiple Cross System Analysis Matrix - M.C.S.A.M. - for Planning:

4.1 The - M.C.S.A.M. - Theoretical Concept:

4.1.1. Introduction:

• Before moving on to the analysis and considerations about the applicability of the proposed G.S.P.M. and M.C.S.A.M. in N.A.S.P. it is necessary to express the importance of the ethical dimension in assessing the short-term and long-term effects of methodology, which has been recognized from the earliest stages of technology assessment• Unintended consequences are likely to result from implemented methodologies and policies if rigorous assessment is not conducted• The question before planners and policymakers as they seek to improve anticipatory methods research is; "How the assessment itself can be used to promote gains in the quality of life?"• The task becomes one of ascertaining the limits of methodology vis-a-vis the value system of individuals who make up society as a whole, and the possible linkages between the region and the communities at the local level (Jessen-1980)•

• Jessen(1980) has also stated that: "Technology assessment and social impact assessment lie at the crossroads of tension between the value free and the value laden"• Or more specifically: "We professionals who use only the narrow, specialist training of sterile quantitative methods, without taking into consideration the qualitative aspects and the broader understandings and insights of citizens regarding their world view in their own situational complexes, cannot adequately define the problem and therefore cannot adequately provide prognosis to accompany our diagnosis"•

• Intentionally, the Multiple Cross System Analysis Matrix(M.C.S.A.M.) is an operational instrument to test the G.S.P.M. Theoretical Model in any planning context and any planning field• A nomenclature definition of the M.C.S.A.M. will result such that; it is a systematic cross examination and comparative analysis of aspects on an iterative process, with the help of the proposed matrix• Conceptually, the M.C.S.A.M. among many others, has the objective of having a live instrument of planning analysis instead of just another methodology for planning with a logical sequence of events to be tested• Operationally, the M.C.S.A.M. is a bidimensional instrument of assessment for planning factors and goals, and for planning theories• Professionally, the M.C.S.A.M. is an instrument to improve multi-disciplinary planning practices, because it is believed that it is impossible to substitute participation and common responsibility in planning• The M.C.S.A.M. performs with the three basic flows as designed in the G.S.P.M. Operational Process in order to assure the dynamic of the methodology, see FIGURE 3.3.-3 in Chapter 3•

4.1.2. Definitions:

• The M.C.S.A.M. is a multi-disciplinary instrument of system analysis for the G.S.P.M. operational process in any planning field and any planning context• The M.C.S.A.M. is also a bidimensional assessment matrix with two input fronts, one on the top side and the other on the left hand side of the matrix• It has also an inner calculation centre and two output surfaces, one on the right hand side and the other on the bottom side of the matrix• The M.C.S.A.M. external connections to the G.S.P.M. operational process, as shown in FIGURE 3.3.-3, will assure the continual process until a satisfactory level of "fitness" of the "form" to the "context" has been achieved• In FIGURE 4.1.2.-1 the M.C.S.A.M. is diagrammatically shown, and the following identification points are required:

1. Input 1.: Is the definition of needs and requirements which identify the planning context and the planning field• This identification is made essentially by multi-disciplinary planning actors, not necessarily just by professional planners in order to permit the unbiassed expression about the planning context in a democratic way• The planning context and planning field identification will then be expressed by theoretical support which could hypothetically be used, if that is the democratic desire of the majority, to promote also the improvement of the planning context in terms of socioeconomic and political issues, instead of solely promote the improvement of the planning field performances• The theoretical support is necessary because it is believed that this is the only way to sustain the behavioural changes within the planning context or planning environment, consequently, that is the stage from where should start any material improvement•

2. Input 2.: The broad definition of the potentially relevant planning factors and goals of the planning field and planning context selected by the same multi-disciplinary planning actors, with the same principles as above•

3. Output 1.: The preferred common planning factors and goals, in a rank order• The resulting preferred planning factors and goals are potentially the most effective within the initial entries, and may express the minimal common requirements of the great majority which are either directly involved in the planning process or indirectly affected by their results• The preferred common planning factors and goals should then be used in any multiobjective planning process that could admit all them simultaneously•

4. Output 2.: The preferred supporting planning theories which will represent the characteristics of the planning context and planning field or planning environment• The resulting preferred planning theories may express the rules from which society has been acting as far as planning is concerned• It is also believed that the preferred planning theories may suggest, perhaps the way in which society could evolve towards a better participation in planning•

5. Operational Adjustments: Are the keys to identify the planning field and the planning context• They also identify the circumstances in which the planning process is taking place, as follows:

5.1. Working Field Selection: Is the selection of the fields where the multi-disciplinary planning actors are working, for instance; the "investigation field" if one is gathering planning information, or the "application field" if one is applying the learned planning information•

5.2. Planning Level Selection: Is the organizational level of planning where the planning process is taking place, for instance; the National, Regional, State, Area or Local administration in the case of public or private planning sectors, alternatively, they will be related to the level of involvement of the planning problem, such as; strategic, tactical or even simple plan level•

5.3. Focused Planning Element or Sub-system: Is the identification of the smallest part of the major System, with which it has been dealing, for instance; the airport, the airline, the airoute, etc•

5.4. Focused Planning Scenario: Is the definition of the scenario within which the specific planning problem is to be set, for instance; high growth, medium growth, low growth or the actual parameters of growth• This operational key also defines the planning horizon in terms of time-scale, for instance; actual or immediate plan, short-term, medium-term or long-strategic-term•

6. M.C.S.A.M. Calculation: It is a simple cross-tabulation operation made up by the multi-disciplinary planning actors• In a common sense process they should democratically select one of the weights provided by the theoretical support and have it multiplied by the interactive value given on a common sense basis to each one of the planning factors and goals• The added values on the right hand side of the matrix will give the preferred common factors and goals rank• The added values on the bottom of the matrix will give the preferred supporting theories•

MULTIPLE CROSS SYSTEM ANALYSIS MATRIX (M.C.S.A.M.)

A MULTI-DISCIPLINARY INSTRUMENT OF SYSTEM ANALYSIS FOR THE G.S.P.M. OPERATIONAL PROCESS

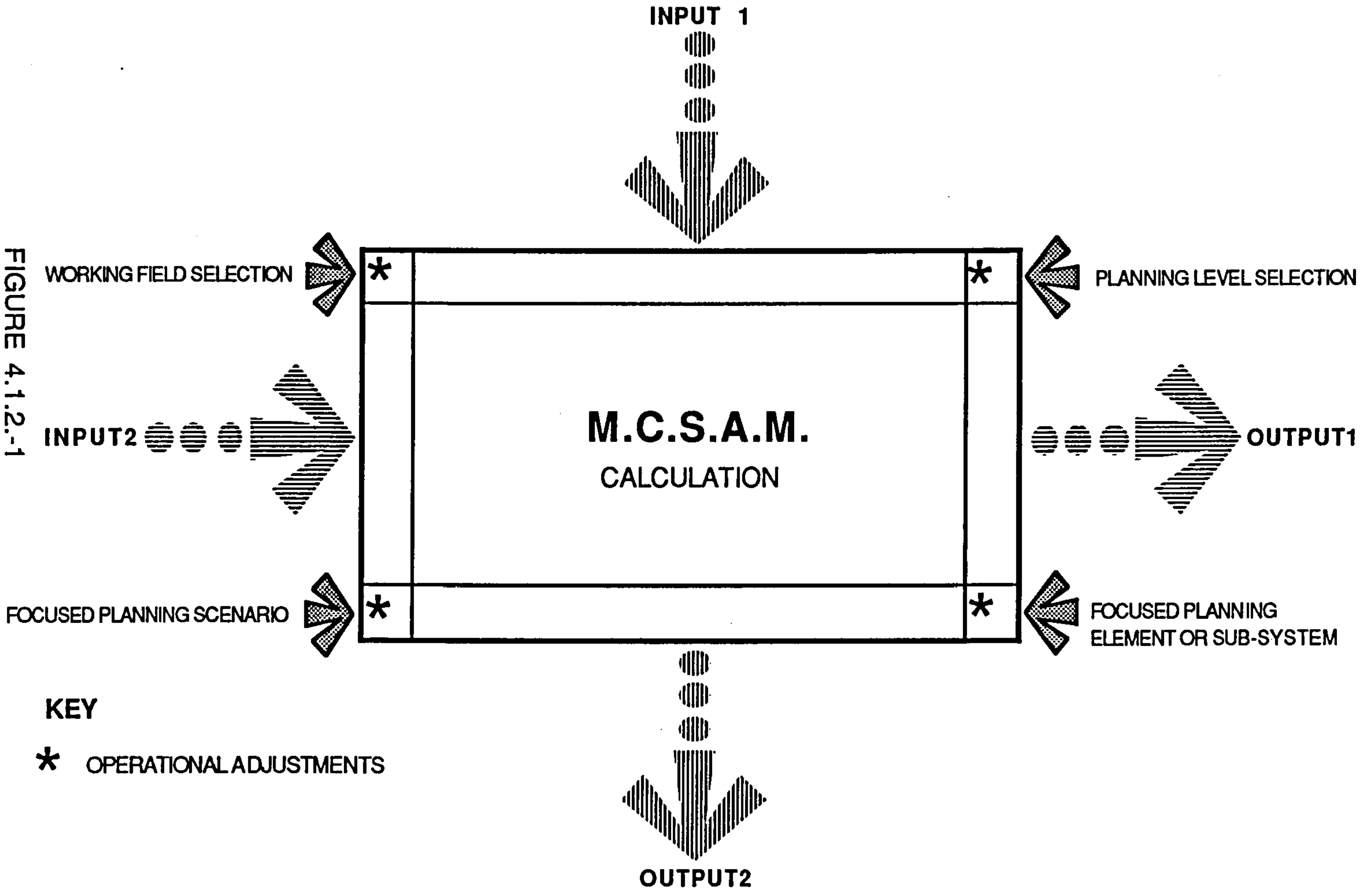


FIGURE 4.1.2.-1
MULTIPLE CROSS SYSTEM ANALYSIS MATRIX-M.C.S.A.M.
RESEARCH PROPOSAL

4.1.3. Selection of both the Supporting Planning Theory, and the Planning Factors and Goals for the M.C.S.A.M.:

- This research has been strictly carried out under the concepts of participatory planning practices, and it is ideally understood that multi-disciplinary planning actors should be the main responsible group for the G.S.P.M. application and practices• It is important to stress the fact that every segment of society, directly or indirectly affected by the planning process should be present or represented in some way within the multi-disciplinary planning actors' group•

- The number of supporting planning theories required by the M.C.S.A.M., sometimes is a direct function of the level of complexity of the planning context and planning field• The consequent level of difficulty in understanding the planning context, or the difficulty in solving a specific aspect of the planning field, will demand a more comprehensive selection of supporting planning theories• Nevertheless, increasing the number of supporting planning theories will not represent by itself improvement in the quality of the planning analysis, but on the contrary, will perhaps misguide the planning analysis• The supporting planning theories selection will be more effective if oriented towards the proper level of adequacy to the planning context and planning field• Finally, in order to assure the required flexibility in planning practices it is important to say that within the feedback process, the supporting planning theories should be reselected if it becomes clear that they are inadequate for application to the planning field or to the planning context•

- At the first stage of the M.C.S.A.M. the number of planning factors and goals is open and it should be said that the more the better, even when they are not so clear in terms of aggregation to the planning field or disaggregation in respect to the planning context• Every entry should be supported by at least one of the members of the multi-disciplinary planning actors group•

4.2. The - M.C.S.A.M. - Performance:

4.2.1. The - M.C.S.A.M. - Functional Model:

• The functional model of the M.C.S.A.M. with all its theoretical elements and operational keys is now considered before we move on to the application of the M.C.S.A.M. in N.A.S.P., which will happen in Chapter 5 and Chapter 6• All the elements of the M.C.S.A.M. functional model have been represented diagrammatically in FIGURE 4.2.1.-1 and they are as follows:

1. **Multi-disciplinary planning actors:** The first step in the M.C.S.A.M. utilization is the definition of the multi-disciplinary planning actors, who are the natural operators of both the G.S.P.M. and the M.C.S.A.M.• They represent all the segments of society that should be directly or indirectly affected by the planning process within the planning field and the planning context•

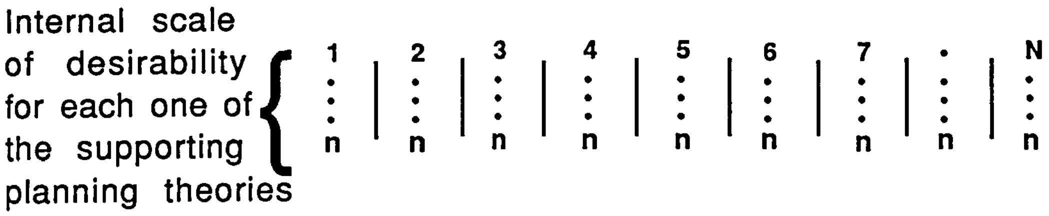
2. **Input 1.:** The second step is the definition of the inputs 1 or supporting planning theories $S_{S.T.}$, also called **Planning Analysis Tools,** which are selected by the multi-disciplinary planning actors team in order to help with the cross examination and comparative analyses processes• Apart from the **Planning Analysis Tool 1** which has been proposed by this research, as a permanent accessory part of the M.C.S.A.M. Functional Model, all the other supporting planning theories will be democratically selected by the multi-disciplinary actors team• The definition of the number of supporting planning theories, say; 1.2.3.4.5.6.7...N, and which supporting planning theories should be selected, plays an important part in the multi-disciplinary planning actors exercises• The decisions should come from discussion about which aspects of the planning field are to be examined, and which aspects of the planning context should drive the judgement and decisions• Its symbolic expression is as follows:

$$\boxed{S_{S.T.}}$$

2.1. At that stage each one of the supporting planning theories will receive by the multi-disciplinary planning actors a progressive scale of desirability $S_{D.F.}$ which will express the weight of importance given to its internal aspects• These different aspects within each one of the supporting planning theories may express their capability to deal with specific problems generated by the planning field and planning context• Its symbolic expression is as follows:

$$\boxed{S_{D.F.}}$$

2.2. The number of supporting planning theories with its internal scale of desirability can be given by the expression below;



3. Input 2.: The next step with the M.C.S.A.M. utilization is the definition of inputs 2 or the selection of the planning factors and goals $S_{p.F.}$, which should be done by the multi-disciplinary planning actors in a democratic way• The selected planning factors and goals should be entered in the matrix in a simple sequential order• There is no limit to the number of planning factors and goals that should be presented, say; **1.2.3.4......Z**• The only exigency to be made is that every entered planning factor and goal must have an actor responsible for it within the multi-disciplinary planning actors in order to be its supporter• Its symbolic expression is as follows:

$$\boxed{S_{P.F._{1...Z}}}$$

3.1. At that stage each one of the presented planning factors and goals should be analysed by the multi-disciplinary planning actors' team according to what has been called the **Planning Analysis Tool 1,** which will be presented later on this Chapter• A brief definition of it can be that; it is an interactive instrument of analysis with the system planning point of view proposed by this research• The main objective is to help with the definition of the level of interaction related to each one of the presented planning factors and goals• The level of interaction will be examined in respect to the other factors and in relationship to the planning context• The level of interaction $I_{W_{1...z}}$ has a range of

1.2.3.4....Y., which are simple pure classificatory numbers•Its symbolic expression is as follows:

$$\boxed{I_{W_{1\ldots Z}}(1\ldots Y)}$$

4. The Calculation Process: The calculation centre of the M.C.S.A.M. Functional Model is the place where some simple mathematical operations are performed, such as follows;

4.1. Each one of the planning factors and goals $S_{p.F.}$ expressed by its level of interaction I_W (1.2.3.4....Y) is multiplied by one of the weights (1...n)• These weights are given by the internal scale of desirability $S_{D.F.}$, which will exist within each one of the selected supporting planning theories $S_{S.T.}$• The result of each multiplication is given by the symbol **f**; the **f**s are the partial weights received by each planning factor and goal during the calculation process• Consequently, each one of the planning factors and goals $S_{p.F.}$ will be given different weights (1...n), as many as there are the supporting planning theories• It is important to say that each one of the planning factors and goals will receive just one weight within each one of the supporting planning theories•

4.2. The simple mathematical expression for the operation which is done to the first listed planning factor and goal within all the supporting planning theories, is:

$$I_{W_1}(1\ldots Y)\, XS_{D.F.1\ldots N}(1\ldots n)$$

4.3. The mathematical expression of the operation done to the second listed planning factor and goal within all the supporting planning theories, is:

$$I_{W_2}(1\ldots Y)\, XS_{D.F.1\ldots N}(1\ldots n)$$

4.4. The mathematical expression of the operation done to the last listed planning factor and goal within all the supporting planning theories, is:

$$\mathbf{I}_{W_Z}(1\ldots Y)\mathbf{XS}_{D.F.1\ldots N}(1\ldots n)$$

4.5. The addition of the weights received for each one of the planning factors and goals, across the supporting planning theories, i.e., the addition of the rows of the matrix can be given by the following mathematical expression:

$$\sum_{1}^{1..N}(f_1^{1}+f_1^{2}+\ldots f_1^{N})$$

...which is the total cumulative weight received by the first planning factor and goal•

4.6. The total cumulative weight received by the second planning factor and goal can be given by the following mathematical expression:

$$\sum_{2}^{1..N}(f_2^{1}+f_2^{2}+\ldots f_2^{N})$$

4.7. The total cumulative weight received by the last planning factor and goal listed in the matrix can be given by the following mathematical expression:

$$\sum_{z}^{1..N}(f_z^{1}+f_z^{2}+\ldots f_z^{N})$$

4.8. The addition of the weights given to each one of the listed planning factors and goals, within the same supporting planning theory, i.e., the addition of the columns of the matrix can be given by the following mathematical expression:

$$\sum_{1}^{1\ldots Z}(f_1^{1}+f_2^{1}+\ldots f_Z^{1})$$

...which is the total cumulative weight received by the first aspect of the scale of desirability, within the first supporting planning theory•

4.9. The total cumulative weight received by the second aspect of the scale of desirability, within the first supporting planning theory, can be given by the following mathematical expression:

$$\sum_{2}^{1...z}(f_1^{2}+f_2^{2}+...f_z^{2})$$

4.10. The total cumulative weight received by the last aspect of the scale of desirability, within the last supporting planning theory listed in the matrix, can be given by the following mathematical expression:

$$\sum_{N}^{1...z}(f_1^{N}+f_2^{N}+...f_z^{N})$$

5. Output 1.: It is obtained from the addition of the rows within the M.C.S.A.M. calculation centre and this operation gives the cumulative weights of the planning factors and goals• The cumulative weights will define the resulting preferred ranking of the common planning factors and goals• They will express the preference of the multi-disciplinary planning actors about the presented planning factors and goals at a given circumstances of the multiobjective planning field and under the planning context characteristics• At that stage the preferred common planning factors and goals should be applied to a multiobjective planning method• In doing so, it is expected that the great majority of society will receive the benefits instead of a small part of society, as usual•

6. Output 2.: This is obtained from the addition of the columns within the M.C.S.A.M. calculation centre and this operation gives the cumulative weights of the supporting planning theories• The cumulative weights will define the resulting preferred ranking of the common supporting planning theories• They will express the preference of the multi-disciplinary planning actors about the selected supporting planning theories to deal with the planning field; first, by suggesting adequate planning processes and appropriate technology, second by solving their problems on a balanced and participatory way• They will also express the preference of the multi-disciplinary planning actors about the selected supporting planning theories in terms of adequacy to the planning context; first by making clear the needs for behavioural changes as far as planning environment is concerned, second by providing the necessary political understanding about the planning context •

M.C.S.A.M. - FUNCTIONAL MODEL

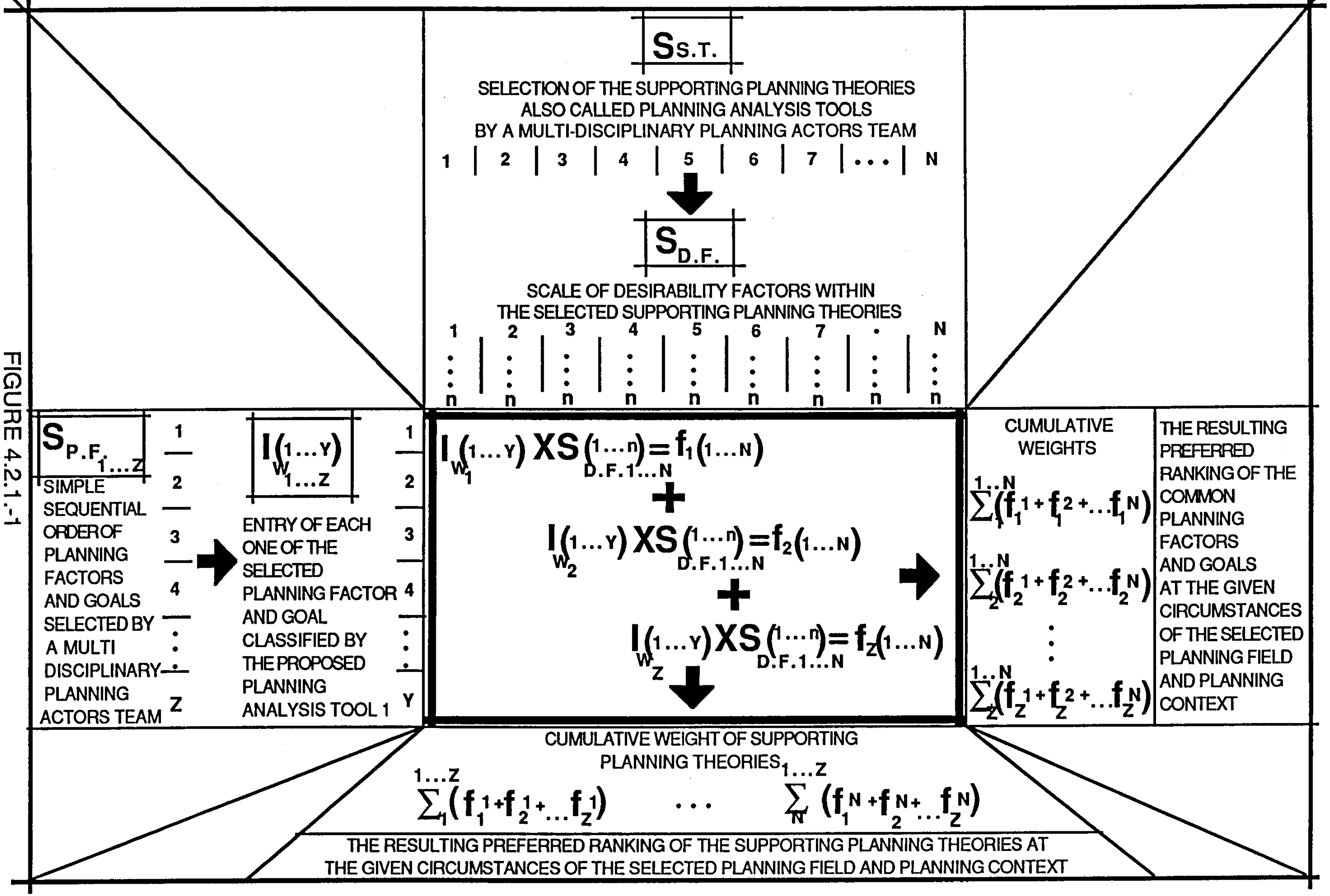


FIGURE 4.2.1.-1
M.C.S.A.M. - FUNCTIONAL MODEL
RESEARCH PROPOSAL

4.3. The M.C.S.A.M. Applicability:

4.3.1 Identification and Interpretation of possible results:

• In this part of the work the possible results of the M.C.S.A.M. applicability are examined from the theoretical point of view, before having the real applicability test done in the planning field of N.A.S.P. on Chapter 5 and Chapter 6•

• The results from the outputs 1 and 2 will be directed to the G.S.P.M. operational process by the multi-disciplinary planning actors, to feed the methodological flow to produce the analysis, the synthesis and the evaluation process, as shown in FIGURE 3.3.-3•

• The results should be then directed to the feedback flow to produce the definition of the "form" within the "context"• In other words, with the help of a multiobjective planning method these results should be evaluated in terms of fitness and effectiveness by the multi-disciplinary planning actors, and if not satisfactory, the results should receive new set of data and information to feed the M.C.S.A.M. again through the inputs 1 and 2 in an iterative process•

• This looping process to fit the solution to the context is called "tailoring", where the solutions are optimized with the maximum benefit-cost•

• The multi-disciplinary planning actors, who are supposed to know the needs and priorities of the planning context, and entitled to promote some specific performance of the planning field, should use the preferred common planning factors and goals to feed for example multiobjective planning processes, such as:

1. The Five-Finger Model from Hickling(1985)•
2. Minimal Requirements Approaches(M.R.A.) from Hill & Lomovasky(1980)•
3. Stochastic Quantitative and Qualitative Multicriteria Analysis(S.Q.Q.M.A.) from Nijkamp(1977)•
4. Qualitative Multiple Criteria Analysis(Q.M.C.A.) from Paelink(1976)•
5. Local Government Implementation-(LOGIMP) - Planning Programme from Friend & Oppenheim(1970)•

6. Analysis of Interconnected Decision Areas(A.I.D.A.) from Friend & Jessop(1969)•
7. Planning Balance Sheet Analysis(P.B.S.A.) from Lichfield(1969)•
8. Goals-Achievement-Matrix(G.A.M.) from Hill(1966)•

• The output 1 or the preferred common planning factors and goals could be helpful to better feed forecasting methodology models for transportation problems with the following characteristics:

1. Aggregate or Disaggregate•
2. Analytic or Empiric•
3. Holistic or Partial•
4. Static or Dynamic•
5. Deterministic or Probabilistic•
6. Simultaneous or Sequential•
7. Behavioral-Social Physics•
8. Discrete or Continuous•

• The output 2 or the preferred supporting planning theories will help to solve the specific problems within the planning context• They will also help to solve common problems of the planning environment, as follows:

1. Identify organizational deficiencies within public planning environments•
2. Identify political boundaries within public planning agencies•
3. Define minimum levels of hierarchy within planning agencies•
4. Define areas of co-ordination for the implementation stage•
5. Definition and monitoring the Ex-Post occupancy evaluation•

4.3.2. Selection of the Supporting Planning Theories or Planning Analysis Tools for the M.C.S.A.M Application Test in the N.A.S.P.:

• In this part of the work the selection and presentation of the supporting planning theories will be made, and they will be called Planning Analysis Tools for the M.C.S.A.M. application test in the N.A.S.P.• This selection is one of the main responsibility of the multi-disciplinary planning actors team, because it is supposed to express the knowledge about the planning problem and the context where it does exist• Unfortunately, it was impossible to have multi-disciplinary planning actors working with this academical research in order to have both the G.S.P.M. operational process and the M.C.S.A.M. functional model ideally tested• Consequently, the solution was to replace the multi-disciplinary planning actors for some artificial behaviour that could simulate their attitude towards planning• Although, if on one hand this substitution was desirable for simple matter of research practicality, on the other hand, in fact this has shown that this substitution should never happen in reality• The only feasible solution was that the researcher should try to take the place of the multi-disciplinary planning actors at the testing stage, and simulate their planning behaviour in order to have the whole work accomplished, at least but not last•

• As already stated the main objective of this dissertation is to promote planning practices improvement, through the G.S.P.M. which is a normative planning methodology, and three specific objectives of planning have been selected to either express the G.S.P.M. effectiveness and also drive this planning practices improvement• The researcher has taken the place of the multi-disciplinary planning actors and according to the three specific objectives of planning, already selected; planning adequacy, planning flexibility, and planning continuity, a comprehensive literature review has been made within planning theory & planning practices, and general systems theory• Therefore, from the best of his knowledge, and from the best of what is available within the applicable literature three supporting planning theories have been selected to cope with the above three specifics objectives of planning, and help with the G.S.P.M. and M.C.S.A.M. test in the N.A.S.P, as shown in FIGURE 4.3.2.-1:

1. Planning Analysis Tool 1: "The Interactive System Planning Analysis(I.S.P.A.)" which is a permanent instrument proposed by this research to the M.C.S.A.M. in order to produce an interactive system planning analysis among the planning factors and goals, and between them and the planning context, and the planning field• This is an instrument which independs of the specific objectives of planning•

2. **Planning Analysis Tool 2**: "The Forms of Planning Identification(F.P.I.)" based on John Friedmann's Planning Theory(1973)• This theory will provide the necessary support within the planning context and planning environment identification, and the adequate planning method that should be adopted•

3. **Planning Analysis Tool 3**: "Political Context & Planning Methods(P.C.&P.M.)" based on The Context for Methods from Michael Breheny(1986)• This theory will indicate the necessary balance between the political context of planning and the adequate planning method that should be adopted•

4. **Planning Analysis Tool 4**: "Uncertainty in Planning(U.P.) based on Coping with Uncertainty in Planning from Karen S. Christensen(1985)• This theory will identify the level of uncertainty within the planning context concerning to the level of agreement about the goals and the appropriate level of technology which is recommended to achieve them•

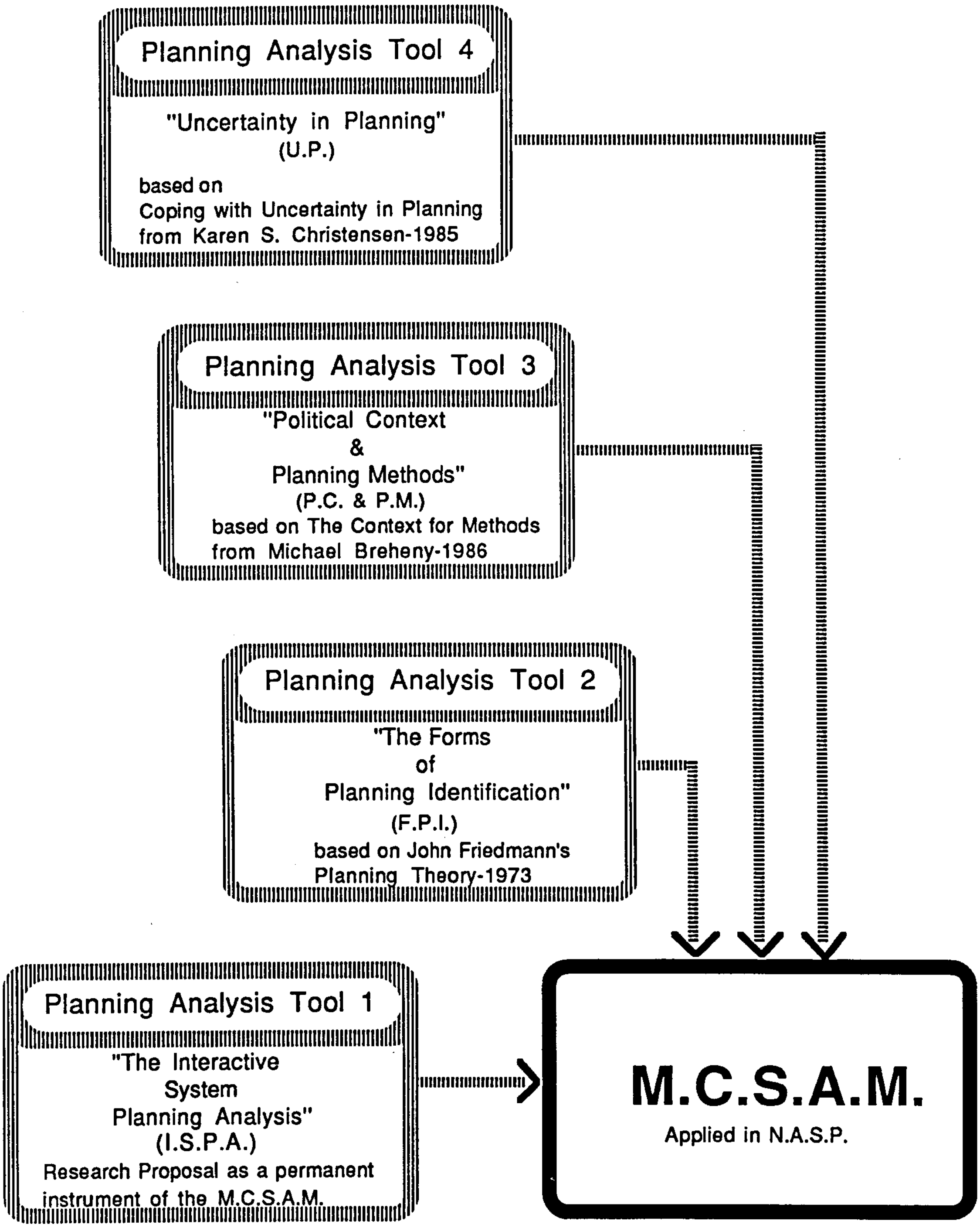


FIGURE 4.3.2.-1
PLANNING ANALYSIS TOOLS
FOR M.C.S.A.M. APPLICATION IN N.A.S.P.

1. Planning Analysis Tool 1: The Interactive System Planning Analysis(I.S.P.A.) is a proposed planning analysis tool to be a permanent part of the M.C.S.A.M. within any planning field and planning context in which it is used• It is a process of system planning analysis to identify the level of interaction among the elements and sub-systems of the same system, and also the interaction between these same elements and sub-systems with the environment• The interaction may happen through the exchange of information, energy and material•

1.1. The Interactive System Planning Analysis(I.S.P.A.) Model is represented in FIGURE 4.3.2.-2 to which the following description refers:

1.1.1. Components: Are the identified elements and sub-systems of the major system, say; **B.C.D...X**• The "Context" is a permanent element of any major system and it is identified by the symbol (A)• Quoting Boulding(1956), it is important to state that this work is dealing with systems in an hierarchical order of complexity• Therefore, all levels of complexity are included excepted the 9th. level which deals with transcendental systems• Consequently, the "Context" represents the "environment" from where all components come from originally•

1.1.2. Levels of Interaction: Are the sequential order numbers given to the identified elements and sub-systems of the major system, say; **2.3.4...N**• The number **1** is given to the "Context" because it is the first and permanent component of the major system•

1.1.3. The Focused Planning Element or Sub-system: Is the element or sub-system of the planning field that will be analysed• In other words, it is the point of reference to which all the other components will be analysed from the interactive point of view•

1.1.4. Levels of Interactive Combinations: Are the possible sequential numbers that will be given to the elements or sub-systems, which will represent different interactions identified in a sequential order of analysis• These combinations represents the level of interaction between themselves and the context, say; Level **1**, Level **2**, ... Level **Z**•

1.1.5. Other Possible Combinations: Are the numbers that will be given to the elements or sub-systems which will represent other possible interactions identified in a non sequential order of analysis• Lets say for example that the sequential order of analysis did not include numbers 5 and 7, and in a second analysis they will be identified and then included in the sequential order•

INTERACTIVE SYSTEM PLANNING ANALYSIS MODEL
(I.S.P.A.)

Components (Elements and sub-systems)	Levels of Interaction	Focused Planning Element or Sub-system	Levels of Interactive Combinations			Other Possible Combinations
			Level 1	Level 2	••• Level Z	
CONTEXT=(A) (Fixed Component)	1	The major system A.B.C.D...X	1	2	••• Z	1
B	2	B.(C.D...X.)	1	2	••• Z	-
C	3	C.(B.D...X.)	1	2	••• Z	-
D	4	D.(B.C...X.)	1	2	••• Z	-
••••••	••••••	••••••	••••••	••••••	••••••	- -
X	Y	X.(B.C...D.)	1	2	••• Z	-

FIGURE 4.3.2.-2
INTERACTIVE SYSTEM PLANNING ANALYSIS(I.S.P.A.) MODEL
PLANNING ANALYSIS TOOL 1
RESEARCH PROPOSAL

• A diagram of the Planning Analysis Tool 1 for the M.C.S.A.M. test in N.A.S.P. is presented in FIGURE 4.3.2.-3• The following is a description of its use and applicability:

1. **N.A.S.P. Components:** The N.A.S.P. test has considered the following components in its analysis: Context(as a fixed component), Airline, Aircraft and Airport•

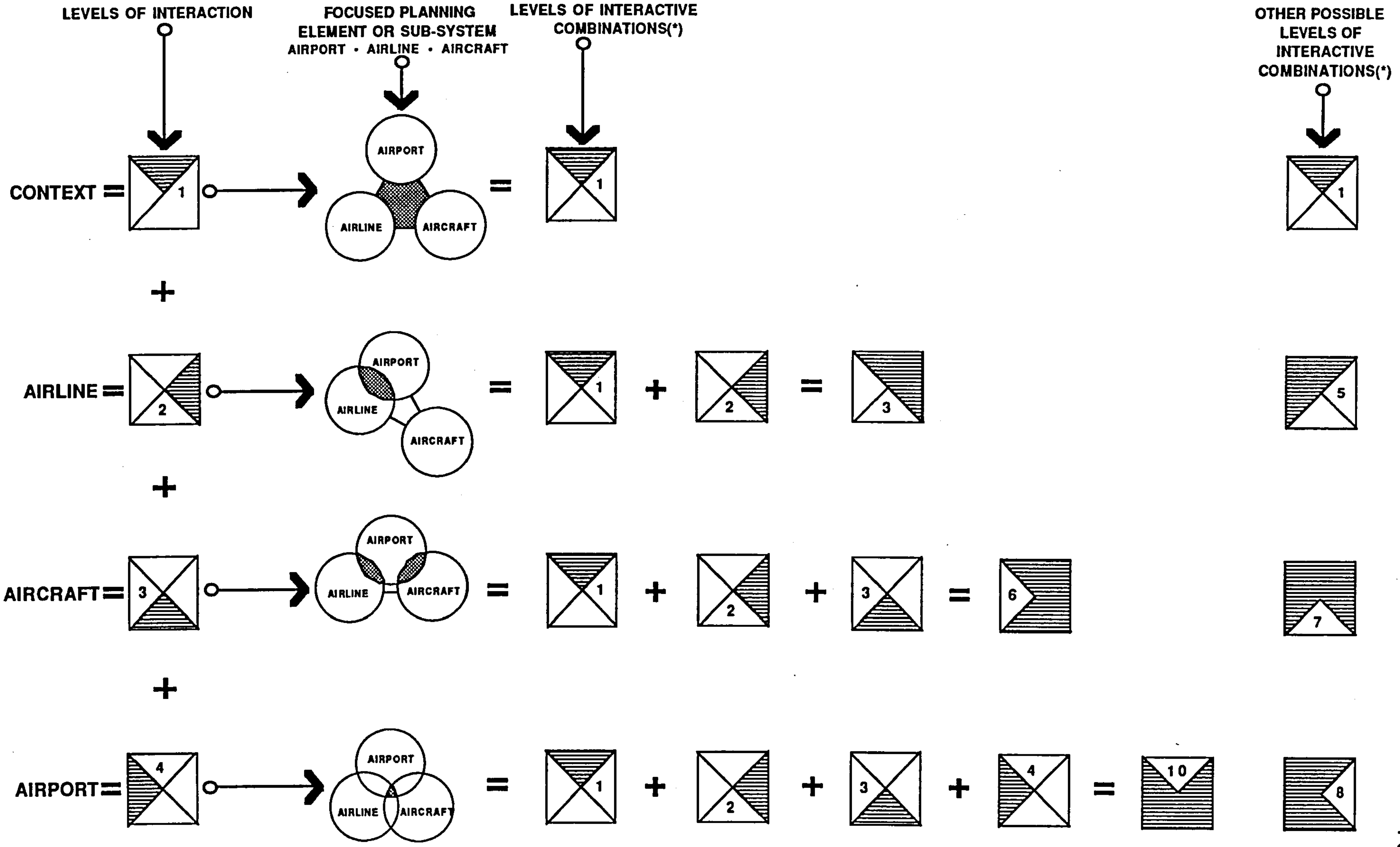
2. **N.A.S.P. Levels of Interaction:** The levels of interaction were the follows; Context=1, Airline=2, Aircraft=3 and Airport=4• Airport has received the highest interactive number because this research is analysing the N.A.S.P. for the Airport point of view• Further research may adopt the Airline point of view which would then receive the highest interactive number•

3. **Focused Planning Element or Sub-system within N.A.S.P.:** As stated above the Airport is the focused planning element or planning sub-system and it will depends upon the referential of the major system, which in that case is the Air Transport Industry• Consequently, the Airport has been represented with the highest level of interaction•

4. **Levels of Interactive Combinations within N.A.S.P.:** Represent the different interactive numbers that a given planning factor and goal will receive under the possible combinations, for example; If the multi-disciplinary planning actors team has considered that a particular planning factor, under the circumstances of the given planning context, belongs simultaneously to the Airline and to the Airport concerns, then it will receive the interactive number 7 because, the Context gives 1, Airline gives 2 and Airport gives 4, which makes 7• It is important to say that this analysis is made within the system planning point of view•

5. **N.A.S.P. Limitations:** Within the Interactive Planning Analysis Tool utilization in N.A.S.P., four components of the major system have been identified with its levels of interaction, such as: Context=1, Airline=2, Aircraft=3 and Airport=4• Consequently, the following levels of interactive combinations were identified in a sequential order of analysis: 1, 3, 6 and 10• Finally, after a second analysis done in a non sequential order, the following other possible interactive combinations have been identified: 1, 5, 7 and 8• Conclusively, in a sequential order of numbers from 1 up to 10, the number 9 has not been identified•

• All the selected planning factors and goals entered in to the matrix will be analysed by this planning tool and will be given an interactive number• The following question will be asked of each planning factor and goal: "To what element, elements, sub-system or sub-system of the major system does it belong in terms of natural influence and operationality?"• The common sense answer to this question will place the planning factor within the proposed I.S.P.A. (interactive system planning analysis) model• As stated before this process should be done by multi-disciplinary planning actors team but the researcher has taken the place of such planning team in order to have the test done in the N.A.S.P.•



(*) Level 9 of interaction has not been identified within the adopted N.A.S.P. concept.

FIGURE 4.3.2.-3

PLANNING ANALYSIS TOOL 1 APPLIED IN N.A.S.P.

INTERACTIVE SYSTEM PLANNING ANALYSIS(I.S.P.A.)

RESEARCH PROPOSAL

2. Planning Analysis Tool 2: The second supporting planning theory selected by this research to help with the G.S.P.M. and M.C.S.A.M. application test in N.A.S.P. is **"The Forms of Planning Identification(F.P.I.)"** which is based on John Friedmann's Planning Theory(1973)•

• In his book "Retracking America"(1973), John Friedmann has stated that: "Societal guidance encompasses both the maintenance and the change of social systems• National planners, for example, may be concerned with holding to a given rate of growth in production, or with keeping unemployment down to politically tolerable levels• But central planners may be equally interested in changing the overall economic performance of the system, accelerating its long-term rate of growth, for example, or altering the proportions of income received by different sectors of the population• Innovations may be needed, for example, to restore a system to a healthy balance: to create conditions of full employment in an environment subject to rapid technological change and skill obsolescence, or to invent new forms of governance for cities that have grown into a measure of balanced order may be prerequisite to the introduction of planned innovations..."• The following forms of planning have identified by Friedmann:

• **Allocative Planning:** By "allocative planning" Friedmann mean a basic form of planning, concerned with actions that affect the distribution of limited resources among a number of competing users• Four different "styles" of allocative planning have been identified by Friedmann, as follows:

1. Command planning or central planning: Is associated with strongly centralized systems of governmental power• In such systems, a bureaucracy exists for the purpose of meeting compulsory targets, and appropriate performance is required of its members...• The command system comes closest to the formal decision model of allocative planning• Its information requirements are extraordinarily demanding• Morris Hill(1985a) made the following comments on central planning modes of planning: "It is assumed that a powerful authority is needed to direct and coordinate the movement of the many parts comprising an interlocking system of relations, and that a central plan is necessary for this purpose• The central or command planning mode occurs when the central planner, authorized to act as an expert seeking an optimal solution, points to the preferred course of action, while taking into account all relevant considerations and interactions and assessing them in terms of their multiple effects"•

2. Policies planning: Is less demanding in its requirements for information, organization, and control• This style of allocative planning is associated with weakly centralized systems of government, its method is to induce appropriate actions through statements of general guide-lines and criteria for choice, the provision of material incentives, and the dissemination of information for decentralized planning• The emphasis is on indirect or field controls• Policy announcements, inducements, and information have the primary purpose or "restructuring the environment for decisions of the relevant actors"• Morris Hill(1985a) has produce the following comments about policies planning: "In this case, the decision-making process is not centralized, and separate sectors or institutions determine their policies separately or in parallel• In this situation it is the role of the planners to assist the decision-makers in developing central guide-lines or policies with the detailed planning being carried out on a decentralized basis"•

3. Corporate planning: Tends to be stressed more than the ultimate product and may even come to be valued in its own right• More specifically, the results of negotiations through which corporate planning is sustained are not determined in advance; they crucially depend on the distribution of effective power among all the participants in the bargaining process and on their comparative skill in using this power• Corporate planning occurs in situations where the structure of power culminates in a small number of influential organizations, such as industrial and business conglomerates, farmers' associations, labour unions, the church, and universities• The corporate planning resembles and may even replace the political process• Participation is limited, however, to a small number of powerful actors, each of whom represents an important sector of the social economy• Morris Hill(1985a) has made the following comments about corporate planning: "It is a mode of planning with separate corporate bodies determining independently what policies they should pursue from the point of view of their own particular interest• In this situation it is the planners' role to serve as mediator between the various corporate bodies• In this case, planning does not rely on a central planning agency and a central command post to design and then manage the course of development• All agencies are encouraged to formulate their own plans favouring their own goals•

4. Participant planning or Participatory planning: Occurs under conditions where power to implement decisions resides in community forms of social organization and, is dispersed• Organizations of this type may be groups of neighbours (village, commune, neighbourhood, housing estate), groups of workers (work-shops, cooperatives, agricultural settlements), and groups of students and faculty (departments, colleges)• In every case, the group must be spatially contiguous and capable of aggregating, formulating, and expressing the interests of its members• The process of participant planning is, at least at the lower levels, not very demanding in terms of information but extraordinarily demanding of time• Morris Hill(1985a) has produced the following comments about participatory planning: "Is typically planning by and for small groups of people interested and affected by the planned intervention• In this context the clients themselves are directly involved in the planning process• The role of the planner is to facilitate the planning activity by feeding information and technical assistance into the process"•

• **Transactive planning:** Has been identified by Friedmann as a powerful instrument of planning which changes knowledge into action through an unbroken sequence of interpersonal relations and a particular style of planning, it can be applied to both allocation and innovation• In transactive planning, two levels of communication have to be distinguished• The first is the level of person-centred communication• The second is the level of subject-matter-related communication• Transactive planning calls for a heightened capacity for learning about itself and, to make what it learns effective in guiding its own development, a way to transform learning into appropriate actions• This implies that it must find a way to join knowledge at the critical points for social intervention• It has been argued that transactive planning is the most appropriate method for achieving this linkage• The transactive style is not, admittedly, applicable to every situation where expert knowledge is joined to action• It is inappropriate, for instance, "where expertise carries sufficient authority to act without the benefit of mutual learning"•

• **Innovative planning:** If innovation is defined as the successful introduction of structural changes into the guidance system of society; then, innovative planning is one of the basic forms of planning, concerned with actions that produce structural changes in the guidance system of society• Innovative planning is essential to the continued structural growth of a social system and consequently to development•

• Based on the above theory about forms and styles of planning this research has produced a diagram called "Forms of Planning Identification"(F.P.I.), which is the selected Planning Analysis Tool 2 to help with the G.S.P.M. and the M.C.S.A.M. application test in N.A.S.P.• The F.P.I. is shown in FIGURE 4.3.2.-4, where the following definitions are inferred:

1. Political and Socio-Economic Characteristics of the Planning Context: On the horizontal axis the potential characteristics of the planning context are plotted• These characteristics are concentrated on the two opposite extremes of the horizontal axis, representing the possible opposition between the same group of characteristics, which may be expressed individually or on a combined manner• On the left hand side of the horizontal axis are plotted the following characteristics:

1.1. Cultural and Socio-Economic Inequalities•
1.2. Central decision-making practices•
1.3. No public participation on planning processes•
1.4. Low income societies•

• On the right hand side of the horizontal axis the following characteristics have been plotted:

1.5. Cultural and Socio-Economic Equalities•
1.6. Rational decision-making practices•
1.7. Public participation on planning processes•
1.8. High income societies•

2. Recommended Planning Evaluation Methods: On the vertical axis of the proposed diagram are plotted the existing multiobjective and strategic planning methods listed in part 4.3.1. of Chapter 4• They are plotted according to a sequential order suggested within the theoretical support, and they are as follows: P.B.S.A., A.I.D.A., LOGIMP, Q.M.C.A., S.Q.Q.M.A., G.A.M., Five-Fingers and M.R.A.•

3. Forms of Planning Identification: The forms and styles of planning suggested in Friedmann's theory are plotted in a supposed resulting axis within the diagram• They are plotted in a sequential order also suggested by Morris Hill, and starting from the bottom of the resulting axis they are as follows: Central Planning, Policies Planning, Corporate Planning, Transactive Planning and Innovative Planning•

• According to Friedmann's theory and Hill's interpretation of it, the Allocative Forms of Planning may be listed in a progressive order which will represent the scale of development of the planning environment or planning context, that is: Central Planning, Policies Planning, Corporate Planning and Participatory Planning• Also according to the referred theory, the mentioned planning environment or planning context should adopt suitable planning evaluation methods to solve their problems in accordance to their stage of development, and the recommended methods are listed in the following progressive order: P.B.S.A., A.I.D.A., LOGIMP, Q.M.C.A., S.Q.Q.M.A., G.A.M., Five-Fingers and M.R.A.•

4. Scale of Desirability: Assuming that "growth" and "development" are common human targets, the following Scale of Desirability has been proposed to identify the Political and Socio-Economic characteristics of the Planning Context as compared to the suggested list of Recommended Planning Evaluation Methods:

4.1. Central Planning(CP1): This represents the lowest level of desirability due to the fact that the above central planning described characteristics are the lowest identifiable levels of socio-economic stage and political behaviour• Consequently, the **CP1** has received the weight **1•**

4.2. Policies Planning(PP1): This represents the intermediate level of desirability towards some sort of progress and development• Consequently, the **PP1** has received the weight **2•**

4.3. Corporate Planning(CP2): This represents a very motivating stage of desirability due to the fact that it is the sign of progress in terms of socio-economic and political development• Consequently, the **CP2** has received the weight **3•**

4.4. Participatory Planning(PP2): This represents the ideal stage of socio-economic and political development within the allocative forms of planning• Consequently, the **PP2** has received the weight **4•**

• The transactive and innovative forms of planning are listed in the diagram without weights because they represent prospective forms of planning within socio-economic structures where there is practically no justification for political representation and political actions• In other words human society has not achieved that stage of development so far•

• All the selected planning factors and goals entered in to the matrix will be analysed by the (F.P.I.) forms of planning investigation and will be given one of the weights from the scale of desirability• A planning factors and goals will be asked the following question: "As far as the political and socio-economic aspects are concerned, what are the characteristics of the planning context or planning environment in which this planning factor and goal has been examined and manipulated?"• The common sense answer from the multi-disciplinary planning actors to this question will place the planning factor and goal into the scale of desirability and consequently will be given a weight• As stated before this process should be done by the multi-disciplinary planning actors but the researcher has taken the place of the planning team in order to have the test done in the N.A.S.P.•

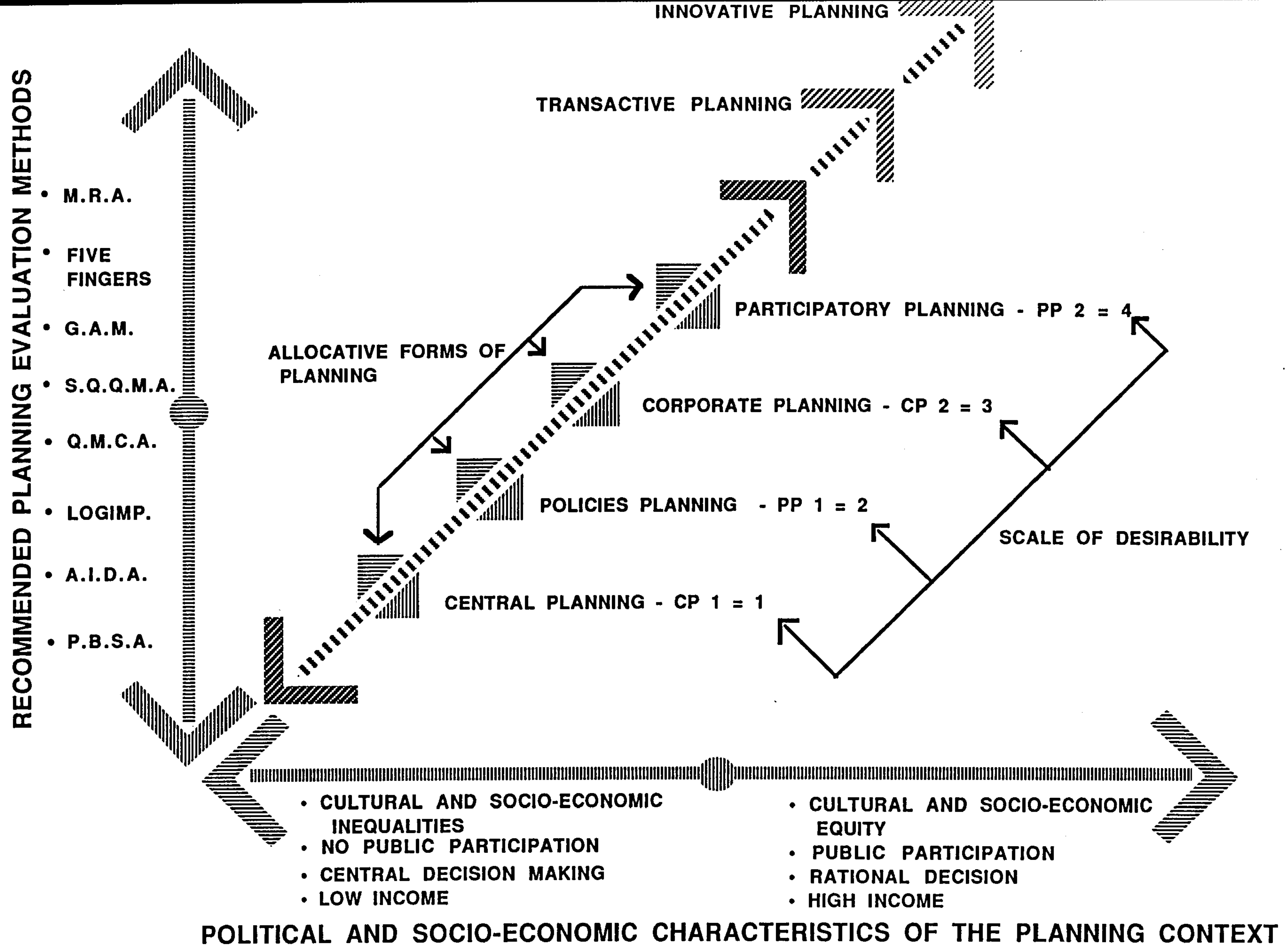


FIGURE 4.3.2-4

PLANNING ANALYSIS TOOL 2 APPLIED IN N.A.S.P.

FORMS OF PLANNING IDENTIFICATION(F.P.I.)

BASED ON JOHN FRIEDMANN'S THEORY(1973)

3. Planning Analysis Tool 3: The third supporting planning theory selected by this research to help with the G.S.P.M. and M.C.S.A.M. application test in N.A.S.P. is "Political Context & Planning Methods" based on The Context for Methods from Michael Breheny(1986)•

• The theoretical approach from Breheny is as follows: "The idea of using quantitative methods in policy analysis is basically a post-war phenomenon• It gained widespread acceptance when such methods were required to support the new "rational" decision-making methodologies during the 1950's and 1960's• Academic researchers, then, can take much of the credit for quantitative work that has influenced policy making during this post war period• The interesting question arises now, however, as to what role these researchers have been playing as rational methodologies and quantitative methods have fallen from favour; as the context has changed, how have the researchers responded?• At that point Breheny stated that; "However, the objection here is to those academics who profess a direct interest in policy analysis, but who have no genuine concern..."•

• He goes on: "In particular it will require serious consideration of the policy context into which methods are to fit; that is, the context in which methods are, or more realistically may be, "consumed"• In the next part Breheny stated that: " If there is no immediate institutional tie between the analyst and the decision makers, and the analysis is simply being offered, then the result will be that the analysis will be ignored, the offer will not be taken up"• He has also identified three major related sets of changes which have radically changed the context for policy making and hence the context for methods, and which "regional scientists" have largely ignored, and they are as follows: " The first and most fundamental set of changes are those concerning the prevailing philosophical, and hence methodological, bases of policy analysis• The second set of changes are more specific and relate to the enduring features of practical policy making which tend to undermine impose "rational" methodologies and methods• The third set of changes concern the shifting practical, political context of policy making•

• Furthermore Breheny(1984b) analysed the uses of rational models by formulating three questions as follows:

1. "*How does one use a formal, procedure methodology, and hence related methods, if*:

a. policy statements are ambiguous,
b. the distinction between policy and implementation is blurred,
c. policy is being interpreted differently by different actors,
d. policy is changed as it is being implemented"•

2. "*How does one use formal evaluations techniques, if*:

a. policy statements are ambiguous,
b. policy statements cannot be converted into measurable form,
c. the desires of multiple actors are ambiguous"•

3. "*How does one monitor the effectiveness and continued validity of policy if*:

a. policy statements are ambiguous,
b. policy is amended as it is implemented,
c. the motives of implementors are different to those of the policy initiators,
d. policy and implementation are blurred"•

• Next, Breheny says that: "...an understanding of the context for methods is crucial for any planner seriously interested in developing methods for policy analysis• Such contexts will determine the prospects for any method, or the information that it provides, actually being used• Thus an understanding of these contexts ought to inform the development of methods...sadly, at present this is rarely the case• To argue for this understanding is not to deny that methods cannot be developed to change the context• Indeed, this may be very desirable, as we have seen for example in cases where reasoning has become unclear or decision-making unaccountable• But to change a context one has to understand it• We must assume now that despite the possibility that methods will help to tidy up the policy context, and indeed may have been designed to do just that, messiness will prevail• Thus the tension between the policy context and methods will persist• Nevertheless, the degree of tension between context and the form of methods will vary in different circumstances• If we are aware of this, it may be possible to identify situations in which the degree of tension seems to be relatively low• Once identified, it may be possible to direct the use of methods to such situations or to use this knowledge to reduce tension between context and methods"•

• Breheny's theory about the tension between the nature of context and the characteristics of the method that should be used on it, is applied here as the "Political Context & Planning Methods"(P.C. & P.M.), which is the selected Planning Analysis Tool 3 to help with the G.S.P.M. and the M.C.S.A.M. application test in N.A.S.P.• The P.C. & P.M. diagram is presented in FIGURE 4.3.2.-5, and the following explanation refers to it:

1. Nature of Planning Methods: On the horizontal axis of the diagram the characteristics of the planning methods are listed in two extremes, one in the right hand side called "limited" and other in the left hand side called "extensive", and they are as follows:

1.1. Limited: In this quadrant the characteristics of the planning methods concerning to their nature are; limited in its scope, limited in terms of transparency and limited in terms of realism•

1.2. Extensive: In this quadrant the characteristics of the planning methods concerning to their nature are; extensive in scope, extensively obscure in terms of results and extremely ambitious in terms of their objectives•

2. Nature of Political Context: On the vertical axis of the diagram the characteristics of the political contexts are also listed in two extremes, identified as:

2.1. Limited: In this quadrant the characteristics of the political context concerning to their nature are; limited in scope, limited in time of application and limited in terms of number of planning actors•

2.2. Extensive: In this quadrant the characteristics of the political context concerning to their nature are; extensive in scope, extensive in time of application and extensive in terms of number of planning actors •

3. Scale of Desirability: The combination of the four defined quadrants as far as the level of adequacy and suitability are concerned will define the scale of desirability as follows:

3.1. Very Unlikely(V): In this quadrant the planning methods with extensive characteristics in nature are very unlikely to be used in political contexts with extensive characteristics in nature• This circumstance obviously represents the lowest level of desirability, consequently, the **V** has received the weight **1**•

3.2. Likely(L): In this quadrant the planning methods with limited characteristics in nature are highly recommended or likely to be used in political contexts with limited characteristics in nature• This circumstances represents the ideal stage of adequacy and suitability which means the highest level of desirability, consequently, the **L** has received the weight **4**•

3.3. Possible(P1): In this quadrant the planning methods with limited characteristics in nature are quite possible to be applied in political contexts with extensive characteristics in nature• In either this circumstances(P1) or in the next one(P2) the stages of adequacy and suitability are in balance and both them represents the medium level of desirability, consequently, the **P1** has received the weight **2.5**, which is the mean between the extremes of the weights **1** and **4**•

3.4. Possible(P2): In this quadrant the planning methods with extensive characteristics in nature are quite possible to be applied in political contexts with limited characteristics in nature• As above the **P2** has received the weight **2.5**•

• All the planning factors and goals entered into the matrix will be analysed by the (P.C. & P.M.) political context & planning methods and will be given one of the weights from the scale of desirability• The planning factors and goals will be asked the following question: "As far as the political nature and planning methods are concerned, what are the characteristics of the planning context and planning environment in which this planning factor and goal has been examined and manipulated?"• The common sense answer from the multi-disciplinary planning actors will place the planning factor and goal into the scale of desirability and consequently will be given a weight• As stated before this process should be done by the multi-disciplinary planning actors but the researcher has taken the place of the planning team in order to have the test done in the N.A.S.P.•

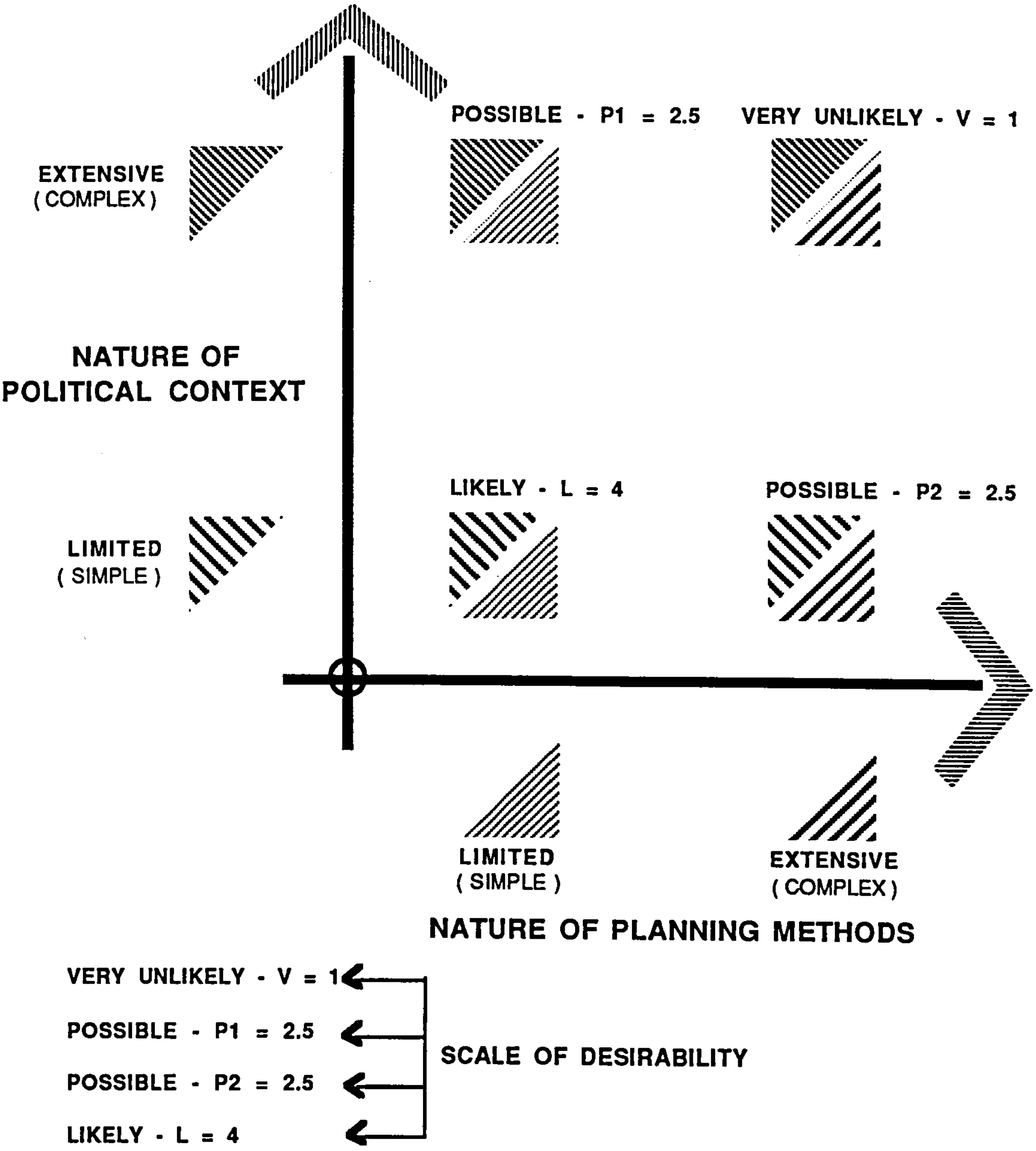


FIGURE 4.3.2.-5

PLANNING ANALYSIS TOOL 3 APPLIED IN N.A.S.P.

POLITICAL CONTEXT X PLANNING METHODS

(P.C. & P.M.)

BASED ON MICHAEL BREHENY(1986)

4. Planning Analysis Tool 4: The fourth supporting planning theory selected by this research to help with the G.S.P.M. and M.C.S.A.M. application test in N.A.S.P. is "Uncertainty in Planning" based on Coping with Uncertainty in Planning from Karen S. Christensen(1985)•

- The theoretical approach from Christensen is as follows: "A critical planning task is recognizing and addressing uncertainty• Actual problems vary in uncertainty over means and ends• If people agree on what they want and how to achieve it, then certainty prevails and planning is rational application of knowledge• If they agree on what they want but do not know how to achieve it, then planning becomes a learning process; if they do not agree on what they want but do know how to achieve alternatives, then planning becomes a bargaining process; if they agree on neither means nor ends, then planning becomes part of the search for order in chaos• Each prototype situation suggests a particular range of planning styles• Planners should tailor their styles to problem conditions• By acting contingently they can use reason to cope with uncertainty"•

- Christensen sets out a matrix to clarify these variable planning problem conditions• This matrix helps to tailor planning processes to conditions by plotting the key variables on it, such as; means, ends and certainty which are considered the heart of planning• The matrix is divided along two dimensions; the vertical dimensions is "technology" meant very broadly as the knowledge of how to do something, or means• The horizontal dimension is "goal", the purpose, desired outcome, or end• Each is dichotomized according to certainty/uncertainty• A technology can be known or unknown; that is, means either have or have not been proven to be effective for achieving a particular goal• A goal can be agreed or not agreed on, since a goal is value-laden and thus cannot be proven known or unknown• Of course, the world is not that tidy• The line that divides means and ends often blurs• Since technologies are rooted in social practices, from a larger perspective they, too are not value-free• Goals are influenced by the technologies considered available• Furthermore, technologies are rarely completely known or completely unknown; over time they show themselves to be more or less effective• Similarly, a goal may elicit various degrees of agreement• Even knowledge may be a matter of degree of belief•

- The proposed matrix from Christensen has produced four prototype variations of conditions that can characterize planning as follows:

a. Known technology and agreed goal: That circumstances frame the conditions necessary for classic bureaucracy• This prototype situation and mode organization allow planners to achieve public expectations of government's predictability, equity, accountability, efficiency, and effectiveness• With such certainty, agencies can be held responsible for dependable planning and implementation•

b. Unknown technology but agreed goal: When the problem is known but the solution is unknown, innovation is needed• Inventiveness and creative sensitivity to varying constraints are the keys to learning the solution• This situation is entirely different from situations in which there are already proven solutions• Without a known technology, standards of efficiency and effectiveness are meaningless•

c. Known technology but no agreed goal: This represents a situation in which there are effective, proven methods but there is uncertainty or conflict over goals• These conditions call for bargaining• Thus, bargaining may mute potential difficulties by adapting technology to achieve several goals at the same time, or it may compensate various interests through explicit qui pro quo trades• Regardless of the particular form and effect of the bargaining process, the expectation is clear; to accommodate multiple preferences•

d. Unknown technology and no agreed goal: This represents a situation in which there are multiple, or unarticulated, goals and no known effective means for achieving them• It is really difficult to draw clear examples of uncertainty over both means and ends because these conditions are in chaos• The appropriate expectation for governmental performance in this situation of uncertainty over both means and ends is to establish order• Without a leader to focus the policy on clear, shared goals, or to focus on workable technologies, the situation becomes a continuous process of action and reaction without direction•

• Christensen's theory about uncertainty in planning, where the characteristics of the planning context and planning environment play an important part over the quality of planning is used as the "Uncertainty in Planning"(U.P.) concept, which is the selected Planning Analysis Tool 4 to help with the G.S.P.M. and the M.C.S.A.M. application test in N.A.S.P.• The U.C. diagram is presented in FIGURE 4.3.2.-6, described bellow:

1. Goals (Ends): On the horizontal axis two situations have been plotted to identify the opposite extremes of agreement over the goals, one in the right hand side called "non agreed" and other in the left hand side called "agreed"•

2. Technology (Means): On the vertical axis two situations have been plotted to identify the opposite extremes of technological knowledge, with "known" at the top and other called "unknown" at the bottom•

3. Scale of Desirability: The combination of the four defined quadrants as far as goals and technology are concerned will define the scale of desirability as follows:

3.1. Chaos(C): In this quadrant the combination of unknown technology with non agreed goals gives the unique planning condition, such as: discovery or creation of order to overcome chaos•This circumstances obviously represents the lowest level of desirability, consequently, the **C** has received the weight **1**•

3.2. Programming(P): In this quadrant the combination of known technology with agreed goals gives the following planning conditions: predictability, equity, accountability, efficiency and effectiveness under programming• This circumstances represents the ideal stage of technical and political development, which means the highest level of desirability, consequently, the **P** has received the weight **4**•

3.3. Bargaining(B): In this quadrant the combination of known technology with non agreed goals gives the specific planning conditions, which is the accommodation of multiple preferences under a continuous process of bargaining• This circumstances represents a motivating stage of political development, which means the medium level of desirability as compared to the programming stage, consequently, the **B** has received the weight **2.5** which is the mean between the weights **1** and **4**•

3.4. Experimentation(E): In this quadrant the combination of unknown technology with agreed goals gives the specific planning conditions, which are the innovation and responsiveness under a continuous process of experimentation• This circumstances represents an also motivating stage of technological development, which means the medium level of desirability as compared to the programming stage, consequently, the **E** has received similarly the weight **2.5** which is the mean between the weights **1** and **4**•

• All the planning factors and goals entered into the matrix will be analysed by the (U.P.) uncertainty in planning aspects and will be given one of the weights from the scale of desirability• All the planning factors and goals will be asked the following question: "As far as the aspects of uncertainty are concerned, what are the characteristics of the planning context and planning environment in which this planning factor and goal has been examined and manipulated?"• The common sense answer from the multi-disciplinary planning actors will place the planning factor and goal into the scale of desirability and consequently will be given a weight• As stated before this process should be done by the multi-disciplinary planning actors but the researcher has taken the place of the planning team in order to have the test done in the N.A.S.P.•

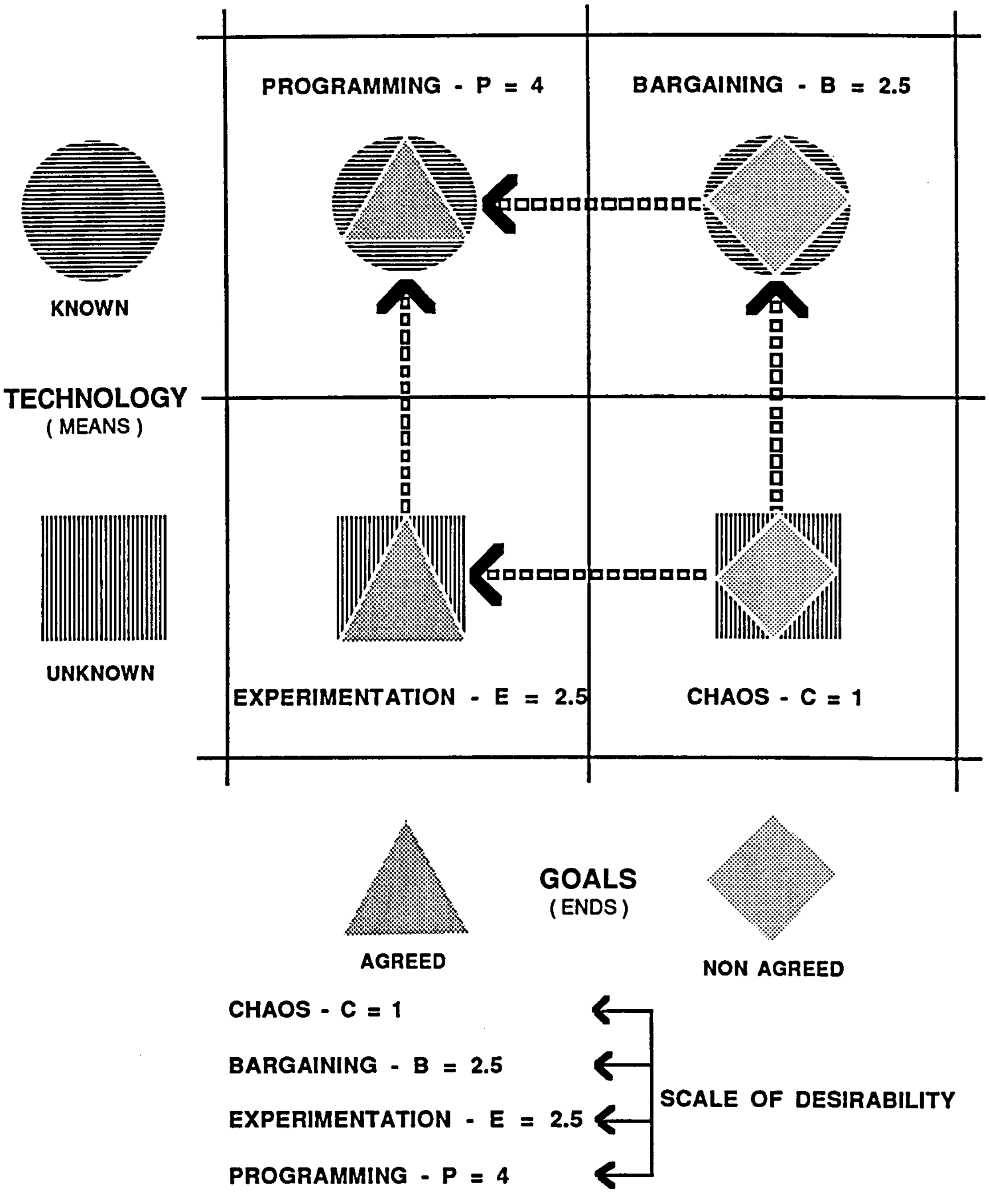


FIGURE 4.3.2.-6

PLANNING ANALYSIS TOOL 4 APPLIED IN N.A.S.P.

UNCERTAINTY IN PLANNING

(U.P.)

BASED ON KAREN S. CHRISTENSEN(1985)

4.3.3. Selection of the Planning Factors and Goals for the M.C.S.A.M Application Test in the N.A.S.P.:

• The selection of the planning factors and goals for the M.C.S.A.M. should ideally be made by multi-disciplinary planning actors, because they are supposed to express the requirements from all elements and sub-systems of the major system, and the most important is the fact that they should also express the needs of all segment of society represented by one of the members of the multi-disciplinary planning actors team, but due to the impossibility to have them working with this academical research, the researcher had to simulate their planning behaviour in order to illustrate the process•

• Using a comprehensive literature review within transportation and air transport industry as this basis for the expertise, this research has taken the place of the multi-disciplinary planning actors and from the best of his knowledge a selection of a set of significant planning factors and goals has been done to represent properly the N.A.S.P., without any specific characteristic of any country at all• Since, the basic idea of this research is to have the G.S.P.M. tested in N.A.S.P. with the help of the M.C.S.A.M., and not to generate a new and effective N.A.S.P. for any particular country, this initial set of planning factors and goals are not intended to be either final (or hermetic) from the N.A.S.P. point of view, but simply a real and significant sample•

• The planning factors and goals to be used in the N.A.S.P. test, came mainly from the "Taxonomy of World Air Transportation"(Osumah-1987)• This is a Ph.D. research report elaborated in May 1987 by Edeki Francis Osumah and Manouchehr Vaziri and submitted to the Department of Civil Engineering at University of Kentucky under the classification nº UK CE8703 •

• The mentioned report has the following description: "A methodology for characterizing and classifying countries of the world so that the air transport demand and supply can be evaluated is presented• The study examined the demand and supply of air transport services in relation to the socio-economic, political, demographical, and geographical characteristics of nations• The classification methodology involved all countries of the world and was made possible by the availability of data from various international organizations such as the publications of the United Nations(U.N.) and the International Civil Aviation Organization(I.C.A.O.)• Various statistical methods including correlation analysis, factor analysis, and cluster analysis were utilized to process and investigate the resulting database for the countries of the world with a developed air transportation system"•

• Homogeneous groups of countries were identified based on the air transport demand and supply potentials• This provided a better framework for the examination and evaluation of the differences and similarities between countries of the world in the consumption and supply of air transport• Based on stepwise regression procedures, disaggregate air transport models were developed for each group of countries• Results of the model simulation were reasonable and acceptable coefficients of determination were reported for most of the models(Osumah-1987)•

• The study was limited to 156 countries and it was not feasible to include all the countries of the world in the study since some countries do not have an air transportation system• Besides, reliable data to support the study was not available at a centralized location for all the countries of the world• All but six of the 156 countries selected are not members of United Nations•

• Six groups of variables for the dataset were identified, as follows:

1. Air transport variables•
2. Other transport modes and communication variables•
3. Economic and social variables•
4. Variables on population demographics•
5. Geographical and environmental variables•
6. Political variables•

• The total number of variables in the dataset is 150, and their origin and break down are as follows:

1. Variables in the air transport group were selected primarily from the ICAO's Civil Aviation Statistics of the World, and they are number 35•

2. Variables in the other modes of transportation and communication were selected to reflect travel behaviour of countries other than air travel as well as interactions• The number of variable are 27 and were selected from four different sources, such as; The United Nations Statistical Year Book, United Nations Energy Statistics Year Book, The New Book of World Rankings, and World Atlas of Railways•

3. There are 39 economic and social variables selected to provide information on financial as well as social condition of countries selected for the study• They were collected mainly from four sources, such as; United Nations' National Accounts Statistics, United Nations' Statistical Year Book, UNESCO Statistical Year Book, and The New Book of World Rankings•

4. There are 21 variables in population and demographics and they provide information on population distribution, rate of population increase, population density, etc• They were collected mainly from the following sources; The United Nations Demographic Year Book, and Countries of the World and Their Leaders•

5. There are 20 variables to provide information of the geographical and environmental condition of each country• They were collected from the following sources; Geo-Date: The World Almanac Gazetteers, The United Nations: 1981 Statistical Year Book, and The International Geographic Encyclopedia and Atlas•

6. There are 8 variables in political structure and affiliation, and they have been collected mainly from the following sources; Countries of the World and Their Leaders Year Book, Geo-Data: The World Almanac Gazetteer, Atlas of Man and Religion•

• From these and other sources 32 planning factors and goals have been chosen to represent the N.A.S.P within the M.C.S.A.M. test• They have been listed in a simple random order, as follows:

1. Accessibility Policy: Expressed in this work by the frequency of flights and the journey cost•

2. Aerospace Industry Profitability: Represented by any reliable economic ratio•

3. Airport System Profitability: Represented by any reliable economic ratio•

4. Airline System Profitability: Represented by any reliable economic ratio•

5. Federal Planning Co-ordination: Expressed by a conceptual scale of "good", "bad", "medium", and "not available(N.A.)" when it does not exist in a particular planning context or country• This conceptual scale should be related to other planning contexts or countries•

6. **Federal Planning Implementation Policy:** Expressed by a conceptual scale of "good", "bad", "medium", and "not available(N.A.)" when it does not exist in a particular planning context or country• This conceptual scale should be related to other planning contexts or countries•

7. **Federal Planning Agencies:** Expressed by a conceptual scale as the same as item 6•

8. **G.N.P. and G.N.P. Growth:** Expressed in total U.S.$ dollars, and percentage of growth as compared to previous years• This value should have a classification number as compared to other countries, and a conceptual scale of "high", "medium", and "low"•

9. **Income per capita and Income Growth:** Expressed in U.S.$ dollars per capita and percentage of growth as compared to previous years• This value should have a classification number as compared to other countries•

10. **National Airport Classification:** Expressed by a conceptual scale of "good", "bad", "medium", and "not available(N.A.)" when it does not exist in a particular planning context or country• This conceptual scale should be related to other planning contexts or countries•

11. **National Airport Movement in terms of total number of Aircraft Movement :** Expressed by a conceptual scale of "high", "medium", and "low", as compared to other countries•

12. **National Airport Movement in terms of total Passenger Throughput:** Expressed by a conceptual scale of "high", "medium", and "low", as compared to other countries•

13. **National Airport Network-General Number:** Expressed by a conceptual scale of "high", "medium", and "low", as compared to other countries•

14. National Airport Network per Category Number: Expressed by a conceptual scale of "high", "medium", and "low", as compared to other countries•

15. National Airport Network per City pair Number: Expressed by a conceptual scale of "high", "medium", and "low", as compared to other countries•

16. National Capital Investment in Airport Infrastructure: Expressed in total U.S.$ dollars, and percentage of growth as compared to previous year•

17. National Demand to Fly: Expressed by the total Number of Passengers in the year divided by the medium Load Factor, or the total Number of Aircraft Movements in the year divided by the Aircraft Mix Factor•

18. National Economic Growth: Expressed by any reliable economic ratio•

19. National Environment Issue: Expressed by a conceptual scale of "good", "bad", "medium", and "not available(N.A.)" when it does not exist in a particular country• This conceptual scale should be related to other planning contexts or countries•

20. National Fleet Composition: Expressed by the total number of aircraft per classified category, such as A, B, C, and D•

21.National Air Transport System Economic Growth: Expressed by any reliable economic ratio•

22. National Air Seat Offer: Expressed by the total number of aircraft seat offered in the year, and percentage of growth as compared to previous years•

23. National Air Seat Utilization: Expressed by the total number of aircraft seat offered in the year divided by the total number of passenger in the same year, and percentage of growth as compared to previous years•

24. National Transport Modal Split: Expressed by percentages of other transportation modes•

25. National Population Growth: Expressed by the total number of inhabitants in the year and percentage of growth as compared to previous years•

26. National Pricing Policy: Expressed by a conceptual scale of "good", "bad", "medium", and "not available(N.A.)" when it does not exist in a particular planning context or country• This conceptual scale should be related to other planning contexts or countries•

27. National Propensity to Fly: Expressed by the total number or inhabitants divided by the total number of air seat utilized in a particular year and percentage of growth as compared to other previous years•

28. National Spatial Distribution: Expressed by the total number of cities and towns and average distance between them•

29. National Supply Policy: Expressed by a conceptual scale of "high", "medium", "low", and "not available(N.A.)" when it does not exist in a particular planning context or country• This conceptual scale should be related to other planning contexts or countries•

30. National Travellers Characteristics: Expressed by the total number of passengers in each one of the classification categories, such as; Business, Tourism, Commuter, and others•

31. Public Participation Policy: Expressed by a conceptual scale of "high", "medium", "low", and "not available(N.A.)" when it does not exist in a particular planning context or country• This conceptual scale should be related to other planning contexts or countries•

32. Deregulation: Expressed by a conceptual scale of "high", "medium", "low", and "not available(N.A.)" when it does not exist in a particular planning context or country• This conceptual scale should be related to other planning contexts or countries•

• In Chapter 5 and Chapter 6 the four selected Planning Analysis Tools and the 32 selected planning factors and goals will be plotted in the M.C.S.A.M. application test in

N.A.S.P. within the two samples of countries called investigation field and application field•

CHAPTER 5

CHAPTER 5:

5. Application Test of the M.C.S.A.M. in the N.A.S.P.:

5.1. Introduction:

• This research has chosen a special circumstance to test the G.S.P.M., that is; the selected planning field is the N.A.S.P. and there are two planning contexts to look at; the first is the investigation field consisting of developed countries, and the second is the application field consisting of M.I.E.A. countries• It is important to consider the fact that this application test is a planning exercise to show the proper workability of the proposed G.S.P.M., which is a normative planning methodology, and the M.C.S.A.M. which is an instrument of procedural planning linked to the G.S.P.M. by three proposed flows• Consequently, it is not the intention of this exercise to produce any statistical result about the Air Transport Industry, nor to propose any new N.A.S.P. method, but the objectives are; firstly, to present a democratic instrument of communication among the multi-disciplinary N.A.S.P. planning actors in order to improve the individual behaviour towards N.A.S.P. planning practices, and secondly, through that communication promote the necessary knowledge of the planning context and the planning environment, which consequently will improve N.A.S.P. practices• The application test will be carried out in two fronts, i.e.; on one front, planning lessons will be learned from the test in the N.A.S.P. practices within the investigation field or developed countries; on the other front, the test within the application field will indicate their weak points and consequently their needs in terms of theoretical support in planning and planning practices improvement• In **Chapter 5** the M.C.S.A.M. application test in the investigation field or Developed Countries sample will be shown, whereas the M.C.S.A.M. application test in the Middle Income and Economically Active Countries or application field will be done in **Chapter 6•**

• The M.C.S.A.M. test within the above sample is expected to provide two different sets of findings:

1. The expected findings from the investigation field: Firstly, it is expected to be possible to identify their N.A.S.P. methodologies by the preferred common planning factors and goals; secondly, it is also expected to be possible to identify the characteristics of the planning contexts and planning environments within which their N.A.S.P. methodologies are taken place• Their planning contexts and planning environments will be provided by the preferred planning aspects of the supporting planning theories• The preferred common planning factors and goals are the sensitive expression of the basic aspects that have been taken into account so far by the developed countries, whereas, the preferred planning aspects are the basic characteristics of the developed countries expressed by their political, cultural and socioeconomic values• Consequently, it is expected to be possible to identify at least the framework of their N.A.S.P. methodologies, and also their N.A.S.P. methodology labels• Another aspect to be considered is that the comparison of the developed countries N.A.S.P. methodologies will provide important evidences about their similarities and inequalities, and indicate as far as regulations and operations are concerned possible needs for changes and co-operative improvements within the International Air Transport Industry• It should be taken into consideration that this research is not supposed to propose any change within the investigation field but on the contrary, to learn the lessons from their experience and their natural mistakes• Nevertheless, a "Developed Countries N.A.S.P. realist methodology model" will be produced by the evidences obtained from the matrix of the five selected developed countries, which should be useful for further research within the developed countries N.A.S.P. contexts and planning environments, and mostly within their N.A.S.P. sensitive factors•

2. The expected findings from the application field: Based on the preferred common planning factors and goals, it is expected to be possible to identify the Brazilian N.A.S.P. methodology framework at least in a non explicit way• The Brazilian actual growth scenario of will provide the necessary information for the M.C.S.A.M. test in N.A.S.P.• The scenario writing process will describe three different future scenarios for Brazil, based on three different performances of the national growth• The M.C.S.A.M. test within the three different future scenarios will enable the identification of three different sets of potential preferred common planning factors and goals which will describe the hypothetical N.A.S.P. methodologies within these assumed scenarios• Comparison with the developed countries N.A.S.P. identified methodologies is expected to suggest and recommend corrections for the actual Brazilian N.A.S.P. within the foreseeable future• The preferred supporting planning theories identified within the Brazilian actual growth scenario will define the characteristics of the actual Brazilian planning context and the actual Brazilian environment for planning• This identification will provide the evidence for the possible limitations and distortions within the actual Brazilian N.A.S.P. methodology• The potential preferred supporting planning theories, identified by the three future Brazilian scenarios will provide evidences of possible distortions within the future Brazilian planning context and planning environment, which perhaps should be avoided in order to assure a more effective N.A.S.P. methodology in the future• It is expected that it will be possible to suggest immediate actions to promote the Brazilian planning context improvement and its planning environment evolution• The evidence obtained from the matrix of the actual Brazilian N.A.S.P. methodology, plus the hypothetical evidence provided by the matrixes of the other three Brazilian N.A.S.P. methodologies within the designed scenarios of growth will produce the "Brazilian Planned Scenario N.A.S.P.", which can be either an instrument for the Brazilian N.A.S.P. practices improvement or a "M.I.E.A.C. N.A.S.P. realist methodology model" to promote N.A.S.P.s analysis and N.A.S.P.s improvements within the Middle Income and Economically Active Couties"•

5.2. Test Explanation:

• The M.C.S.A.M. application test model in N.A.S.P. is shown in FIGURE 5.2.-1 and the following steps can be identified from what has been done:

1st. step: As part of the application test the following operational adjustments have to be made:

1. Working Field Selection: The test will be applied to both "investigation field" or developed world(U.S.A., U.K., Fed.Rep. of Germany, Canada, and Norway) and "application field"(Brazil actual scenario and three other developmental scenarios of growth to Brazil)• This adjustment will vary upon the country which the test is been applied•

2. Planning Level Selection: The test will be applied to the "National" organizational level of N.A.S.P. in both cases of working field, i.e., "investigation field" and "application field"•

3. Focused Planning Element or Sub-system: The test will focus the "airport" as one of the smallest parts of the major system of the "Air Transport Industry", and also the resulting judgements obtained from the answers to the forthcoming questions will be made from the airports point of view•

4. Focused Planning Scenario: The test will focus the "actual parameters of growth" for the "investigation field" and will vary the "focused planning scenario" for the "application field" upon the Brazilian scenario which is been considered• The actual planning horizon is also defined, in terms of time-scale, for the "investigation field", whereas the different Brazilian scenarios will be examined accordingly, i.e., "actual planning horizon" for the Brazilian actual growth scenario, and "strategic-term planning horizon" for the other three developmental scenarios of growth(low, medium and high)•

2nd. step: Input 1 or the supporting planning theories selection: The following ones have been selected:

1. Planning Analysis Tool 1: "The Interactive System Planning Analysis" which is a research proposal as a permanent instrument of analysis to the M.C.S.A.M.•

2. Planning Analysis Tool 2: "The Forms of Planning Identification" based on Friedmann(1973), and its defined internal scale of desirability, $S_{D.F.1}$•

3. Planning Analysis Tool 3: "Political Context & Planning Methods" based on Breheny(1986), and its defined internal scale of desirability, $S_{D.F.2}$•

4. Planning Analysis Tool 4: "Uncertainty in Planning" based on Christensen(1985), and its defined internal scale of desirability, $S_{D.F.3}$•

3rd. step: Input 2 or the planning factors and goals selection: Thirty two(32) planning factors and goals expressed by $S_{P.F._{1...32}}$, have been selected mostly from the "Taxonomy of World Air Transportation"(Osumah-1987)•

4th. step: The 32 planning factors and goals selected as above are now entered to the M.C.S.A.M. in a simple sequential order expressed by $S_{P.F._{1...32}}$ • Each one of the planning factors and goals are at that stage classified by the Planning Analysis Tool 1 or the "Interactive System Planning Analysis", and receive an equivalent interactive number expressed by $I_{W_{1...32}}$ = (1...10**)(**=except nº9)• It is important to point out that all the 32 planning factors and goals are analysed after the application by the multi-disciplinary planning actors of the operational adjustments•

5th. step: Each one of the 32 planning factors and goals are now analysed within each one of the selected supporting planning theories, as follows:

1. From the "Forms of Planning" the following question is addressed to each one of the 32 planning factors and goals; "*As far as the forms of planning are concerned, what are the planning characteristics within which this particular selected planning factor and goal has been manipulated ?*"• The answer is a common sense or democratic result within the multi-disciplinary planning actors, and will classify the planning factor and goal within one of the four weights of the internal scale of desirability, as follows; **CP 1, PP 1, CP 2,** and **PP 2**• The weight which is given to this particular planning factor and goal(**1, 2, 3,** or **4**), will be then multiplied by its interactive number(**1, 2, 3,...10**), which has already being given by the Planning Analysis Tool 1, and the result, $\mathbf{f_{1}1}$ is entered to the matrix• The results, from the other planning factors and goals will have the expressions; $\mathbf{f_{2}1, f_{3}1, ...f_{32}1}$, respectively•

2. From the "Planning Context & Planning Methods" the following question is addressed to each one of the 32 planning factors and goals; "*As far as the planning context & planning methods are concerned, what are the planning context characteristics and what planning methods have been adopted within this planning context to deal with this particular planning factor and goal* ?"• The answer is a common sense or democratic result within the multi-disciplinary planning actors, and will classify the planning factor and goal within one of the four weights of the internal scale of desirability, as follows; **V, P1, P2,** and **L**• The weight which is given to this particular planning factor and goal(**1, 2.5, 2.5,** or **4**), will be then multiplied by its interactive number(**1, 2, 3,...10**), which has already being given by the Planning Analysis Tool 1, and the result, $\mathbf{f_{1}2}$ is entered to the matrix• The results, from the other planning factors and goals will have the expressions; $\mathbf{f_{2}2, f_{3}2, ...f_{32}2}$, respectively•

3. From the "Uncertainty in Planning" the following question is addressed to each one of the 32 planning factors and goals; "*As far as the level of uncertainty is concerned, what is the level of agreement about this particular planning factor and goal, and what is the level of knowledge about it in terms of; its possible controllability, improvement of its performance, or knowledge as related to the level of technology which is required to deal with it* ?"• The answer is a common sense or democratic result within the multi-disciplinary planning actors, and will classify the planning factor and goal within one of the four weights of the internal scale of desirability, as follows; **C, B, E,** and **P**• The weight which is given to this particular planning factor and goal will be then multiplied by its interactive number(**1, 2, 3,...10**), which has already being given by the Planning Analysis Tool 1, and the result, $\mathbf{f_{1}3}$ is entered to the matrix• The results, from the other planning factors and goals will have the expressions; $\mathbf{f_{2}3, f_{3}3, ...f_{32}3}$, respectively•

6th. step: Output 1 or The Preferred Common planning factors and goals: The addition of the rows will give the cumulative weights to each one of the entered planning factors and goals• The expression, $\sum_1(\mathbf{f}_1 1+\mathbf{f}_1 2+\mathbf{f}_1 3)$ gives the cumulative weight to the first planning factor and goal entered into the matrix• Each one of the other planning factors and goals will receive a cumulative weight, which is given by the following expressions respectively:

$\sum_2(\mathbf{f}_2 1+\mathbf{f}_2 2+\mathbf{f}_2 3)$ to the second planning factor,

$\sum_3(\mathbf{f}_3 1+\mathbf{f}_3 2+\mathbf{f}_3 3)$ to the third planning factor, and consequently,

$\sum_{32}(\mathbf{f}_{32} 1+\mathbf{f}_{32} 2+\mathbf{f}_{32} 3)$ to the thirty second factor•

7th. step: The cumulative weights rank will define the potential most effective planning factors and goals, which are expected to be used in adequate multiobjective planning methods• The ranking will also define the common preferred planning factors and goals, which are expected to express the common objectives of the large majority of the multi-disciplinary planning actors• Assuming every element and sub-system of the major system is expressed by the interactive number, and also assuming that every single group of the community will be represented in the multi-disciplinary planning actors team, it is possible to conclude then that; The preferred common planning factors and goals are on one hand the expression of the minimal requirements identified by Hill(1980), and on the other hand they may express the most effective planning factors and goals within the selected planning field at the given circumstances of the planning context and planning environment• Finally, the preferred common planning factors and goals will identify the basic framework of the N.A.S.P. methodology of each one of the selected countries from the "investigation field" as an exercise of "emphatical understanding" about their N.A.S.P. practices• The basic framework of the actual Brazilian N.A.S.P. methodology will be identified, and the potential frameworks of the other three Brazilian N.A.S.P. methodologies under the three designed scenarios will be also identified, as an exercise of "predictable understanding" about their actual N.A.S.P. practices and their hypothetical N.A.S.P. practices in the future•

8th. step: Output 2 or the resulting preferred supporting planning theories: The addition of the columns will give the cumulative weights to each one of the aspects considered within the entered supporting planning theories• The expression,

$\sum_{1}^{1...32} \mathbf{f1}_{1...32}$ gives the cumulative weight to (CP 1), the first of the four forms of planning within the scale of desirability defined for the first supporting planning theory entered into the matrix• Each one of the other three "forms of planning" of the first supporting planning theory will receive the cumulative weight, which is given by the following expressions respectively:

- $\sum_{2}^{1...32} \mathbf{f1}_{1...32}$ to (PP1), the second "form of planning",
- $\sum_{3}^{1...32} \mathbf{f1}_{1...32}$ to (CP2), the third "form of planning", and
- $\sum_{4}^{1...32} \mathbf{f1}_{1...32}$ to (PP2), the fourth "form of planning"•

There are two other supporting planning theories with four aspects within each one of them, which will receive also their cumulative weights through the following expressions:

- $\sum_{5}^{1...32} \mathbf{f1}_{1...32}$ to (V), the first combination of the quadrants within the "planning context & planning methods",
- $\sum_{6}^{1...32} \mathbf{f1}_{1...32}$ to (P1), the second combination of the quadrants within the "planning context & planning methods",
- $\sum_{7}^{1...32} \mathbf{f1}_{1...32}$ to (P2), the third combination of the quadrants within the "planning context & planning methods",
- $\sum_{8}^{1...32} \mathbf{f1}_{1...32}$ to (L), the fourth combination of the quadrants within the "planning context & planning methods",
- $\sum_{9}^{1...32} \mathbf{f1}_{1...32}$ to (C), the first combination of the quadrants within the "uncertainty in planning",

- $\sum_{10}^{1...32} \mathbf{f1}_{1...32}$ to (**B**), the second combination of the quadrants within the "uncertainty in planning",

- $\sum_{11}^{1...32} \mathbf{f1}_{1...32}$ to (E), the third combination of the quadrants within the "uncertainty in planning", and finally,

- $\sum_{12}^{1...32} \mathbf{f1}_{1...32}$ to (**P**), the fourth combination of the quadrants within the "uncertainty in planning"•

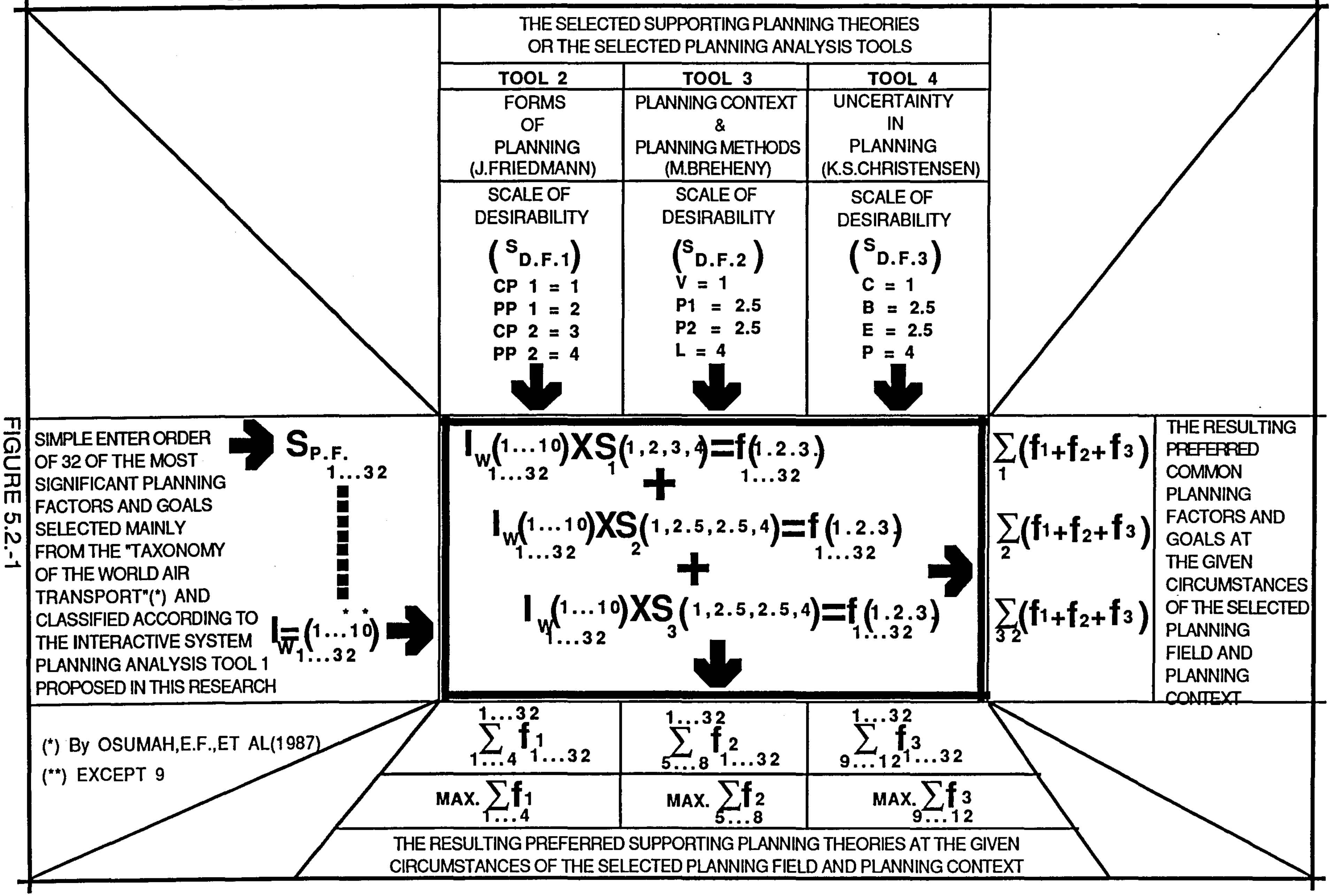
9th. step: The maximum cumulative weight within each supporting planning theory is given by the expression $\text{MAX}.\sum_{1...12} \mathbf{f(1.2.3.)}$, and the expression $\text{MAX}.\sum_{1...4} \mathbf{f1}$ will define the preferred aspect within the first one of the supporting planning theories• The expression $\text{MAX}.\sum_{5...8} \mathbf{f2}$, will define the preferred aspect within the second supporting planning theory• Whereas, the expression $\text{MAX}.\sum_{9...12} \mathbf{f3}$, will define the preferred aspect within the third supporting planning theory• These preferred aspects will express the main characteristics of the planning context and planning environment as far as the supporting planning theories are concerned• The combination of the three preferred aspects will indicate the planning context and planning environment as far as "forms of planning" are concerned, followed by the "political context and planning method" identification, under the expressed level of "uncertainty in planning"• The internal rank within each one of the supporting planning theories will indicate the relative position of the preferred aspects and consequently, express the potential ways in which it is theoretically possible to promote the necessary changes in the planning context and planning environment, i.e., first by changing the planning behaviour upwards the next step of the scale of desirability; second by promoting institutional changes which should be directed towards the improvement of the planning environment• The preferred aspects and the internal rank will also help to understand the common planning factors and goals rank, and vice-versa, because it is believed that by knowing the planning context and planning environment characteristics it is much easier to understand the reasons why a specific planning factor and goal would be located in a specific position of the ranking•

10th. step: The output 1 and output 2 obtained from the application field will promote the identification of different hypothetical frameworks for the Brazilian N.A.S.P.

methodologies, within potentially different characteristics of the Brazilian planning contexts and planning environments• Three potentially different characteristics of the Brazilian planning contexts and planning environments will be identified under three different Brazilian scenarios of growth designed for the next 25 years• The actual Brazilian scenario will indicate the necessary changes within the actual planning context and planning environment as compared to the characteristics provided by the hypothetical Brazilian future scenarios• The common characteristics of the planning context and planning environment obtained from the developed countries will help to understand the conflicting areas within the actual Brazilian planning context, and perhaps to allocate the potential theoretical changes within the actual Brazilian planning context• The common characteristics of the N.A.S.P. methodologies from the developed countries will support the necessary changes within the Brazilian N.A.S.P. methodology• The recommended changes within the framework of the Brazilian N.A.S.P. methodology and the suggested behavioural changes within the planning context and planning environment will be called "Tailoring Process of Planning"• Consequently, it is hoped that the resulting framework for the Brazilian N.A.S.P. methodology will be possibly implemented within what is called in this work, the "Brazilian Planned Scenario"•

11th. step: The combination of input 1 and input 2 is called the "Analysis", and that will be demonstrated through the test of adequacy in choosing the selected supporting planning theories(input 1) to assess the selected planning factors and goals(input 2) of the N.A.S.P.• The output 2 and the input 2 has been described by "Synthesis", and that will be demonstrated through the test of adequacy in choosing the correct selected planning factors and goals to represent the N.A.S.P., in accordance to the identified planning context and planning environment• The output 1 and the output 2 has been described by "Evaluation", and that will be demonstrated through the examining of correlations between the preferred aspects within the supporting planning theories and the preferred common planning factors and goals• The "Evaluation" can also be demonstrated by the correlations between the cumulative ranking of the planning factors and goals, and the cumulative ranking within the aspects of the supporting planning theories• The "Feedback 1" and "Feedback 2" will be demonstrated by the "Brazilian Planning Scenario", which is the result of the "Tailoring Process of Planning", i.e., the definition of the "form" within the "context"•

M.C.S.A.M. - APPLICATION TEST MODEL IN N.A.S.P.



THE SELECTED SUPPORTING PLANNING THEORIES OR THE SELECTED PLANNING ANALYSIS TOOLS

TOOL 2	TOOL 3	TOOL 4
FORMS OF PLANNING (J.FRIEDMANN)	PLANNING CONTEXT & PLANNING METHODS (M.BREHENY)	UNCERTAINTY IN PLANNING (K.S.CHRISTENSEN)
SCALE OF DESIRABILITY ($S_{D.F.1}$)	SCALE OF DESIRABILITY ($S_{D.F.2}$)	SCALE OF DESIRABILITY ($S_{D.F.3}$)
CP 1 = 1 PP 1 = 2 CP 2 = 3 PP 2 = 4	V = 1 P1 = 2.5 P2 = 2.5 L = 4	C = 1 B = 2.5 E = 2.5 P = 4

SIMPLE ENTER ORDER OF 32 OF THE MOST SIGNIFICANT PLANNING FACTORS AND GOALS SELECTED MAINLY FROM THE "TAXONOMY OF THE WORLD AIR TRANSPORT"(*) AND CLASSIFIED ACCORDING TO THE INTERACTIVE SYSTEM PLANNING ANALYSIS TOOL 1 PROPOSED IN THIS RESEARCH

$S_{P.F.\,1\ldots32}$

$I_{W_{1\ldots32}}(1\ldots\overset{**}{10})$

$$I_{W_{1\ldots32}}(1\ldots10)XS_1(1,2,3,4)=f_{1\ldots32}(1.2.3.)$$

$$+$$

$$I_{W_{1\ldots32}}(1\ldots10)XS_2(1,2.5,2.5,4)=f_{1\ldots32}(1.2.3.)$$

$$+$$

$$I_{W_{1\ldots32}}(1\ldots10)XS_3(1,2.5,2.5,4)=f_{1\ldots32}(1.2.3.)$$

$\sum_1(f_1+f_2+f_3)$

$\sum_2(f_1+f_2+f_3)$

$\sum_{32}(f_1+f_2+f_3)$

THE RESULTING PREFERRED COMMON PLANNING FACTORS AND GOALS AT THE GIVEN CIRCUMSTANCES OF THE SELECTED PLANNING FIELD AND PLANNING CONTEXT

(*) By OSUMAH,E.F.,ET AL(1987)

(**) EXCEPT 9

$\sum_{1\ldots4}^{1\ldots32} f_{1\,1\ldots32}$	$\sum_{5\ldots8}^{1\ldots32} f_{2\,1\ldots32}$	$\sum_{9\ldots12}^{1\ldots32} f_{3\,1\ldots32}$
MAX. $\sum_{1\ldots4} f_1$	MAX. $\sum_{5\ldots8} f_2$	MAX. $\sum_{9\ldots12} f_3$

THE RESULTING PREFERRED SUPPORTING PLANNING THEORIES AT THE GIVEN CIRCUMSTANCES OF THE SELECTED PLANNING FIELD AND PLANNING CONTEXT

FIGURE 5.2.-1

M.C.S.A.M. - APPLICATION TEST MODEL IN N.A.S.P. RESEARCH PROPOSAL

• As described so far all the operations with and within the M.C.S.A.M. have been designed to be ideally executed by multi-disciplinary planning actors, specially the M.C.S.A.M. test in N.A.S.P., but due to practical problems, that was not possible at all• Consequently the researcher has taken the place of the multi-disciplinary planning actors in order to simulate their planning behaviour and promote the necessary test for the G.S.P.M. through the M.C.S.A.M. in N.A.S.P.• In order to provide the reliable evidence about the researcher's capability of judgement and unbiassed choices that will have to be made within this analytical process, specially to answer the questions formulated in the test explanation, this research has been guided by two evaluative frameworks proposed by Morris Hill(1985b)• The first is the "Decision-making Contexts and Strategies for Evaluation", where a set of decision variables are identified and used to provide what he called "the evaluation variables"• In our case the evaluation variables are the planning factors and goals• According to Hill, the suggested set of variables which have significant implications for evaluation procedures are as follows:

1. The perception of the public interest•
2. The treatment of uncertainty•
3. The number of stages in the evaluation process•
4. The assessment of time preference•
5. Ex ante, continuous or ex post evaluation•
6. Distributional equity•
7. Comprehensibility (transparency of methodology•
8. Sophistication of evaluation procedures•
9. Extent that effects on all interested parties are recorded•
10. Optimum-seeking or satisficing evaluation method•
11. Comprehensiveness or disjointedness of evaluation procedure•
12. Interactive nature of evaluation process•

• The second evaluative framework adopted by this research was the "Variables of a Decision-Making or Planning Process" from Morris Hill(1985b)• According to Hill the appropriate evaluation strategy to analyse each one of the planning modes separately should include variables which better focus on its specific characteristics• The supporting planning theories will be assessed by this evaluative framework in order to provide the support to the researcher's decisions concerning to the formulated questions by the M.C.S.A.M. test• The evaluative framework has considered the following variables:

1. Degree of centralization of power associated with the planning mode•

2. Form of control•
3. Number of clearance points required before implementation•
4. Conceptual distance between the decision and the actual intervention in the field•
5. Emphasis on product or on process•
6. Number of actions involved•
7. Accountability i.e., extent to which the citizen can check about what is happening to him/her•
8. Role of the technical expert•
9. Who benefits from the mode•
10. Assumed consensus in the system•
11. Breadth of responsibility of the decision-making body•
12. Opportunity for participation in the decision-making process by interested parties•

• In FIGURE 5.2.-2 the proposed variables are displayed in a matrix for evaluation•

Mode Variable Parameter	Command/ Initiatory Planning	Command/ Regulatory Planning	Policies Planning	Corporate Planning	Participatory Planning
Degree of Centralization	Centralized	Centralized	Weakly Centralized	Fragmented	Dispersed
Degree of Control	Great Control Budgetary	Great Control Statutory	Indirectly Induced -incentives guidelines information	Compliance by consent and mutual interest	Voluntary compliance
Number of Clearance Points before Intervention	Few	Can be few or several depending on system hierarchy	At least two stage	Multiple clearance depending on £ of corporate bodies	Single or numerous depending on number of participants and issue addressed
Conceptual distance from Intervention in field	Immediate	Conditional dependent on initiative of others	Imminent distant depending on degree of consensus	Intercorporate distant or imminent, for corporate bodies imediate	On issues subject to control immediate
Emphasis on Product or in process	Product	Product/plan or statutory behaviour	Process and product	Process	Process and product
Number of Actors Involved	Fewer than subsequent ones	Fewer than subsequent ones	Potentially numerous	Potentially numerous	Many
Accountability (Transparency)	Patent or latent	Patent or latent	At least partially patent	Patent	Patent
Role of Planner	Technical specialist	Technical specialist	Advisor and simulation analyst	Advocate and negotiator or broker	Advocate and facilitator
Who benefits? (whose) Interests are served?	Central decision-making body and "the public"	Central decision-making body and "the public"	Central decision-making body and sectoral/ regional decision-making bodies and "the public"	Corporate bodies and who they represent	Active participants (if they are representative of the entire constituency)
Extent of Consensus in System	Consensus assumed	Consensus assumed	Consensus on basic policies (Not detail)	Concensus on need for negotiated settlement not on issues	Potential for conflict but can facilitaty consensus
Breadth of Areas of Responsibility	Responsibility for broad range of areas of public sector activity	Responsibility for broad range of areas of public sector activity	Central body-broad areas of responsibility and sectoral/ regional areas of responsibility of subordinate bodies	Specific areas of responsibility of corporate bodies	Areas of concern of participants as defined by them
Opportunity For Participation by Interested/affected Parties	Limited	Limited	Limited	Greater opportunities for participation by corporate bodies	Based on participation by interested parties

FIGURE 5.2.-2 VARIABLES OF A DECISION-MAKING OR PLANNING PROCESS
Source Hill(1985)

5.3. Selection of the Investigation Field Sample within the Developed Countries to the M.C.S.A.M. application test in their N.A.S.P.:

5.3.1. Introduction:

• The Investigation Field sample is constituted by five developed countries, such as: U.S.A., U.K., Federal Republic of Germany, Canada, and Norway• In this part of the work a matrix for each one of the countries will be filled up according to the described process and the interpretation of the results will contain the identification of the N.A.S.P. methodology framework, and the respective planning context and planning environment for all the countries of the sample• Their planning contexts and planning environments will be identified as far as the supporting planning theories are concerned, as follows; "forms of planning", "planning policy & planning methods", and "uncertainty in planning"• Before that a thorough investigation will be made of the five selected countries of the sample in order to be qualified to assume the position of a hypothetical multi-disciplinary planning actors team, and have the M.C.S.A.M. tested in N.A.S.P.• That investigation has included mainly the following aspects of the countries:

1. The country and its history•
2. The geography and climate•
3. Their Constitutional form of government•
4. Their economy, energy and industry•
5. Their transportation modes and communication•
6. Their National Airport System•
7. Their planning practices and planning experiences•

• The intermediate results of all this thorough investigation have not been included in this piece of writing for practical reasons, but they have been compiled for further examination• Hence, in order to provide a real evidence about that investigation it has been decided to include here the Norwegian case study, which is done in the next section•

5.3.2. The investigation of the Norwegian Planning Context and Planning Methods before the M.C.S.A.M. application test in its N.A.S.P.:

1. Introduction: In this part of the work will be presented the results of a thorough investigation which has been made of the Norwegian planning context before applying the M.C.S.A.M. and have it properly tested• Although, the same investigation has been done of the other four countries of the "Investigation field" sample, Norway has been selected to be included in the work due to its peculiarities in terms of; geography, economy, government characteristics, and planning practices• The identification of the planning context is an important support to the research reliability, and to qualify the researcher within the actual test of the M.C.S.A.M. in the Norwegian N.A.S.P.• The main objective of this overview about Norway is to learn from their planning practices and planning experiences by knowing firstly their planning context, and secondly understanding their specific needs and objectives• It would be impossible to insert in this dissertation all the results obtained from the extensive investigation over the Norwegian planning context and planning practices, nevertheless, some of the most important evidences have been selected to be reported, as follows:

2. The Country: Norway is bounded to the north by the Arctic Ocean, east by the USSR, Finland and Sweden, south by the Skagerrak Straits and west by the North Sea (FIGURE 5.3.6.-1)• Oslo is the capital of Norway and the country has a mainland total area of 323.877 sq.km. with a total population of 4.2 m. in 1986 and a GNP per capita of US$13.940 in 1985• Originally, Norway was ceded to the King of Sweden by the King of Denmark in 1814 but then the Norwegian people declared themselves independent up to 1905 when Prince Carl of Denmark accepted the throne and was formally elected King of Norway with the name of Haakon VII• The actual reigning King is Olav V since 1957• The official norwegian languages are Bokmål (or Riksmål) and Nynorsk (or Landsmål)•

3. Constitution and Government: Norway, is a constitutional and hereditary monarchy• The royal succession is in direct male line in the order of primogeniture• In default of male heirs the King may propose a successor to the Storting (Parliament), but this assembly has the right to nominate another, if it does not agree with the proposal• The Constitution, voted by the constituent assembly at Eidsvoll on May 1814 and modified at various times, vests the legislative power of the realm in the Storting (Parliament)• The royal veto may be exercised, but if the same Bill passes two Storting formed by separate and subsequent elections it becomes the law of the land without the assent of the sovereign• The King has the command of the land, sea and air forces, and makes all appointments•

3.1. In Norway the mode of election is direct, and the method of election which is proportional takes place every four years• The country is divided into 19 counties (fylker), with each one of these districts electing from 4 to 15 representatives to the Storting• At the elections for the Storting held in 1985 the following parties were elected with their respective number of sits : Labor, 71; Conservative, 50; Centre Party, 12; Christian Democratic Party, 16; Socialist Left Party, 6; Party of Progress, 2• A Labour Government was formed and took office on 9 May 1986•

3.2. The Storting when assembled, in every year between October and the following June, divides itself by election into the Lagting and the Odelsting• The former is composed of one-fourth of the members of the Storting, and the other of the remaining three-fourths• Each of three "Ting"; The Storting, The Odelsting and The Lagting nominates its own president• Most questions are decided by the Storting, but questions relating to legislation must be considered and decided by the Odelsting and the Lagting separately• Only when the Odelsting and the Lagting disagree, the Bill has to be considered by the Storting in plenary sitting, and a new law can then only be decided by a majority of two-thirds of the voters• The same majority is required for alterations of the Constitution, which can only be decided by the Storting in plenary sitting•

3.3. The executive is represented by the King, who exercises his authority through the Cabinet or Council of State (Statsråd), composed of a Prime Minister (Statsminister) and 17 ministers (Statsråder)• The ministers are entitled to be present in the Storting and to take part in the discussions, but without a vote•

3.4. For the purposes of administration each one of the 19 norwegian counties (fylker) has its own central government which is represented by a county governor (fylkesmannen)• In addition, there are 47 urban districts (bykommuner) and 407 rural districts (herredskommuner), each of which usually corresponds in size to a parish (prestegjeld)•

3.5. Locally, the districts are administered by district councils (kommunestyrer), whose membership may vary between 13 and 85 councillors, and by a committee (formannskap) which is elected by and from the members of the council• The council is four times the size of the committee and the chairman and vice-chairmen for the committee are elected by the council from among the committee members• Each of the 18 counties forms a county district (fylkeskommune), while the remaining one, Oslo, comprises an urban district•

3.6. The supreme authority in a county district is the county council (fylkesting)• The members of the county council are elected directly by the electors of the county and the number of representatives varies between 25 and 85• In a county district the county committee (fylkesutvalg) occupies a position corresponding to that of the committee (formannskap) in the primary districts(urban districts and rural districts)• The county committee is elected by and from among the members of the county council• The number of county committee members is one fourth of the membership of the county council, but must be not more than 15•

4. Area and Population: The 19 norwegian counties or Fylker are as follows in order of geographic size;

TABLE 5.3.2.-1
NORWEGIAN COUNTIES AND POPULATIONAL DISTRIBUTION
(The Central Bureau of Statistics)
(Statistisk Sentralbyrå-Oslo)

Fylker	Area	Population	Population	Density
(counties)	(sq.km.)	(80 census)	(86 census)	(pop./sq.km.)
Finnmark	48.637	78.331	75.650	1.6
Nordland	38.327	244.493	242.275	6.3
Hedmark	27.388	187.223	186.383	6.8
Troms	25.953	146.818	146.730	5.7
Oppland	25.259	180.765	181.799	7.2
Nord-Trondelag	22.463	125.835	126.686	5.6
Sor-Trondelag	18.831	244.760	246.814	13.1
Sogn og Fjordane	18.633	105.924	106.113	5.7
Hordaland	15.633	391.463	399.669	25.6
Telemark	15.315	162.050	162.560	10.6
More og Romsdal	15.104	236.062	237.271	15.7
Buskerud	14.927	214.571	219.990	14.7
Aust-Agder	9.211	90.629	94.688	10.3
Rogaland	9.140	305.490	323.346	35.4
Vest-Agder	7.280	136.718	140.215	19.3

Akershus	4.916	369.193	393.350	80.0
Ostfold	4.183	233.301	234.952	56.2
Vestfold	2.215	186.691	191.606	86.5
Oslo (City)	.454	452.023	449.228	989.5
TOTAL	323.877	4092.340	4159.325	12.8

4.1. On November 1980, 2.874.990 persons lived in densely populated areas and 1.197.939 in sparsely populated areas• There are 24 major towns in Norway and according to the 1986 census the rank was as follows;

TABLE 5.3.2.-2

24 MOST IMPORTANT NORWEGIAN TOWNS

(The Central Bureau of Statistics)

Town	Populat.	Town	Populat.	Town	Populat.
Oslo	449.208	Sandnes	40.805	Gjovik	25.925
Bergen	207.866	Alesund	35.173	Halden	25.836
Trondheim	134.406	Sandefjord	35.152	Moss	24.518
Stavanger	95.076	Bodo	34.496	Lillehammer	22.119
Kristiansand	62.624	Porsgrunn	31.322	Harstad	21.949
Drammen	50.852	Haugesund	26.909	Molde	21.439
Tromso	48.101	Fredrikstad	26.831	Kongsberg	21.049
Skien	47.030	Ringerike	26.821	Steinkjer	20.477

5. Climate: There is a considerable variation in the norwegian climate because of latitude, the topography and the varying effectiveness of prevailing westerly winds and the Gulf Stream• Winters along the whole west coast are exceptionally mild but precipitation is considerably high as for example;

TABLE 5.3.2.-3

NORWEGIAN CLIMATE SAMPLE

(The Central Bureau of Statistics)

Town	Temperat.-January	Temperat.-July	Annual rainfall
Oslo	25 F (- 3.9 C)	63 F (+17.0 C)	27.0"(683 mm)
Bergen	35 F (+ 1.5 C)	61 F (+16.1 C)	78.3"(1.958 mm)
Trondheim	26 F (- 3.5 C)	57 F (+14.0 C)	32.1"(870 mm)

6. Economy: The norwegian currency is the "Krone" of100 "ore" with the value of 11 kroner to £1 and their comparative national budget from 1981, 1983 and1986 is as follows;

TABLE 5.3.2.-4

NORWEGIAN BUDGET

(The Central Bureau of Statistics)

(in1.000kron.)	1981	1983	1986
Revenue	100.924.000	165.421.000	221.339.000
Expenditure	91.629.000	157.432.000	222.287.000
National debt	107.662.000	92.406.100	142.392.600(85)

7. **Energy and Natural Resources:** Norway is a large producer of hydro-electric energy and the potential total power at regulated mean water flow is estimated at 160.000m.kwh. annually• In 1985 the total energy production was 119.082m.kwh. of which 99.7% was generated by hydro-electric plants• In 1966 the first oil exploration well was drilled and by 1985 the production was 40.5m. tonnes or 8 times the domestic consumption of petroleum and is valued at about 20% of the GNP• Others main natural resources of Norway are; mineral gas, minerals, agriculture, forestry and fisheries•

8. **Industry and Trade:** Industry is chiefly based on the following raw materials produced within the country; wood, fish, water power, crude petroleum and natural gas• The most important export manufactures are; paper products, industrial chemicals and basic metals with the following comparative general trading results;

TABLE 5.3.2.-5

NORWEGIAN TRADE

(The Central Bureau of Statistics)

(in 1.000kron.)	1981	1983	1985
Imports	89.687.802	98.407.773	132.563.356
Exports	104.265.370	131.396.960	170.732.779
Results	+14.577.568	+32.989.187	+38.169.423

9. **Road and Railway Transport:** In 1985 the length of public roads in Norway, including in towns was 85.882 km., where 55.334 km. were main roads and 55.974 km. had some kind of paving• The total length of state railways was 4.242 km. and of private companies was 16 km., where 2.443 km. of electric traction was installed in 1985•

10. Norwegian Air Transport: With just over 4 million people, living on an area of approximately 324.000 sq.km., which equals 12.3 persons per square km., Norway can truly be said to be a sparsely populated country• The distance between the northern-most and southern-most point, is about 1.800 kms., and just about equals the distance from the southern-most point in Norway to Rome, in Italy• Approximately 30% of the norwegian land area is situated north of the Arctic Circle and only 360.000 people, or slightly less than 10% of the total population however, resides in that part of the country•

10.1. Major roads both in the southern and in the northern part of the country are liable to be blocked by snow for several months of the year• The severe and long winters naturally tend to create problems for rail-road travel as well• Coastal shipping, however, operates more or less unhindered the year round, thanks to the presence of the Gulf Stream•

10.2. As can easily be imagined, the long distances between Southern and Northern Norway, and especially when adverse weather conditions prevail, have proven to be a major obstacle as regards travel within the country• The advent of air transportation, however, has radically changed this• Whereas only 30 years ago it took as long as 6 days to travel the entire length of Norway, the same journey can today be covered in a matter of 6 hours, using scheduled airline flights•

10.3. The Norwegian Air Transport comparative figures between 1982 and 1985 were as follows;

TABLE 5.3.2.-6

NORWEGIAN DOMESTIC AIR TRANSPORT FIGURES

(The Central Bureau of Statistics)

year	1.000km flown	passen. carried	1.000 passen. km.	Post,luggage, freight and passen. (1.000 ton-km) total
1982	56.070	5.210.452	4.118.000	498.000
1983	59.638	5.610.866	4.345.000	514.000
1984	59.359	6.114.038	4.533.000	534.000
1985	63.666	6.799.735	4.791.000	557.000

11. Norwegian Airports: In 1986 there were 51 Airports in Norway which have been displayed in FIGURE 5.3.2.-7, with the following ranking order, according to the Civil Aviation Statistics;

TABLE 5.3.2.-7

NORWEGIAN AIRPORTS RANKING BY TOTAL NUMBER OF PASSENGERS-1986

Nº	AIRPORTS	TOTAL PASSENGERS	85%G.
1	OSLO/FORNEBU*	5.349.833	7.4
2	BERGEN/FLESLAND*	1.977.443	9.2
3	STAVANGER/SOLAM/FORUS*	1.805.853	6.6
4	TRONDHEIM/KVERNBERGET*	1.169.952	7.4
5	OSLO/GARDERMOEN*	1.072.534	3.1
6	BODO*	829.468	3.7
7	TROMSO/LANGNES*	748.917	`6.0
8	ALESUND/VIGRA*	518.814	2.6
9	KRISTIANSAND/KJEVIK*	517.309	8.3
10	EVENES*	408.202	-1.3
11	HAUGESUND/KARMOY*	231.738	-5.8
12	MOLDE/ARO*	202.157	-1.7
13	KRISTIANSUND/KVERNBERGET*	177.401	-3.8
14	ALTA*	174.555	1.0
15	KIRKENES/HOYBUKTMOEN*	130.841	3.9
16	BARDUFOSS*	117.477	-1.6
17	Hammerfest•	100.553	-2.9
18	Stokmarknes/Skagen•	92.974	6.5
19	Bronnoysund/Bronnoy•	81.311	25.7
20	Vadso•	80.685	-1.7
21	Moi Rana/Rossvoll•	78.422	25.8
22	Sandnessjoen/Stokka•	75.865	21.9
23	Sogndal/Haukasen•	74.608	6.8
24	Floro•	71.512	5.2
25	Leknes•	68.181	22.0
26	Sandefjord/Torp•	64.947	19.9
27	Svolvaer/Helle•	63.271	15.3
28	BANAK*	61.078	1.4
29	Skien/Geiteryggen•	52.643	47.3
30	ANDOYA*	49.676	-3.5
31	Namsos•	48.962	-7.1
32	ROROS*	43.353	1.8

33	Sandane/Anda•	43.034	46.0
34	Forde•	41.834	56.2
35	Orsta-Volda/Hovden•	41.466	62.6
36	Narvik/Framnes•	33.581	65.8
37	Honningsvag/Valan•	31.493	4.7
38	SVALBARD/LONGYEAR*	23.815	7.6
39	Mehamn•	23.140	-7.7
40	Berlevag•	16.965	-3.5
41	Sorkjosen•	15.673	3.7
42	Batsfjord•	11.601	-0.4
43	Rost•	10.173	103.7
44	Orland•	8.129	-0.9
45	Vaeroy•	8.068	-12.0
46	Hasvik•	6.837	-4.5
47	LISTA*	6.803	-19.3
48	Stord/Sorstokken• Δ	4.858	--.--
49	Rorvik/Ryum• Δ	1.694	--.--
50	Dagali• Δ	1.475	--.--
51	Hamar/Stavsberg• Δ	1.231	--.--
---	21(*) MAIN ROUTE AIRPORTS-TOT.	Σ*=15.560.740 ∞	5.9
---	30(•) OTHERS AIRPORTS-TOTAL	Σ•= 1.311.668 ∞	14.7
---	51(*)+(•) AIRPORTS-TOTAL-Σ*+Σ•	16.872.408 ∞	6.5

(*) Airports connected to the main routes.

(•) Commuter line traffic only, here included as "other airports".

(Δ) Airports opened in 1986.

Σ Addition.

∞ Proportion.

11.1. According to the number of Civil aircraft movements the Norwegian Airports had in 1986 the following ranking classification, which in fact has been extended to 53 Airports instead of 51 Airports according to the Civil Aviation Statistics ;

TABLE 5.3.2.-8

NORWEGIAN AIRPORTS RANKING BY TOTAL AIRCRAFT MOVEMENTS

1986

Nº	AIRPORTS RANK TABLE 5.3.2.7	TOTAL AIRCRAFT MOVEM.	% 85
1	1 *	115.229	6.2

2	3 *	80.105	4.8
3	2 *	77.526	1.6
4	6 *	46.272	5.0
5	4 *	45.686	18.1
6	5 *	41.661	10.8
7	7 *	33.753	16.4
8	9 *	27.246	11.0
9	26 •	24.716	8.7
10	11 *	19.078	-6.3
11	8 *	16.960	7.0
12	10 *	15.276	4.0
13	15 *	14.066	11.3
14	29 •	13.054	17.3
15	13 *	12.796	9.4
16	17 •	12.250	12.1
17	Rygge •	11.120	32.8
18	14 *	10.781	2.5
19	16 *	10.502	-6.0
20	12 *	9.587	17.1
21	24 •	9.532	8.8
22	20 •	9.453	-4.6
23	28 *	8.351	1.7
24	21 •	7.833	42.9
25	30 •	7.824	-20.1
26	19 •	7.070	9.6
27	23 •	7.002	14.9
28	22 •	6.948	5.8
29	38 *	6.303	28.6
30	36 •	6.237	84.5
31	18 •	6.230	-0.5
32	31 •	5.388	19.1
33	37 •	5.276	6.7
34	44 •	5.237	-3.7
35	32 *	5.235	40.5
36	34 •	5.191	18.6
37	25 •	5.054	-3.4
38	35 •	4.797	30.6
39	33 •	4.565	17.9
40	27 •	4.321	-3.2
41	39 •	3.979	0.7
42	41 •	3.651	5.3
43	Notodden •	3.309	349.6

44	40 •	3.292	-0.2
45	48 • Δ	3.053	-
46	42 •	2.646	-1.4
47	46 •	2.506	-7.5
48	47 *	2.296	-7.7
49	45 •	1.716	-7.1
50	43 •	1.210	31.0
51	50 • Δ	1.137	-
52	49 • Δ	.736	-
53	51 • Δ	.428	-
-	21(*)MAIN ROUTE AIRPORTS-	TOTAL Σ*= 596.413	7.0
-	32(•)OTHERS AIRPORTS-	TOTAL Σ•= 199.056	14.1
-	53(*)+(•) AIRPORTS - TOTAL-	Σ*+Σ•= 795.469	8.7

11.2. In FIGURE 5.3.2.-3 are shown the Norwegian Airoutes Network for 53 Airports, according to the 1986 Civil Aviation Statistics issue•

12. Norwegian Airlines: The D.N.L.- Det Norske Luftfartselskap started its post-war activities on April 1946 and on August 1946, together with the D.D.L.- Danish Airlines and A.B.A./S.I.L.A.- Swedish Airlines, formed the "Scandinavian Airlines System'- S.A.S.• The 3 companies remained independent units, but all services were co-ordinated and in 1951 a new agreement was signed, according to which the 3 national companies became holding partners in a new organization which took over the entire operational system• Norway and Denmark hold each two-sevenths and Sweden three-sevenths of the capital, but they have joint responsibility towards third parties•

12.1. In the autumn of 1985 SAS had a fleet of 85 jet planes, with a length of route network, about 252.000 km.• The scheduled air services are run by SAS, Braathens South-American and Far East Air transport service (SAFE) and Wideroes Flyveselskap service• The Norwegian share of the scheduled air service run by SAS is two-sevenths of the SAS service on international routes and the total SAS service in Norway•

12.2. According to the Norwegian Civil Aviation Statistics the total traffic performed by SAS in 1986 as regards Norway was as follows;

TABLE 5.3.2.-9

SAS TOTAL FIGURES IN - 1986

Description	Unit	International	Domestic	Total

Aircraft kilom.	1.000	100.093	36.272	136.365
Aircraft depar.	number	109.925	88.512	198.437
Aircraft hours	number	176.398	78.122	254.520
Passen. carr.	number	5.983.701	5.885.530	11.869.231
Freight-to.car.	number	85.368	23.570	108.938
Passenger-kil.	1.000	9.642.128	2.896.693	12.538.821
Seat-kil. avai.	1.000	14.605.582	4.296.311	18.901.893
Passenger lo.f.	%	65.7	67.2	66.4
Ton-kil. perf.				
a. passen.+ba.	1.000	855.343	246.574	1.101.917
b. freight	1.000	388.499	15.249	403.748
c. mail	1.000	42.839	10.981	53.820
Total a-c	1.000	1.286.681	272.806	1.559.487
Ton-kil. avai.	1.000	2.020.295	449.512	2.469.807
Weight lo.fac.	%	63.8	60.5	62.2

12.3. The total traffic performed by the other Norwegian scheduled airlines in 1986 was as follows according to the Civil Aviation Statistics;

TABLE 5.3.2.-10

NORWEGIAN SCHEDULED AIRLINES FIGURES IN - 1986

Description	Unit	International	Domestic	Total
Aircraft kilom.	1.000	20.603	44.171	73.774
Aircraft depar.	number	34.582	195.454	230.036
Aircraft hours	number	53.009	110.236	163.245
Passen. carr.	number	1.725.522	5.764.926	7.490.448
Freight-to. car.	number	28.891	28.073	56.964
Passenger-kil.	1.000	2.759.131	2.270.491	5.029.622
Seat-kil. avai.	1.000	4.186.276	3.711.488	7.897.764
Passen. load f.	%	66.0	61.2	63.7
Ton-kil. perf.				
a. passen.+ba.	1.000	244.601	190.344	434.945
b. freight	1.000	110.999	12.618	123.617
c. mail	1.000	12.239	7.622	19.861
Total a-c	1.000	376.841	210.584	587.425
Ton-kil. avai.	1.000	578.010	393.067	971.077
Weight lo. fac.	%	65.2	53.5	60.2

12.4. The total number of aircraft registered in Norway in 1986 was as follows;

TABLE 5.3.2.-11

TOTAL NUMBER OF AIRCRAFT IN NORWAY IN 1986

FIXED-WING AIRCRA.	HELICOPTERS	BALLONS	GLIDERS	TOTAL
765	107	8	121	893

12.5. The number of persons employed in the Norwegian air transport in 1986 was as follows, according to the Civil Aviation Statistics;

TABLE 5.3.2.-12

MANPOWER OF NORWEGIAN AIR-SERVICE COMPANIES IN 1986

COMPANY	CREW	TECHNICAL	OTHERS	TOTAL
Scandinavian Airl. System	1.026	845	2.402	4.273
Braathens SAFE A/S	576	616	1.330	2.522
Helikopter Service A/S	200	270	390	860
Wideroe's Flyveselskap A/S	251	179	117	547
A/S Norving	78	56	90	224
Busy Bee of Norway A/S	173	12	35	220
Fred. Olsens Flyselskap A/S	30	69	33	132
NorskAir A/S	37	15	19	71
Partnair A/S	32	23	14	69
A/S Morefly	20	26	10	56
Coast Aero Center	13	9	12	34
Norsk Luftambulanse A/S	7	5	18	30
Fjellanger-Wideroe A/S	4	2	8	14
A/S Westwing	4	3	2	9
Other companies	95	32	45	172
TOTAL	2.546	2.162	4.525	9.233

12.6. The number of international passengers on flights FROM and TO Norway in 1986 was as follows, by main countries rank;

TABLE 5.3.2.-13

DESTINATION AND ORIGIN OF TOUR CHARTERS IN 1986

Nº	DESTINATION	Nº	ORIGIN	TOTAL
1	FRANCE-5.721	1	FRANCE-3.352	9.073
2	W. GERMANY-5.685	2	W. GERMANY-2.347	8.032
3	GREAT BRITAIN-5.022	3	ITALY- 1.371	6.393

4	SWEDEN-2.677	4	GR. BRITAIN-862	3.539
5	USA-2.246	5	SWITZERLAN.-1.01	3.256
6	DENMARK-1.525	6	AUSTRIA-797	2.332
7	NETHERLANDS-847	7	DENMARK-700	1.547
8	ITALY-814	8	ICELAND-347	1.161
9	FINLAND-668	9	USA-314	982
-	OTHERS-6.508	-	---	---
-	TOTAL-30.246	-	TOTAL-11.100	41.340

13. Norwegian Air Transport Development up to 1970: Towards the end of the nineteen thirties scheduled domestic air traffic using landplanes was available only between three Norwegian cities in southern Norway• In addition scheduled seaplane services were available on certain routes• After the last war, however, the hazards connected with seaplane operations during the winter darkness led to the seaplane services being gradually replaced by landplane services, as aerodromes, with runway lengths varying between 1.600 m. and 2.500 m., were constructed• By 1965 15 such aerodromes were in operation, half of them joint civil-military ventures•

13.1. A government appointed commission recommended at the beginning of the nineteen sixties that a further 9 such aerodromes should be built, in order to make air transportation available to most of the country's main population centres• During the political debates and discussions that followed, however, it was found that the costs of building 9 such aerodromes would be extremely high, and that large part of the population still would not have easy access to scheduled airline services• Seemingly, both of these shortcomings could be overcome by instead constructing a larger number of smaller airports suitable for operations with smaller types of aircraft•

13.2. The resultant conclusion was that only three main airports, out of the nine recommended, should be constructed, supplemented on a trials basis by four STOL-ports(short-take-off-and-landing) situated in Middle Norway, also offering scheduled services• It was further stated that the STOL-ports were to be located as close as possible to the communities they were intended to serve, preferably on "City-Town Main street', and the type of aircraft to be used would be the DHC-6 Twin Otter•

14. The Norwegian STOL-PORT System: The first STOL route was opened in 1968• It connected the major airports of Trondheim and Bodo, via four new airports, (FIGURE 5.3.2.-4)• In 1971, Western Norway became a part of the system, via four STOL airports and the major airport of Bergen• The following year, 1972 saw further extensions: Three new airports in the region northwest of Bodo; in 1974, the final extension of the basic network took place via five new airports and the existing major airports of Tromso and Kirkenes• This final stage covered the northern-most coast of Norway• Thus, the development can be described as a stepwise process, successively connecting new sub-systems of STOL airports to the existing major airports in Western and Northern Norway• FIGURE 5.3.2.-4 shows the progressive results of the STOL-port programme from 1968 up to 1979, however, 1968-1974 was the period when things really happened: In the course of only six years, the entire system was established• Coastal Norway from Bergen to Kirkenes, an air distance of more than 1.000 miles, was linked together by an interconnected and unbroken net of air routes•

14.1. The Norwegian STOL-ports were not constructed only to serve aircraft with STOL-performance but also CTOL-aircraft (conventional-take-off-and-landing)• Consequently, all traffic at their STOL-ports is operated conventionally•

14.2. The accessibility policy of the Norwegian STOL-programme was to provide a better communication offer to small communities along the Western and Northern coast of Norway• In this connection the STOL-ports very often serve communities which are sparsely populated•

14.3. When choosing a site for a STOL-port the following factors have been considered;

1. *The distance from the airport to the centre of the community which is to be served should normally not exceed approximately 5 km.*•
2. *Use of cultivated or cultivable areas should be avoided* •
3. *Care should be taken to avoid noise disturbances* •
4. *Design and location should be such that cross-wind operation is kept to a minimum and downwind operation avoided* •
5. *Possibility of runway-extension should be taken into account* •
6. *A yearly regularity of not less than 95% is the goal or the potential services* •
7. *Due to escalation in construction costs it is important hat the leveling work is kept to a minimum* •

14.4. The following General Planning criteria has been adopted to the Norwegian STOL-ports programme;

1. *As a general guide for runway system the following dimensions have been set up;*

- **1.1** *800m. in runway length and 30m. width with 15m.wide shoulders at either sides •*
- **1.2.** *5 m. width for Taxiway •*
- **1.3.** *45 m. x 70 m. for Apron areas •*
- **1.4.** *Runways, taxiways and aprons are asphalt-surfaced, while runway shoulders are grass-covered with a certain, carrying capacity •*

2. *As far as Aerodrome lighting is concerned the following guide lines have been adopted;*

- **2.1.** *Runway lights, including threshold lights •*
- **2.2.** *Approach lights •*
- **2.3.** *Obstruction lights •*
- **2.4.** *Circling lights (where deemed necessary) •*
- **2.5.** *AVASIS •*

3. *The following Navigation aids have been provided;*

- **3.1.** *ILS Localizer •*
- **3.2.** *DME, where terrain does not allow establishment of Marker Beacons •*
- **3.3.** *Radio Beacons •*
- **3.4.** *D/F equipment •*
- **3.5.** *IFR-operations •*

4. *The aerodromes have been provided with the following technical buildings;*

- **4.1.** *Terminal building •*
- **4.2.** *Control tower •*
- **4.3.** *Work shop and garages •*

5. *The following equipment has been provided;*

5.1. *Crash and fire protection equipment •*

5.2. *Snow removal equipment •*

14.5. • The first four STOL-ports in the Middle Norway were commissioned and opened for operations in the fall of 1968• The aerodromes were owned and operated by municipal authorities• Nevertheless, the responsibility for planning, financing and full operations, was shared between the government and the municipal authorities on the following basis:

1. *Planning was carried out by the Directorate of Civil Aviation •*
2. *Land purchases were effected by the municipal authorities •*
3. *Procurement and maintenance of navigational aids etc. and the provision of air traffic services was effected by the government •*
4. *Constructing and operating the aerodrome was the responsibility of the municipal authorities and the government had covered, however, between 50% and 90% of the investment costs • Normally, the total costs of investments are actually shared respectively in the following proportion; 60%- State or Central Government, 30%- District Government, 10%- County Government •*

14.6. Operations at the four STOL-ports during the trial period 1968-1969 proved to be so promising that the authorities decided to go ahead with a gradual expansion of the STOL-port network•

15. Norwegian Air Transport Development after 1970: In 1976, scheduled air services was available at 18 STOL-ports, all constructed and equipped according to the programme bellow and also yet at 21 main airports in Norway•

TABLE 5.3.2.-14

NORWEGIAN STOL-PORTS PROGRAMME-1968/1975

year	quantity	aerodrome type	norwegian region
1968	4	STOL-PORTS	Middle Norway
1971	4	STOL-PORTS	Western Norway
1972	3	STOL-PORT	Lofoten region
1975	5	STOL-PORT	North-easternmostNor.
1975	1	STOL-PORT	Western Norway
1975	1	STOL-PORT	Lofotern region

15.1. During the STOL-ports implementation programme the costs of construction have increased greatly and the aerodromes that were built in 1968 cost a total of less than US$ 1 mill. each; while in 1975 the cost had escalated to US$ 3 mill.• This increase is due to several factors, such as inflation and improvements in the general standard of buildings and equipment, and also the construction of STOL-port in Norway has involved necessarily large scale of work such as in same cases it had been necessary to blast 200.000 cubic metre of rock and to move up to 100.000 cubic meters of gravel•

15.2. The passenger trend in STOL-port operations has proved satisfactory• In the first year (1968) 70.000 passengers were carried; by 1975 this number had increased to 250.000 passengers• Scheduled services at STOL-ports were provided by one airline company only which had operated a fleet of 10 DHC- 6 Twin Otter aircraft in a total of 173 scheduled landings, flying a distance equal to the distance between the North and South poles each day• The company had employed a total of 175 persons of whom 90 were pilots•

15.3. As a relatively small country, with a population of 4 million they had in 1976, about 40 airports offering scheduled air services, or, to put it in a different way, one airport per every 100.000 inhabitants• In the northern-most county, which is sparsely populated, there was one airport per every 10.000 inhabitants and one of these airports serves a community of 2.500 people whose connections to the national highway system is snowblocked for a period of up to 4 months each winter time• Just to illustrate this last circumstance, prior to the opening of the airport (1974), this community could be totally isolated for long periods during the winter when adverse weather conditions put a stop to all shipping•

15.4. In JULY, 1983 the I.T.E.- Institute of Transportation Economics of Norway has produced a technical report about the Norwegian STOL-ports programme entitled, "The Case of Norwegian STOL System, and its Regional and Socio-Economic Impacts" and the following analytical comments can be made on Norwegian STOL System programme;

1. *The development of the Norwegian STOL-port system can be described as a stepwise process, successively connecting new sub-systems of STOL airports to the existing major airports in Western and Northern Norway* •

2. *The actual operation is the responsibility of the municipality in which it is located• Up till now, this responsibility has also been an economic one• This policy has changed, so that the municipality is refunded, according to certain standards, the operating cost• This brings them on the same footing in that respect as the major airport communities •*

3. *The price policy has been such that the operating company must be subsidized• However, the need for these subsidies has on the whole been relatively diminishing• In fixed prices, they reached a high in 1973 with 76 NOK per passenger, a low in 1979 with less than half that figure• In relation to total company sales, the subsidies amounts at present to some 40% •*

4. *The average increase in number of passengers raveling by STOL in Norway amounts to some 30% per year during the period 1968-82• This immense growth rate must of course be greatly attributed to the frequent extensions of the network• But even when one consider each route separately, the growth is substantial, of the order of 10-15% a year• Such growth figures are very unusual, compared with other indicators of development• Two such examples are passenger transport in total and private consumption in total during the 1970's• They grew by 6% and 3.5% year respectively •*

5. *The above growth rates are formidable also in comparison with those of other public modes of transport• Nevertheless, the STOL system is still a kid brother in comparison with the other modes of public transport• Measured in number of passengers, some 500.000 per year at present, the STOL share is still only 3-4%• It is interesting to note that the traffic between the mainland and the oil installations in the North Sea carries more passengers than the mainland STOL system •*

6. *Many political goals, though often vague and ambiguous in formulation, can be associated with this particular transportation system• One of them is on the balance between STOL as a feeder system and as an "autonomous" mode of transport• On the average then, 60% of the trips reflect the autonomous function of the STOL system, 40% of the trips its feeder function• In view of the non-quantification of the political goals, it is impossible on the basis of these figures to state whether there is a general conflict or not between objectives and experiences •*

7. *Normally, the concept of " sphere of influence "associated with the geographical dimension• The distance dependency of travel frequencies is one such* *measure• However, an analysis of spheres of influence should most of all keep in mind the fact that "areas" consist of "people", with different needs, possibilities and demographic characteristics• Thus, it is imperative that the socio-economic dimension is included in the definition of "sphere of influence', in order to understand the demand structure for air transport, and understanding that is a presupposition for changing things in a normatively speaking positive direction •*

8. *It is still very useful to discuss the geographical dimension of airport development and hence planning separately, in that, geography represents such a powerful goal achievement constraint in all regional planning practices• FIGURES 5.3.2.-5 and 5.3.2.-6 may serve as a visual introduction to the analysis of the STOL system's geographical sphere of influence• They show, respectively, where in Norway the passengers live, and the share of each STOL county, i.e. a county with one or more STOL airports, in relation to its resident population• FIGURE 5.3.2.-5 accentuate in particular the fact that more than 50% of the passengers reside in Northern Norway and it also shows that 10% live in the Oslo region, i.e. in a per definition non-STOL region •*

9. *FIGURE 5.3.2.-6 emphasizes the regional variations even more clearly, in that it compares traffic figures to the corresponding population figures• Two of the northernmost counties, Finnmark and Nordland, come up with much larger traffic shares that indicated by the size of their resident population• The county of Sogn and Fjordane in Western Norway has a somewhat larger share •*

10. *A major problem in the impact study is the analysis of benefits;"Who benefits much, less, and not at all? The mapping of the geographical spheres of influence is an obvious contribution to that discussion: Distance-physical, time or cost distance and perceived distance is important for the utilization of any service facility, so also the distance from an airport the use of it• On the average, approximately 75% of the people making use of STOL system live in an airport municipality •*

11. *Based on a travel speed of 30 miles/hour, that people living closer to the airport than 30 minutes constitute 70% of all passengers• The next half-zone picks up 15% of the traffic• Thus, 85% of the total traffic on the STOL system is generated by people living closer to the airport than 30 miles• The use of the service by people living further away, can only be termed as sporadic• This very strong distance dependency is visualized by FIGURE 5.3.2.-7 •*

12. *FIGURE 5.3.2.-8 shows that travel frequencies decline very rapidly with the distance from the airport• The requency in the zone with 0-1/2 hour traveldistances is 250% higher than in the next zone, 1/2-1 hour• Compared with the 1-3 hour zone, it is five times as high• When the travel time is more than 3 hours, the travel frequency turns of course out to be very close to zero •*

13. *The geographic sphere of influence has been treated as a multi-dimensional concept where the Airport spheres of Influence are equal the Social Dimension represented by the STOL system users• FIGURE 5.3.2.-9 illustrates an attempt to formulate a causal model as a possible answer to the following question: "What determines the social sphere of influence, i.e. what kind of people, not taking into account the effect of their localization in space, use and not use the STOL system? And how can these structural aspects best be described?" FIGURE 5.3.2.-9 also indicates that "exogenous" factors such as "perception" and "who pays" play a role, in case for the extent to which travel needs are transformed into actual trips• The "who pays" factor reflects society's rules of the game for reimbursing travel expenses •*

14. *FIGURE 5.3.2.-10 shows the Northernmost Coastal county of Finmark where an impact analysis has been made over accessibility changes promoted by the STOL System• Before the air service was established, Hammerfest was in approximately the same accessibility situation in relation to all settlements in the region• According to FIGURE 5.3.2.-11, however, this situation changed dramatically as a consequence of the air service• The accessibility map for Hammerfest and the other STOL settlements, quite closely corresponds with the regular geographic map of Finnmark• This is also yet another illustration of the narrowness of the geographical sphere of influence when it is not applied the concept of Social Dimension in the multi-dimensional analysis of STOL System impacts •*

16. Norwegian Air Traffic Authority: Despite the fact that the "ground" of all Norwegian Airports are owned by the Ministry of Defence, the Air Traffic Authorities are the State Organisation encharged for the management and operation of Airports properly, with their buildings, operational areas and traffic equipments as well• The Air Traffic Authorities work, under the Ministry of Transport of Norway orders and is responsible for all the Civilian Air Traffic matters within the Civilian Airports• Its main duties are as follows:

1. *Administration of the Air Traffic law •*

2. *Supervision and Control of the technical and operative sides •*
3. *Planning and expansion of all Civil Airports •*
4. *Operation and maintenance of the individual projects •*

16.1. In FIGURE 5.3.2.-12 is shown the Organizational Diagram for the Air Traffic Authority from the period 1985-1986• The leader is the Director of Traffic and the Organisation is divided into three parts: Airport Administration, Air Traffic Service and the Main Administration• The Airport Administration is divided into eight Airport Administrations led by an Airport Manager• Four of these with their own Airport Manager and four Regional Airport Administrations• The Air Traffic Service is divided into four Districts with District Managers responsible for 54 Air Traffic Service Units in all• In 1985, 18 new permanent positions were granted to the Air Traffic Authorities which brings the total number of positions up to 1662 people responding for the Organisation• FIGURE 5.3.2.-13 and FIGURE 5.3.2.-14 show the Main Administration Diagrams for 1985 and 1986 respectively, with their continual changes and transformation within the working structure in order to better coupe with new needs•

16.2. The main income comes from the air traffic fees, landing, passengers and transit fees• These increased by 120% from 1981-1985 and represent 82% of all the total income, also there is income from fees for certifying aircraft, issuing of certificates and concessions• Other incomes, so called secondary income, are letting and payment for commercial enterprises at the Airports• These increased by 135% from 1981 till 1985•

16.3. As far the expenses are concerning, with the large increase in traffic it was necessary to expand the system• In 1985, 324 million kroner were used for expansion projects, 93% more than in 1981• Investments of the total expanses were 35% in 1985• Operational costs in 1985 were 60% of total expenses• Within the operational costs salaries and allowance were 66%• In addition to investments and operational costs related to the main National Airports, the Air Traffic Authorities give grants for expansion and operation of District Short Runway Airports• These amounted to 41 million kroner in 1985• In addition to that 29 million kroner was spent in National Air Security Service for the Short Runway Airports•

16.4. The use of DHC-7 in the Short Runway Airports has made significant affect on the traffic and the income of the districts• Increase of income in 1984 was 29% from 1983 while the increase of expenses was 7% for the same period • Running grant paid out for 1983 was 10.4 mill. kroner, for 1984: 9.9 mill. kroner and for 1985: 8.9 mill. kroner•

Running grant for return trips per passenger was 17 kr. in 1983, 14 kr. in 1984 and 11kr. in 1985• But an increase in running cost is expected as the demands for fire and accident measures are raised with the use of DHC-7•

16.5. During the 1970's the fees per flight decreased measured in kroner• In the 1980's they increased considerably• In 1985 an airline paid 26% less in fixed kroner in Air Traffic fees for a trip by DC-9 or Boeing 737 from Berger to Oslo than 15 years ago• On the same period the full price for price ticket for the same journey increased by 29%• The proportion of fees of the full ticket price Berger-Oslo was reduced by 21% in 1970 to 12% in 1985• For Oslo-Copenhagen the fee-proportion decreased from 17% to 10% in the same period•

16.6. The Air Traffic Authorities make sure there are several service outlets in their buildings to satisfy the public's needs such as restaurants, bank, car-hire and various shops• They charge extra over the normal rent for these facilities as they consider the state's investment in the Airports give the basis for a concentrated customer potential•

16.7. Every year has offered several new challenges to their information work, especially information to the public in connection with the new bigger building projects• Fornebu had an exhibition in the departure hall showing the plans of work at any time• Sola had a pamphlet and an exhibition showing the large Stavanger expansion of the Airport and what they could look forward to take into use in 1986• At Flesland, Bergen there was a wide information plan in connection with the expansion of the new service building• All these information activities are aimed at employees, the public and the press media•

16.8. The Air Traffic Authority are very concerned to the problem of capacity of the system• The traffic density in Eastern Norway has reached a level which calls for a revision of the traffic regulation systems• In order to find a rational method of solving the problem, an agreement has been entered into with the Swedish Air Traffic Authorities to simulate the traffic picture in the area• It was a relatively large task to gather all the necessary data which had made demands on the work-capacity centrally in the Air Traffic Board as well as in the Air Traffic Service• The results of the work was ready early in the Summer of 1986•

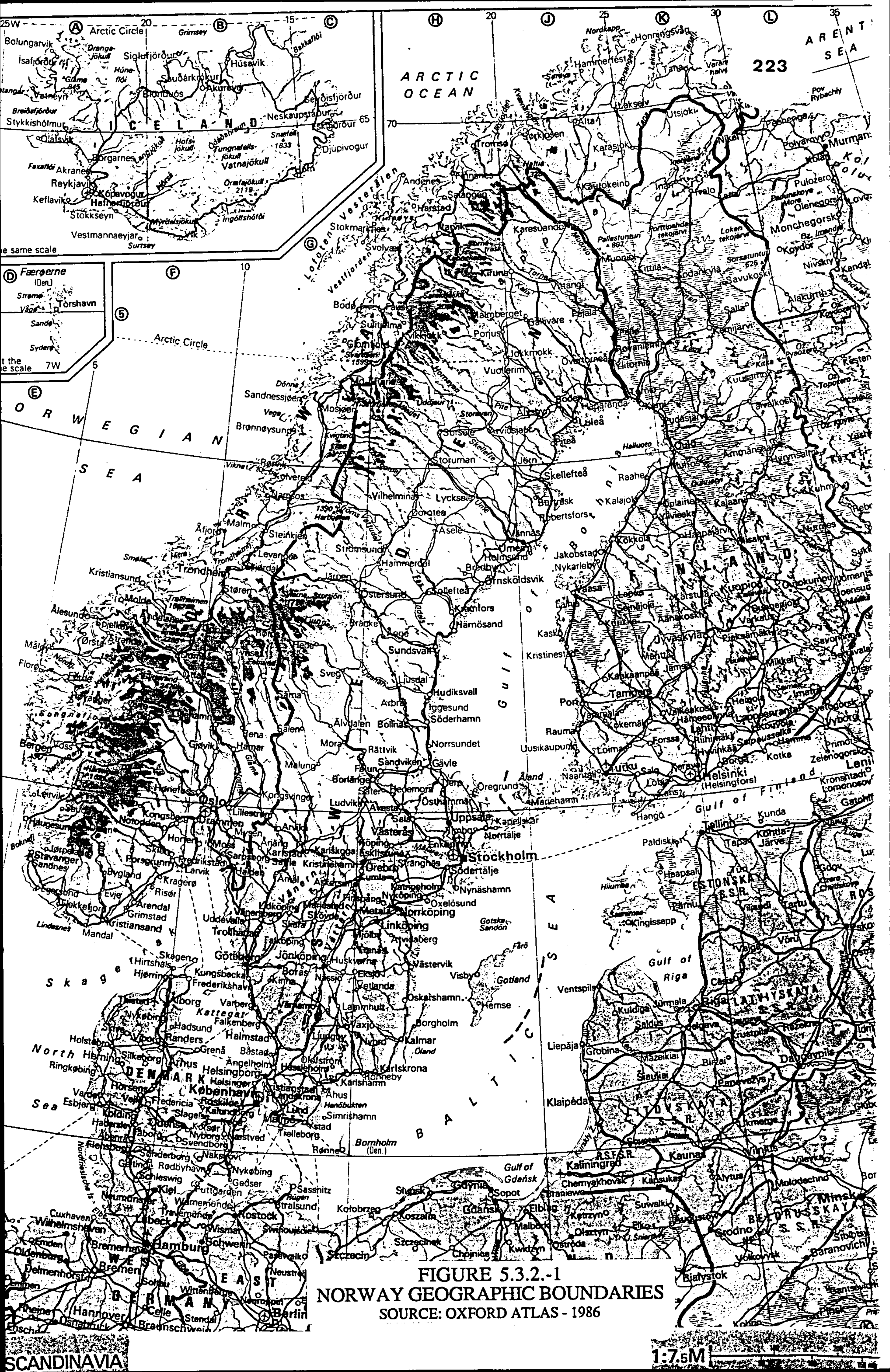


FIGURE 5.3.2.-1
NORWAY GEOGRAPHIC BOUNDARIES
SOURCE: OXFORD ATLAS - 1986

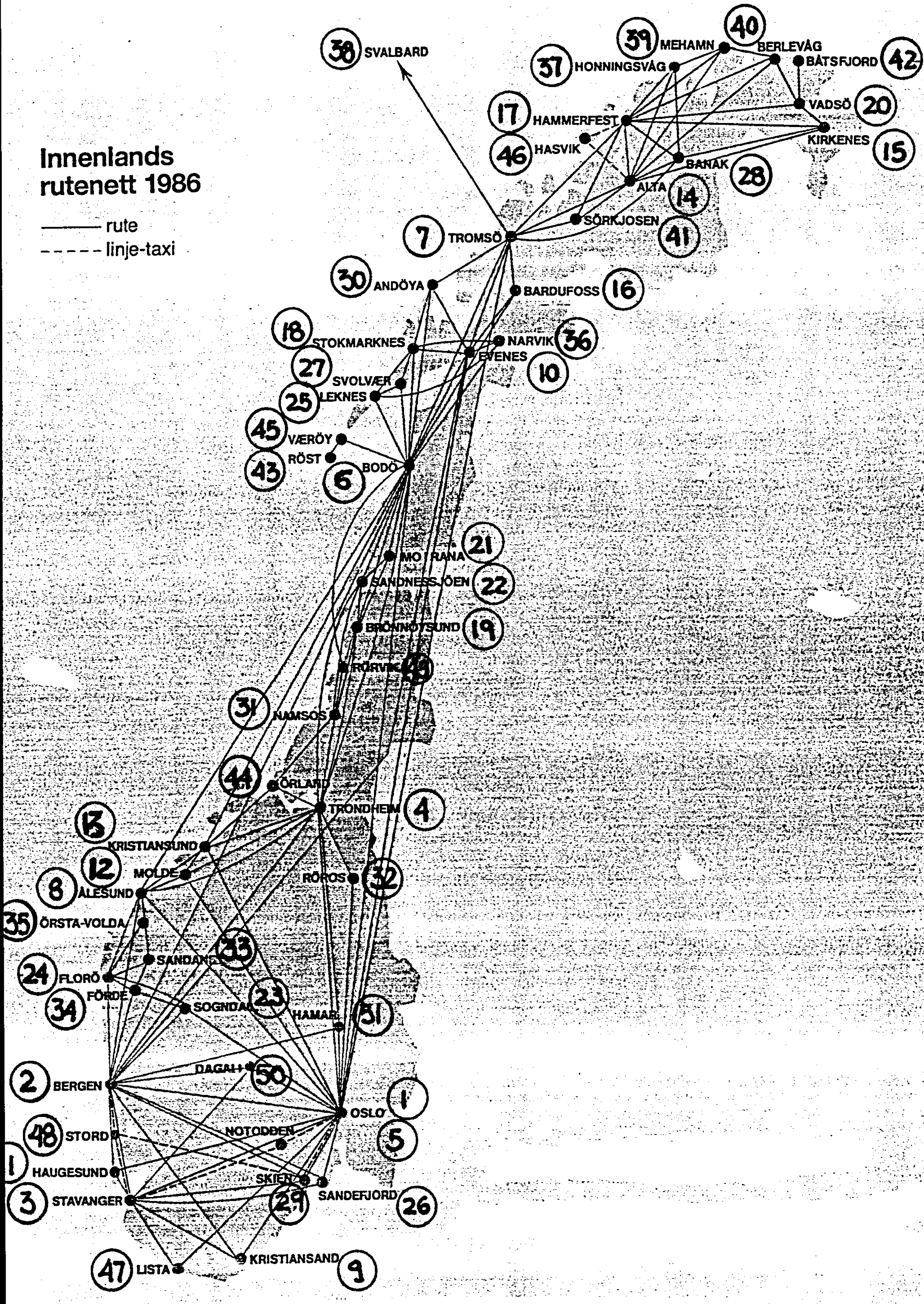


FIGURE 5.3.2.-2
NORWEGIAN AIRPORTS NETWORK
SOURCE: CIVIL AVIATION STATISTICS - NORWAY 1986

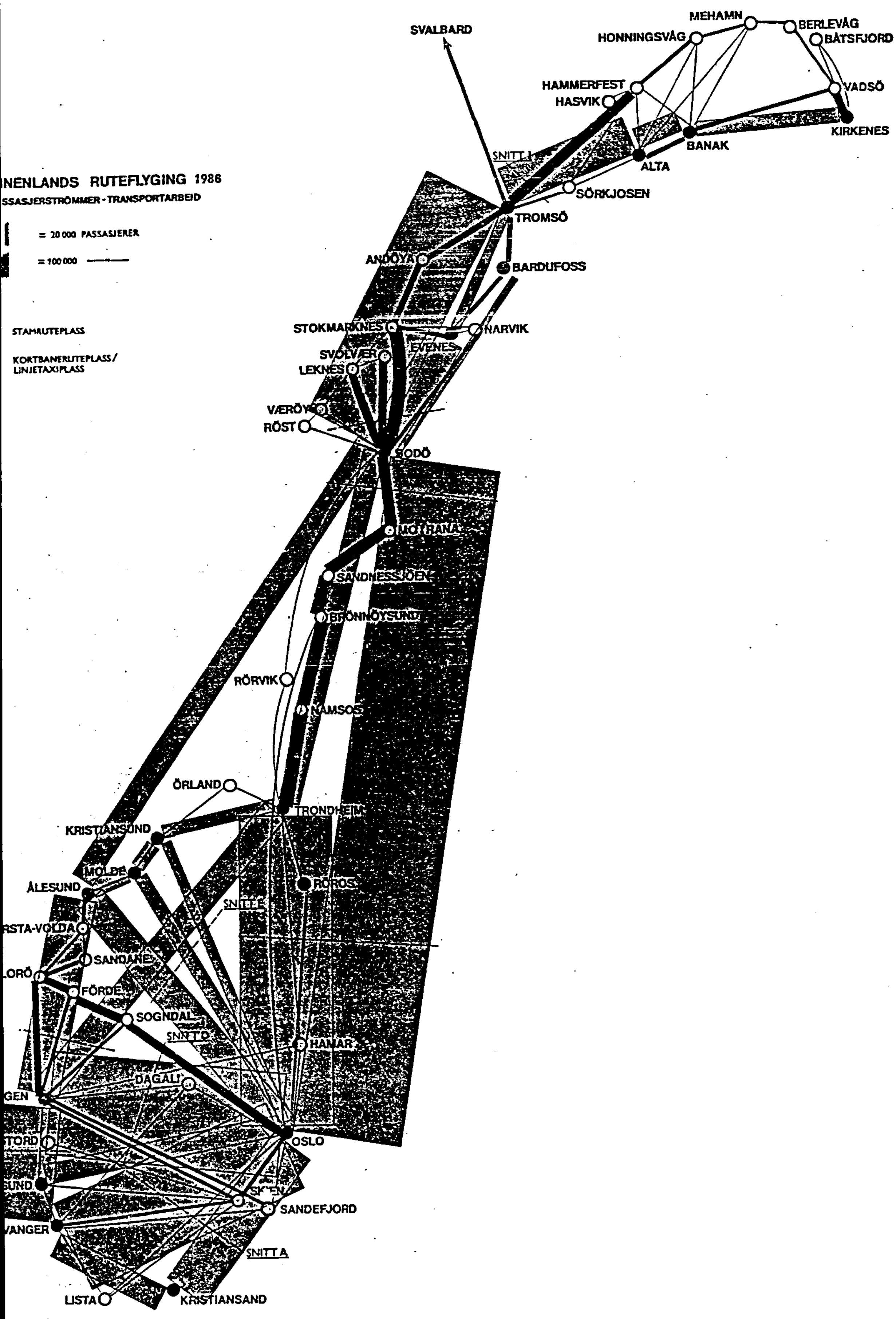
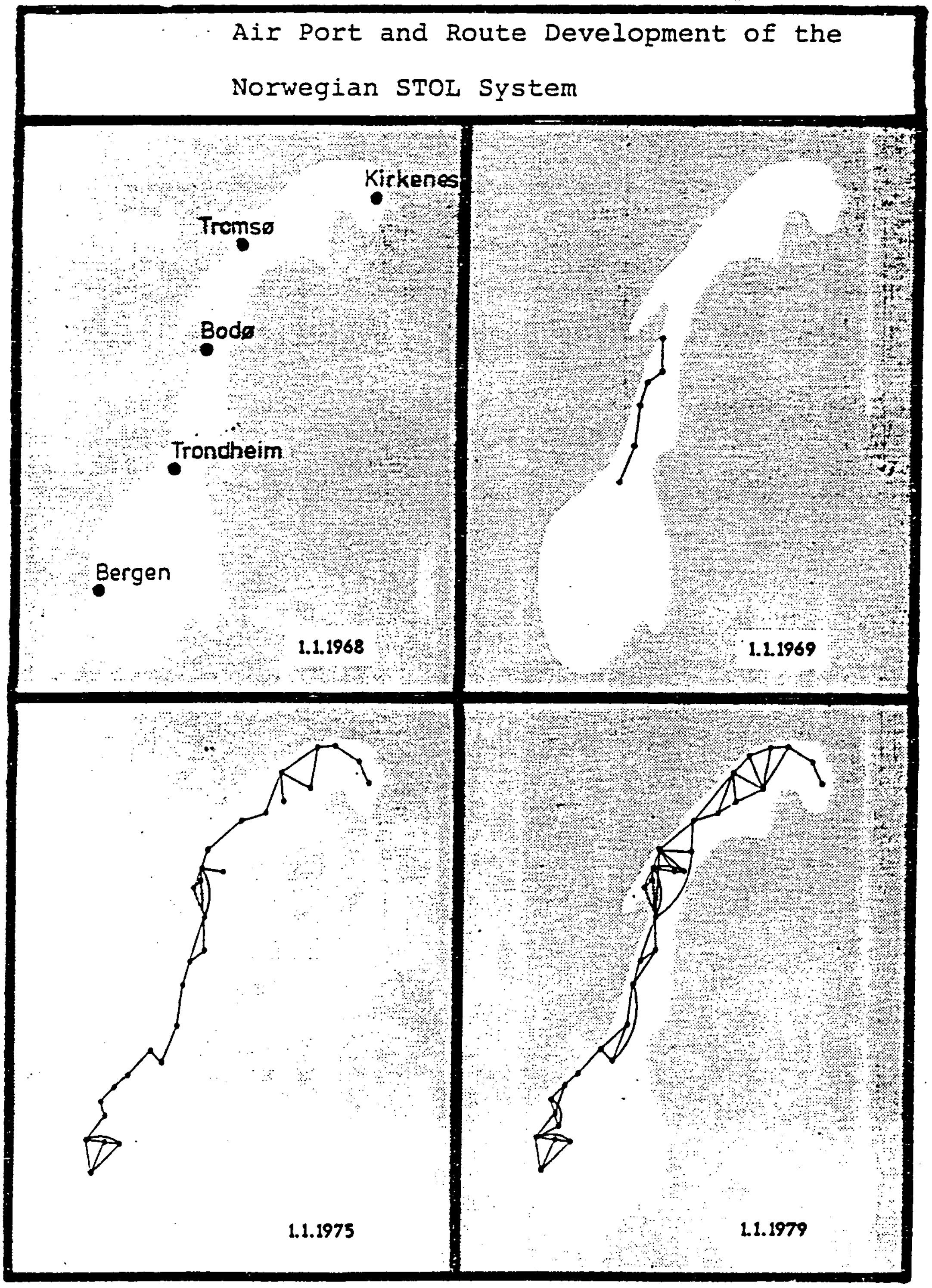


FIGURE 5.3.2.-3
NORWEGIAN AIROUTES IN 1986
SOURCE: CIVIL AVIATION STATISTICS - NORWAY 1986



Air Port and Route Development of the Norwegian STOL System

FIGURE 5.3.2.-4
NORWEGIAN STOL-PORT SYSTEM PROGRAMME 1968•1979
SOURCE: I.T.E. - INSTITUTE OF TRANSPORT ECONOMICS - 1983

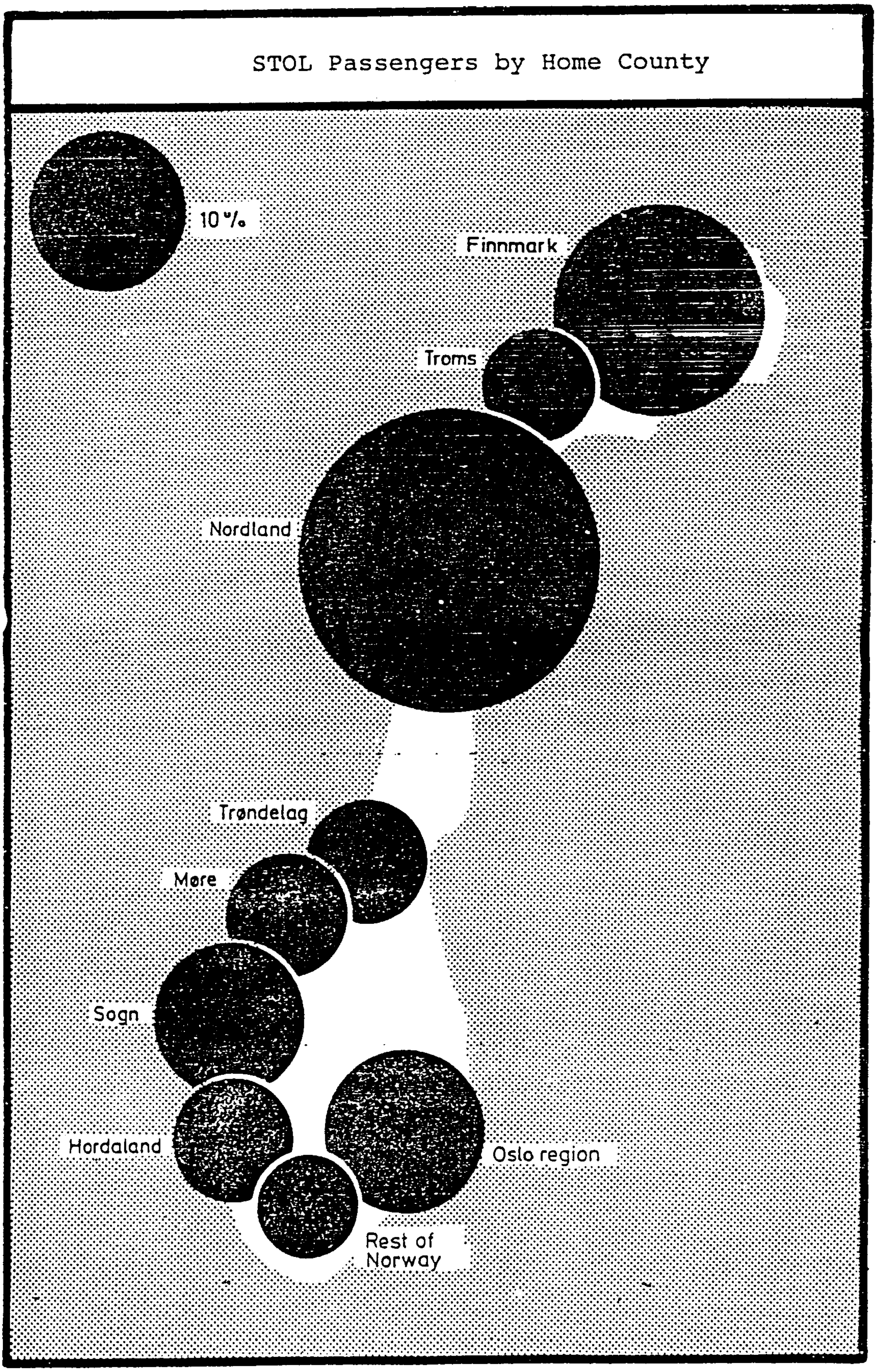
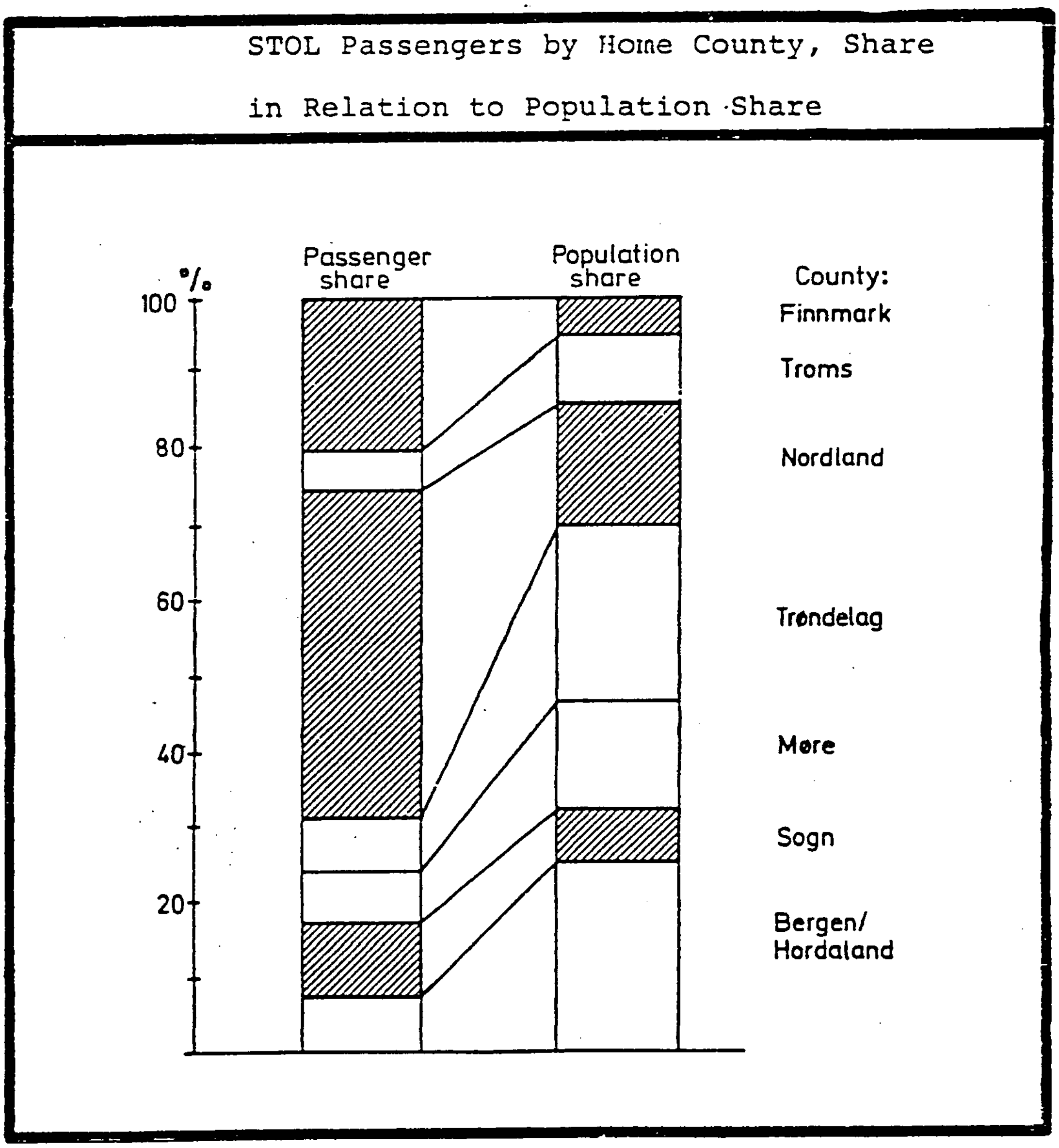
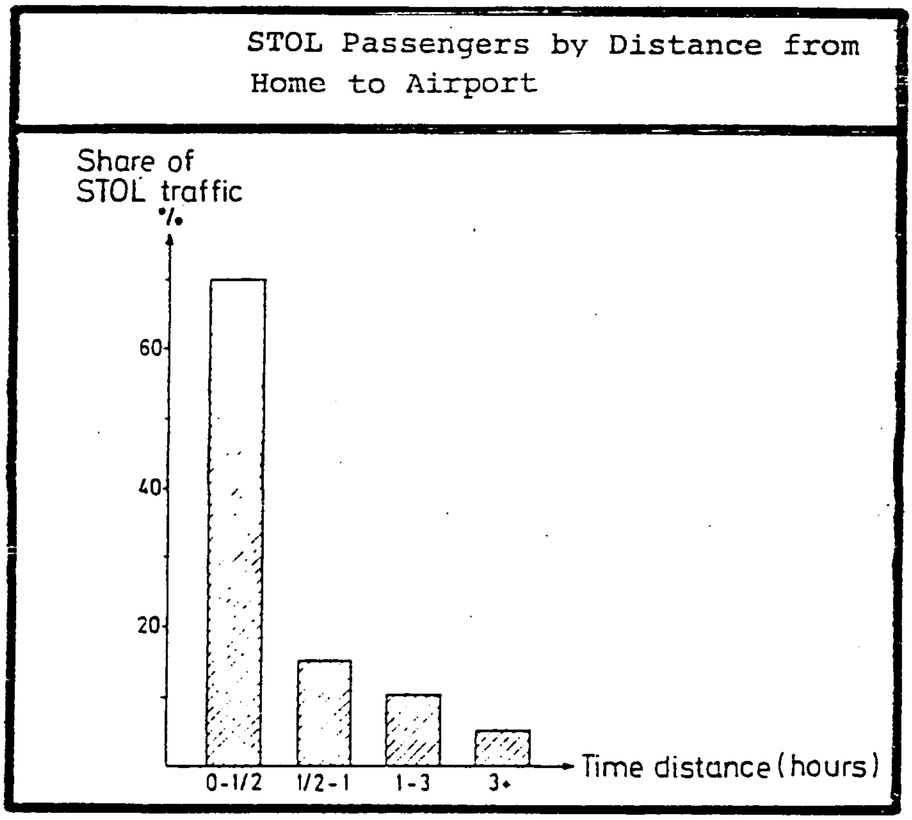


FIGURE 5.3.2.-5
NORWEGIAN STOL-PORT SPHERE OF INFLUENCE
SOURCE: I.T.E. - INSTITUTE OF TRANSPORT ECONOMICS - 1983



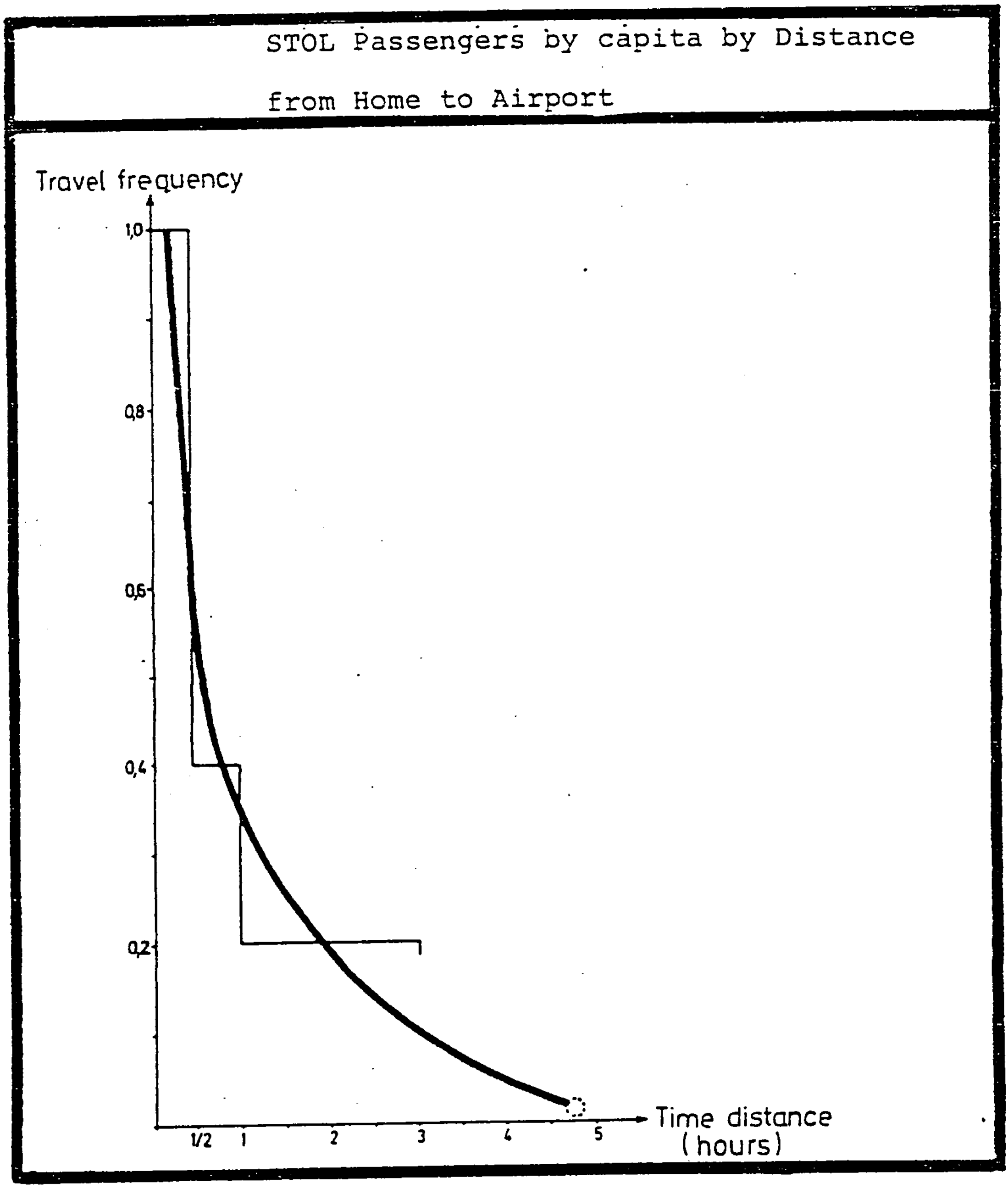
STOL Passengers by Home County, Share in Relation to Population Share

FIGURE 5.3.2.-6
NORWEGIAN STOL-PORT REGIONAL VARIATION
SOURCE: I.T.E. - INSTITUTE OF TRANSPORT ECONOMICS - 1983



STOL Passengers by Distance from Home to Airport

FIGURE 5.3.2.-7
NORWEGIAN STOL-PORT PASSENGERS DISTANCES DEPENDENCY
SOURCE: I.T.E. - INSTITUTE OF TRANSPORT ECONOMICS - 1983



STOL Passengers by capita by Distance from Home to Airport

FIGURE 5.3.2.-8
NORWEGIAN STOL-PORT TRAVEL FREQUENCY
SOURCE: I.T.E. - INSTITUTE OF TRANSPORT ECONOMICS - 1983

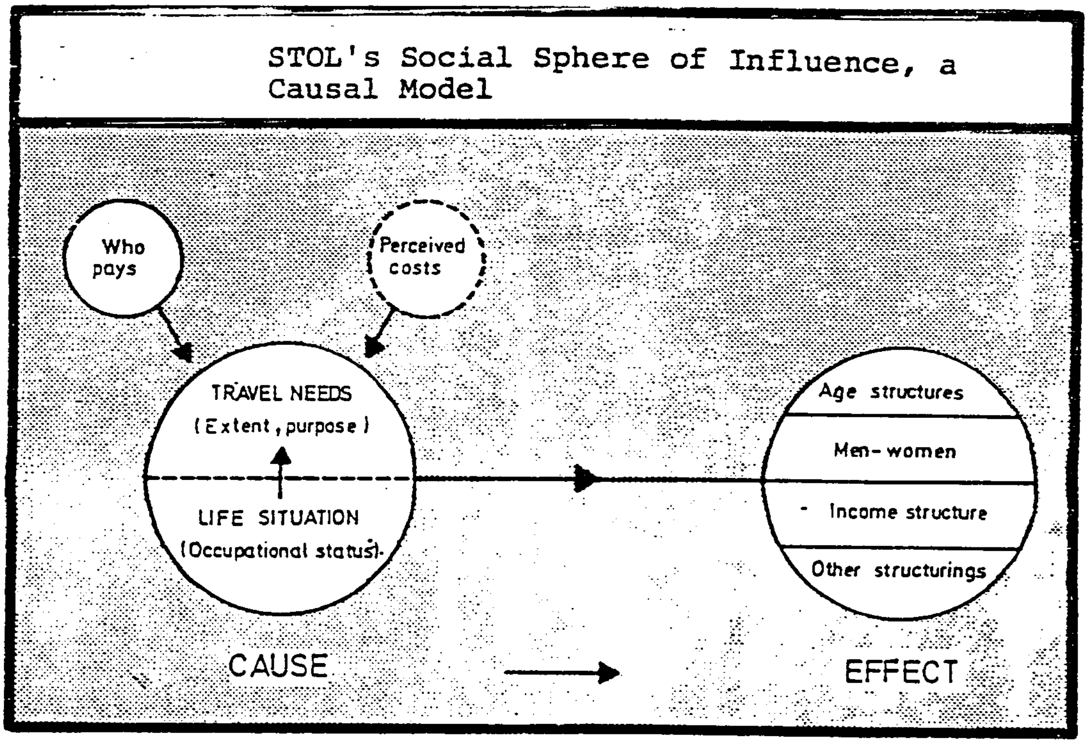


FIGURE 5.3.2.-9
NORWEGIAN STOL-PORT CAUSUAL MODEL
SOURCE: I.T.E. - INTITUTE OF TRANSPORT ECONOMICS - 1983

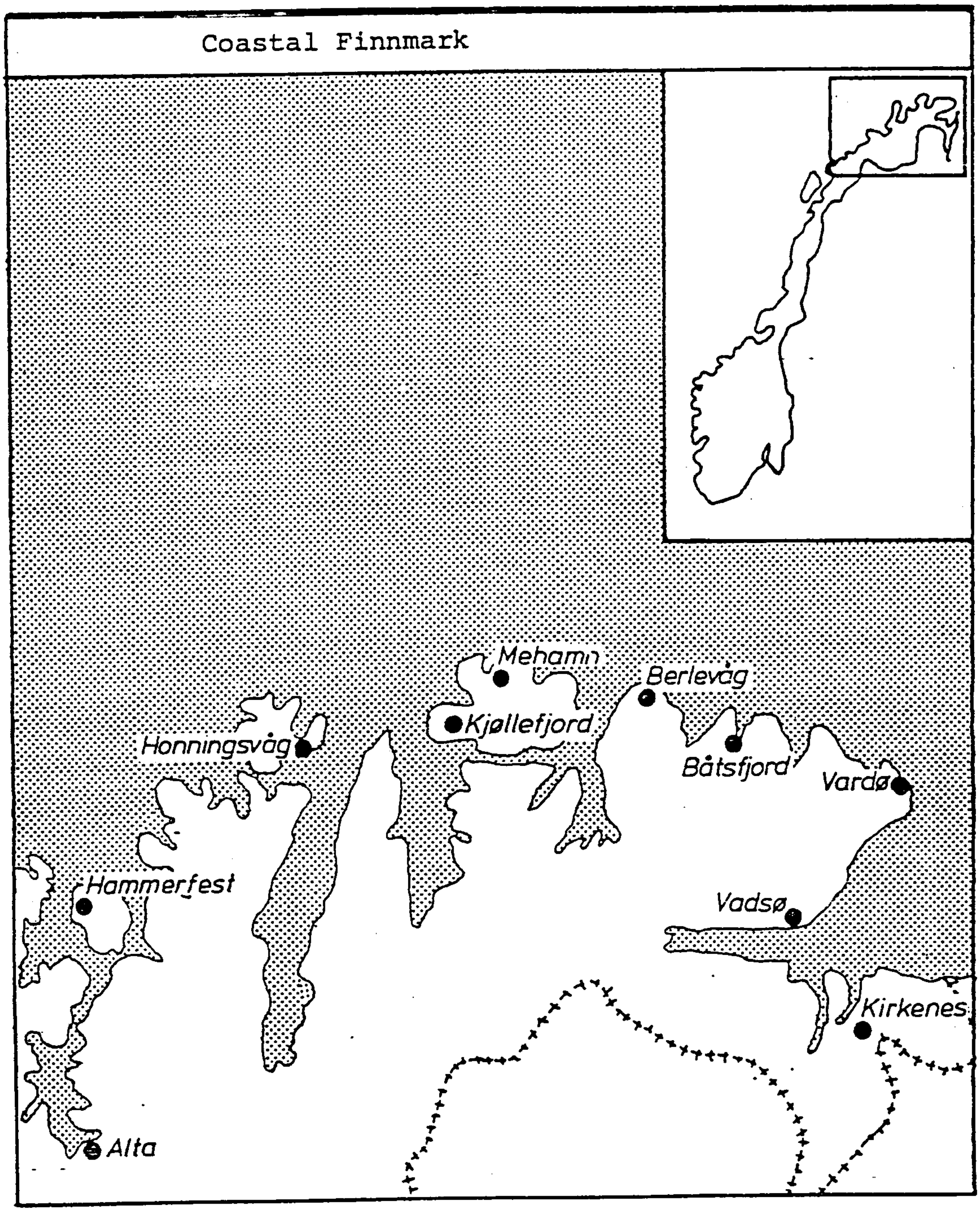


FIGURE 5.3.2.-10
NORWEGIAN NORTHERNMOST COASTAL FINNMARK
SOURCE: I.T.E. - INSTITUTE OF TRANSPORT ECONOMICS - 1983

Necessary Time of Absence for Travels from Hammerfest to Other Finnmark Settlements, Before and After STOL

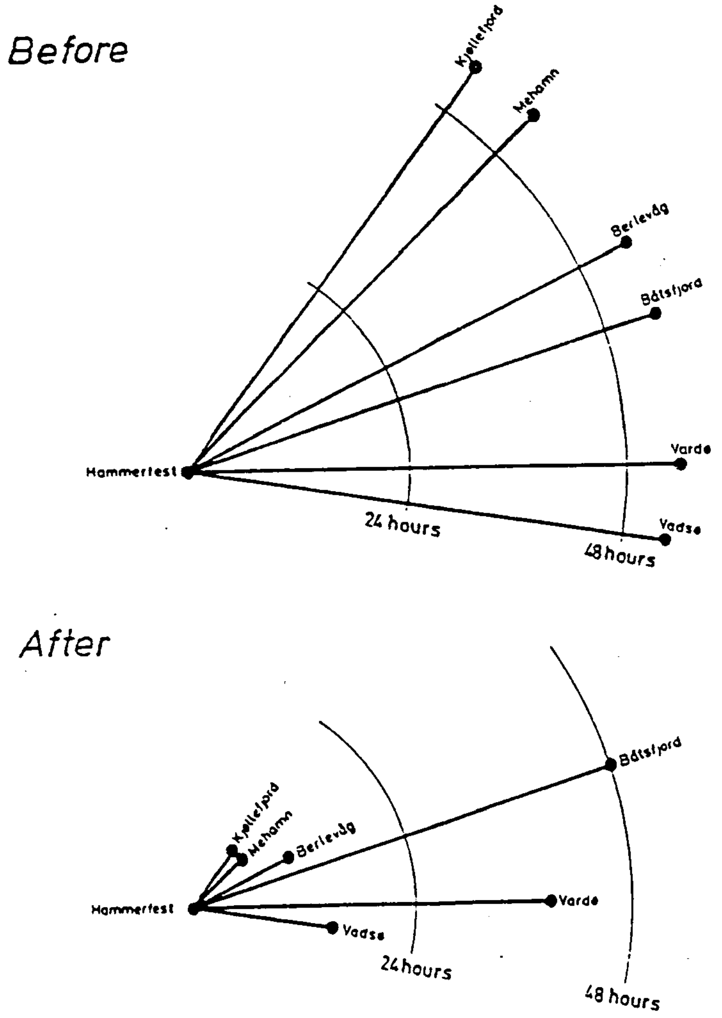


FIGURE 5.3.2.-11
NORWEGIAN STOL-PORT ACCESSIBILITY MAP
SOURCE: I.T.E. - INSTITUTE OF TRANSPORT ECONOMICS

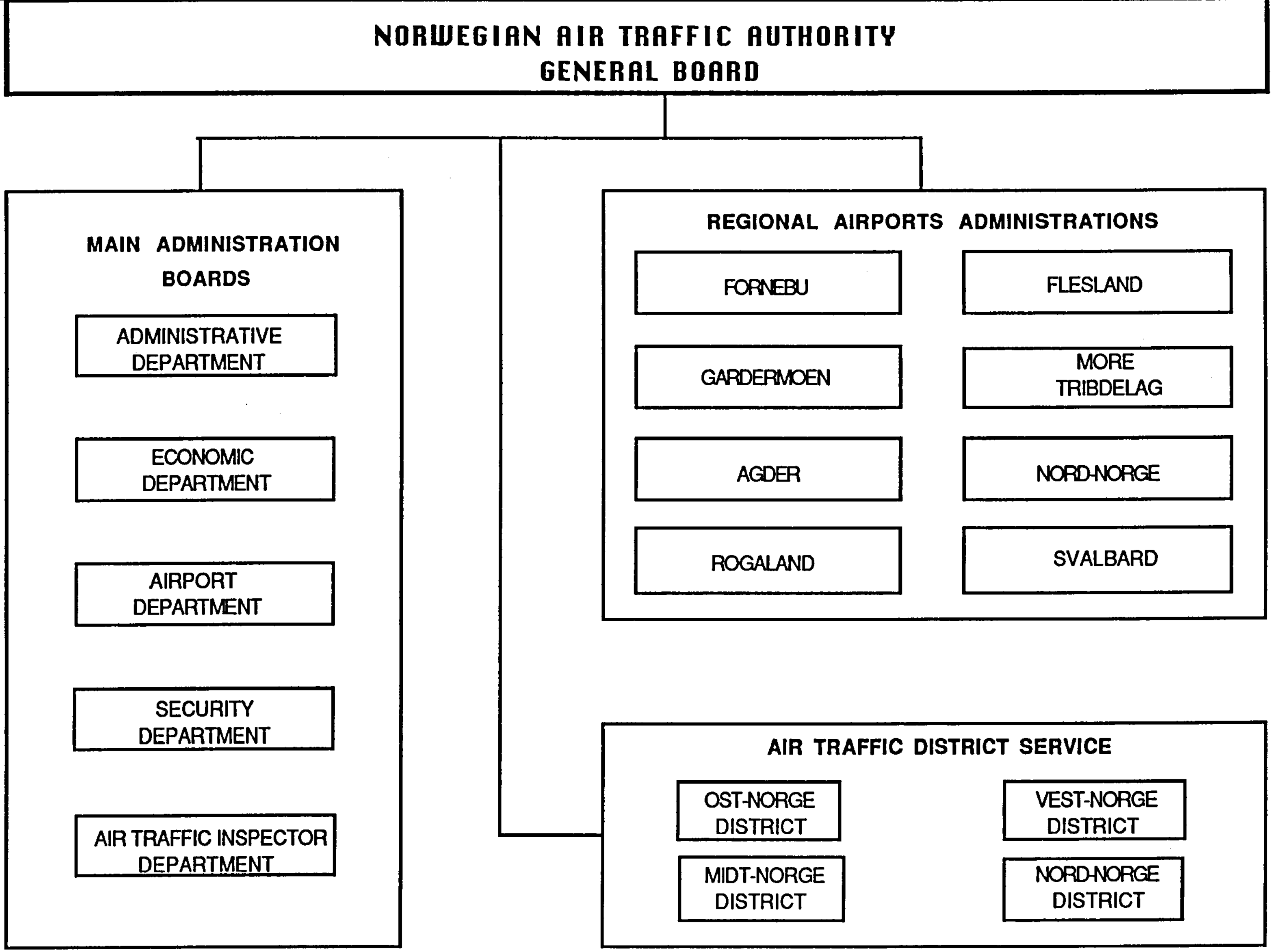


FIGURE 5.3.2.-12

WEGIAN AIR TRAFFIC AUTHORITY - ORGANIZATIONAL DIAGRAM - 1985/1986

SOURCE: LUFTARTSVERKET-ÅSRAPPORT-1986-NORWAY

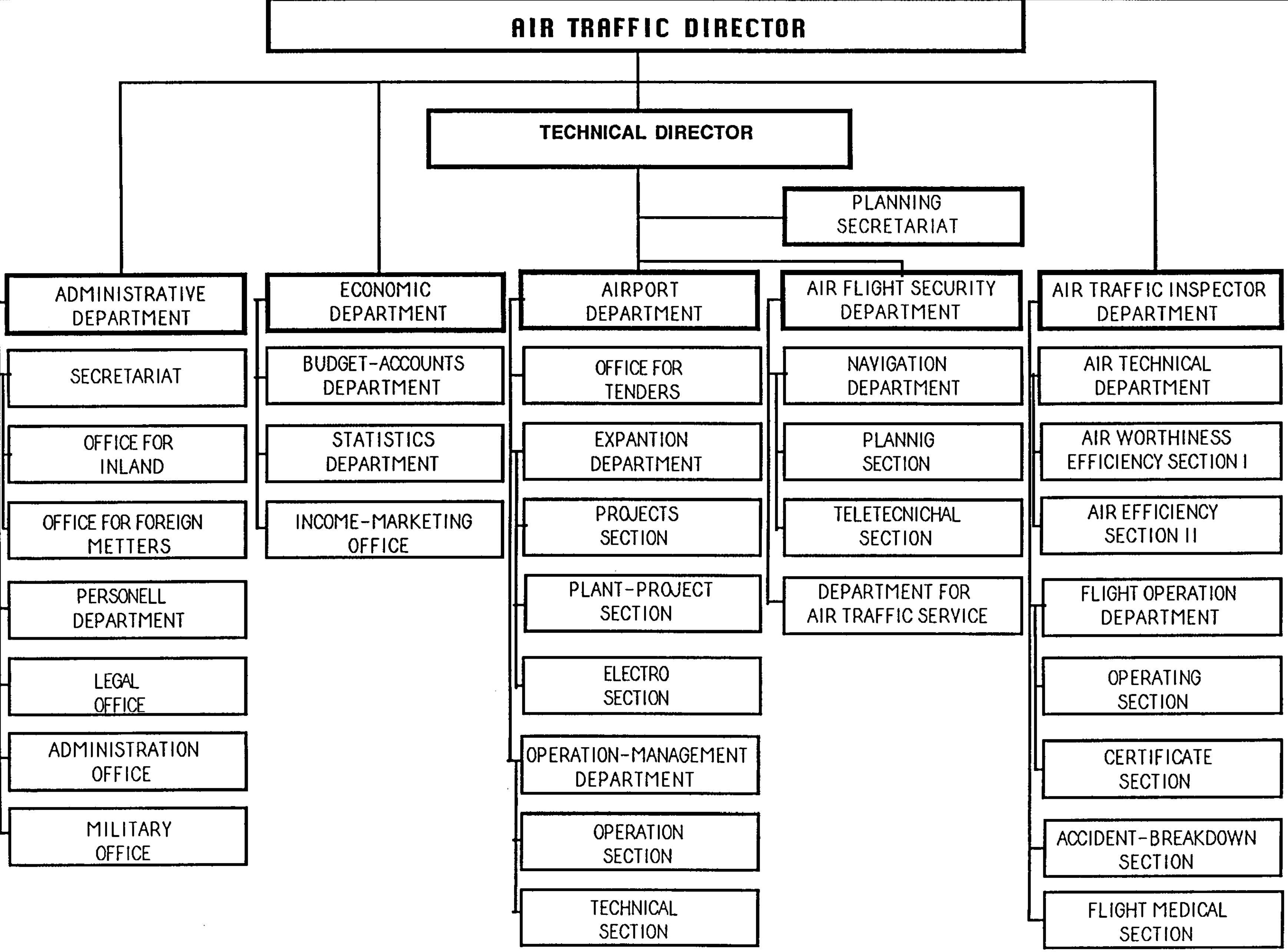


FIGURE 5.3.2.-13
NORWEGIAN AIR TRAFFIC AUTHORITY
MAIN ADMINISTRATIONAL DIAGRAM - 1985
SOURCE: LUFTARTSVERKET-ÅSRAPPORT-1985-NORWAY

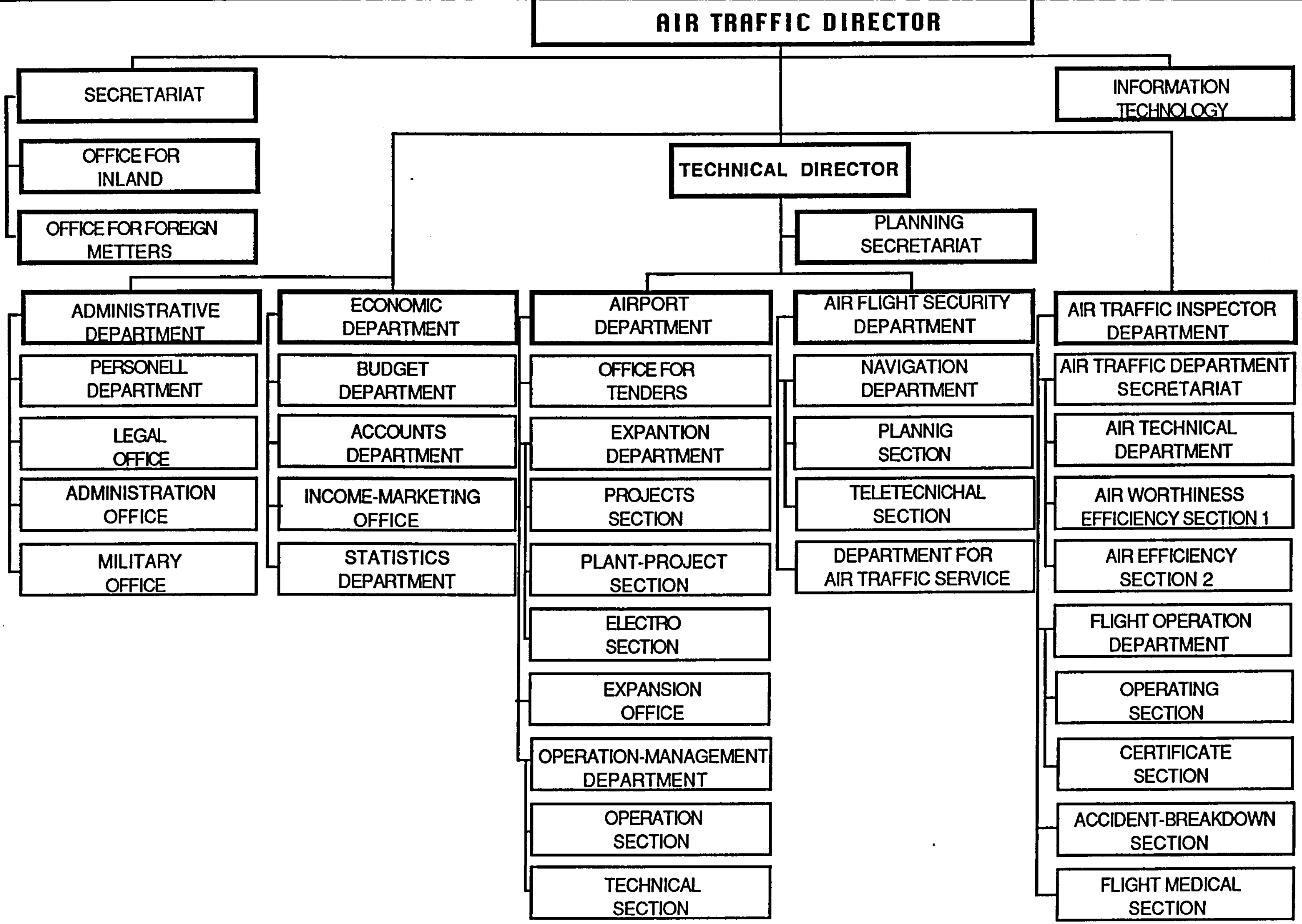


FIGURE 5.3.2.-14
NORWEGIAN AIR TRAFFIC AUTHORITY
MAIN ADMINISTRATIONAL DIAGRAM - 1986
SOURCE: LUFTARTSVERKET-ÅSRAPPORT-1986-NORWAY

17. The Norwegian Planning Methods: Before properly testing The M.C.S.A.M. in the Norwegian N.A.S.P., an extensive investigation has been made within the Norwegian planning methods especially in the Air Transport sector and the results are as follows:

17.1. PHOENIX: An air traffic forecasting model for Norway:

- In 1985 The TØI (Transportøkonomisk Institutt) The Institute of Transport Economics of Norway has prepared new forecasts for the passenger traffic at the 21 conventional Norwegian Airports•

- The forecasts have been made under varying assumptions about fares and economic growth• The lowest alternative yields a traffic growth of 4.9% per year for the network as a whole, while the highest alternative corresponds to a 6.6% annual traffic growth• In the Oslo area annual growth rates range between 6.1% and 6.8%, in Bergen between 6.0% and 7.6%, and in Stavanger between 5.0% and 6.8% per year•

- The forecasts were made by means of a new projection model, which was called PHOENIX• This forecast arrivals and departures on the entire conventional national network, by the commercial STOL aircraft, and by scheduled or chartered international flights, as well as transfer of passengers between domestic and or international flights•

- The most elaborate part of PHOENIX is the submodel for conventional national flights• The traffic flows on the entire national network, consisting of 21 Airports, are simulated by means of a gravity type intercity model taking into account population and income growth in each region, average air fares, the cost of competing surface travel, as well as travel times by air and surface• Income, fares and travel time are assumed to interact in such a way that the income elasticity increases with higher fares as well as with reduced travel times• By the same token, price elasticities decrease (in absolute values) as income grows, while the opposite is true of travel time elasticities, supposedly because the opportunity cost of time is a function of the wage level• The model has been calibrated econometrically by means of a data set consisting of 1140 combined cross-sectional and time series observations from the period 1972-1983, each observation referring to a given city pair in a given year• As of 1983, the average income elasticity (for all city pairs) has been calculated to approximately 1.7, while the direct price elasticity estimate is around -0.8 and the travel time elasticity is about -1.1•

- The submodel for STOL aircraft is extremely simplistic and has not been calibrated econometrically due to the absence of suitable data• Scheduled international traffic is forecast by means of another rather simple model relating travel demand to air fares and to the rates of economic growth in Norway and in the OECD area• Here, the income elasticity is 2.0 and the price elasticity is -0.4• For international charter flights the elasticity with respect to real disposable household income in Norway has been estimated at 2.2, while the price elasticity is -1.4• Inclusive tours arranged from Norway represent more than 90% of all international charter passengers at Norwegian Airports•

- A total of six projections up to the 2.000 have been made, designated as alternatives AO, CO, C1, DO, E2 and E3, respectively• Here, the letters denote different assumptions with respect to the rate of economic growth, while the figures refer to the development of travel fares•

- Assumptions regarding the rate of economic growth range from a 2.1% annual increase in real disposible income for Norway (alternative E), via a 2.7% rate (alternative A and C) to a 3.3% rate in the high-growth variant (alternative D)• The rates are annual averages over the period 1983-2000• All alternatives are based on the long-term economic perspectives drawn up on the study NOU 1983:37, prepared for the Ministry of Finance• In order to exploit the regional disaggregate structure of PHOENIX, these long-term perspectives have been broken down to a county level by means of the model REGION operated by the Central Bureau of Statistics• Thus, alternative C differs from A only in that the western-most counties, most affected by the off-shore and on-shore petroleum-related activities, are assumed to represent a larger share of the nation's overall economic growth•

- Although the real price of crude oil is expected to increase during the projection period, real air fares are generally assumed to fall (except in alternative O, where they are kept constant)• This is because improved fuel economy is assumed to reduce the per passenger fuel consumption by 30% before the end of the century•

- Alternative 1 is based on a 2% annual real increase in the price of crude oil• Under plausible assumptions about the fuel costs' share of the airlines' total operating costs in 1983, this increase is almost exactly offset by the assumed 30% improvement in fuel economy, so that on conventional flights real fares are left almost unaffected as of the year 2000• Surface and STOL travel fares, being subsidized, are, however, assumed to grow by 1% year in real terms•

• In alternative 2 the real oil price is falling until 1988• Over the period 1983-2000 it grows, however, by 1.5% annually• Real air fares decrease by some 0.3% annually while surface fares still grow by 1%•

• In alternative 3, certain developments in the market for air travel are assumed to yield further fare reductions, in the order of 10%-20% over the entire 17 year period• What is kept in mind are such factors as economies of scale, new technology, increased competition, and more efficient price discrimination• Under alternative 3, real air fares fall by almost 1% year up to the end of the century•

• Travel times are assumed constant over the entire projection period, by air as well as by surface• This is obviously unrealistic, since the Parliament has imposed a ceiling on the number of passengers (5.5 millions) to be handled by the Fornebu Airport near Oslo• This ceiling is almost certain to be hit long before the turn of the century, meaning that traffic will have to be transferred to the Gardermoen Airport, thus increasing travel times considerably• Air travel demand is likely to decrease accordingly•

18. Norwegian Counties Air Traffic Plan: In 1986 Asplan AS and TØI The Norwegian Institute of Transport Economics have produced The Norwegian Counties Air Traffic Plan• Up to now in Norway applications for concessions to extend Airports for public use outside the main network of air-routes, have been worked out individually for each Airport and its Regulation Plan• This involves much work to be done before a co-ordinated evaluation is made• In addition this material is often not suitable for such superior evaluations•

• This is one of the reasons why a superior and co-ordinated plan has been considered for these Airports at County and National level• Guide-lines are given for how this superior plan should be prepared and carried through, and how it should be adapted to the present system• The emphasis in the guide-lines was to go through the process of planning and treatment of the County's Air Traffic Plan in which the whole work was ending•

• These guide-lines in organizing and carrying through the processed plans have been followed by new guide-lines which show how the individual projects could be solved•

• Planning according to the new arrangements did start to be implanted in Norway in July1986• The plans which have then been introduced in the County Councils have provided the basis for treatment by the local Air Traffic projects in the Norwegian Air Traffic Plan for the periods 1990-93 and 1994-97• ASPLAN and Transportokonomisk Institutt (TØI) have been the consultants for the preparation of these guide-lines•

19. The main traits and limitations of the Norwegian Airport Planning Process are as follows:

1. A developing and co-ordinated Air Traffic Plan is considered at County and National level• At County level, planning is limited to lay-out of new and expansion of existing Airports for public use outside the main network•

2. Co-ordination with other transport enterprises and local priorities must happen at County level and put in the County's Air Traffic Plan• This plan will be a part of the County's Transport Plan and in the same way go into the current County Planning•

3. Centrally, the co-ordination has been done through working these plans into the Norwegian Air Traffic Plan• However, here the main pattern for the regional network is drawn up as basis for treatment of route concessions• Further, the plan will say which Airport are preferential and which will get state subsidy, if any•

4. Planning for expansion of the individual Airport will be as before; applications for concessions, Airport Plans and Regulation Plans to be worked out in the normal way for the preferential projects• This applies also to project due to be built and financed by the initiator alone•

20. Stages of the Projected Plan:

• The projected plan will in all have four stages of planning evaluation and expansion of Airports for public use outside the main air route network, as follows;

1. Superior Plans:
    1- Norwegian Air Traffic Plan.
    2- The Air Traffic Plans of the Counties.

2. Detailed Plans:
    3- Airport Plan and Regulation Plan.
    4- Expansion Plan and Expansion Programme.

3. The superior evaluations go through co-ordinated and developing planning at County Council and National levels•

4. The Counties have to consider actual Airport locations in the County•

5. The work has to go into the County's Air Traffic Plan as a part of the Transport Plan and County Plan and must contain a preferential programme of treatment for the recommended expansion•

6. The Air Traffic Plans of the Counties must be sent to the central Air Traffic Authorities when a joint evaluation and list of priorities are made and a decision taken as to which projects should receive grants from the state• The evaluations will be made in connection with the work of the Norwegian Air Traffic Plan•

7. Applications for concessions must be made in the usual way and attached to the Airport Plan and Regulation Plan• This applies also to projects which are to be built and financed by the county alone or by other enterprises•

8. The Airport Plan has to be the basis for evaluating the expansion of the individual Airport• The Regulation Plan must ascertain that the necessary area can be used for expansion and that people concerned will get the opportunity to express themselves about the plan• The actual development happens according to the Expansion Plan and the Expansion Programme•

9. The detailed planning in connection with applications for concessions has occurred according to this pattern for several years• It is the superior planning which now will give the framework for this detailed planning•

10. The planning will start in the Counties and take as its starting point local Airport proposals and the aims for the general development in the County and especially of the transport sector• The national framework for the project is set by the Norwegian Air Traffic Plan for the period up to 1989•

11. The first generation of the Counties' Air Traffic Plans must be worked out and approved by the local Councils in the spring of 1988• These will be sent to the Air Traffic Authorities who will allocate them to the Norwegian Air Traffic Plan for the periods of

1990-1993 and 1994-1997, which will set out revised national frameworks for the expansion and further Air Traffic Planing in the Counties•

12. Development plans will be revised every four years as illustrated in FIGURE 5.3.2.-15•

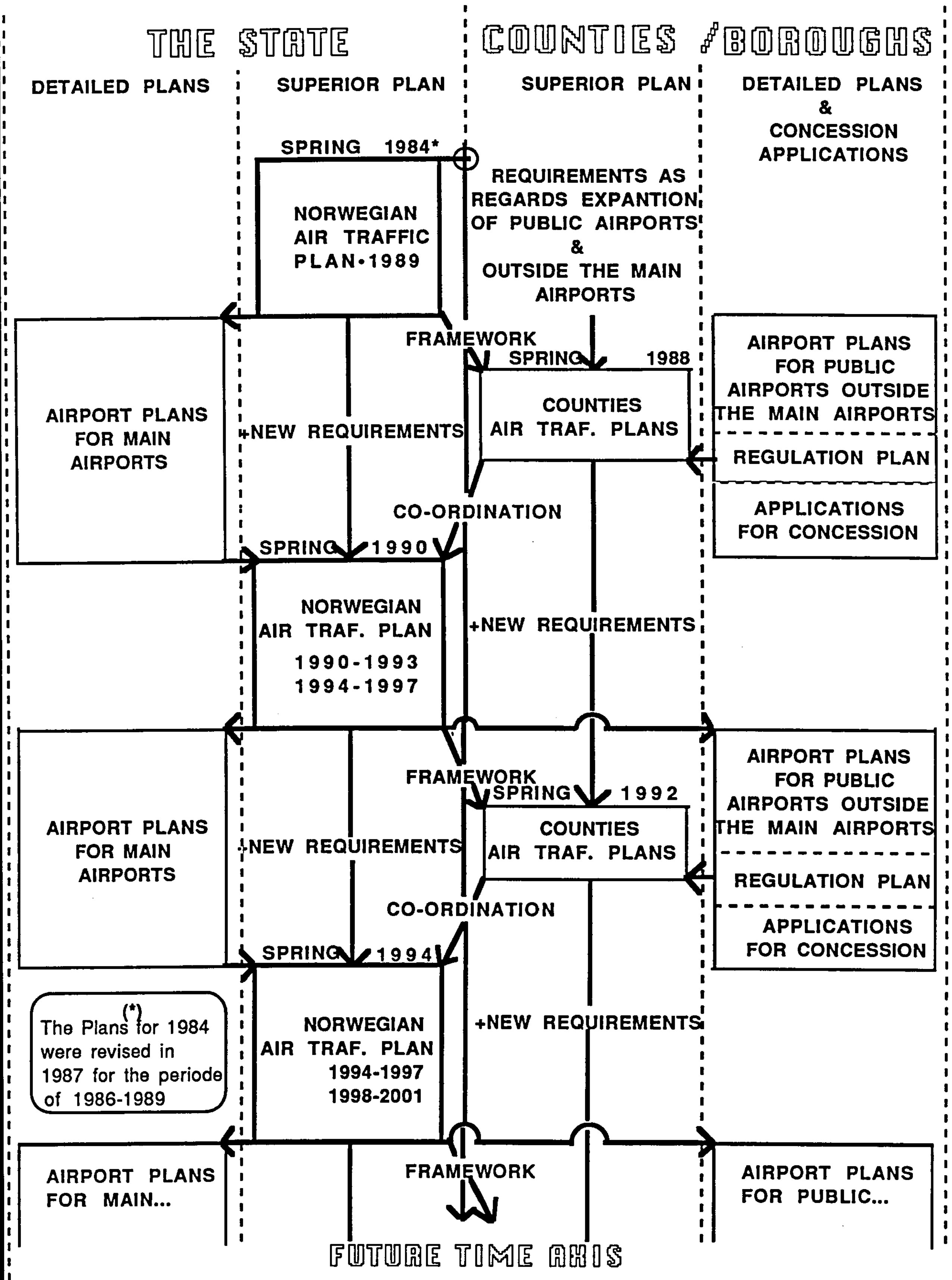


FIGURE 5.3.2.-15
THE INTERPLAY BETWEEN THE VARIOUS LEVELS OF THE NORWEGIAN AIRPORT PLANS AND THE TIME SCHEDULE FOR THE PROPOSED SUPERIOR PLANS
(SOURCE-FYLKETS LUFTARTSPLAN-NORWAY-1986)

21. The contents of the County's Air Traffic Plan:

1. The main tasks in the work with the County's Air Traffic Plan will be as follows:

1.1. Analyse all the actual new Airports in the County and,

1.2. To estimate the further expansion of existing Airports•

1.3. To co-ordinate the expansion proposals in a collected Air Traffic Plan for the County with preferential treatment plan for the expansion•

2. The report on the individual Airport proposals should contain these following part-tasks:

2.1. Estimate the traffic foundation,

2.2. To measure the areas and the most important technical plans for the Airport (airstrip, service buildings, parking areas, etc.). The basis for the dimensions will, among other things, be the flight operative requirements for the types of aircrafts which are planned to use the Airport•

2.3. To estimate the cost for the plan and the operation and to work out the finances and organisation plan for the implementation•

2.4. To map the most important consequences of the development of the Airport•

3. The Air Traffic Authorities will issue their own guide-lines which will describe lines of action and which will contain key figures of how to solve these tasks•

4. The main document of the plan should have an introduction where the transport situation in the County and future transport requirements are described briefly• This should give an account of the main traits in the travel pattern and of the standard of transport on the main connections within the County and in and out of the County• Future needs have to be elucidated based on the aims of the County's Transport Plan and County Plan draw up for the development•

5. The first main chapter in the plan must give a survey of all the actual Airport proposals in the County with the main results from the calculations and evaluations which have been made for the individual proposals. This instrument must show how large the number of elements which form the basis for the calculation will be; which areas the Airport requires, which needs the Airport can cover taken into consideration which types of air planes can call at the Airport(route traffic, air taxis, charter,etc.)•

6. The second main chapter must explain the considerations which are taken into account between the actual Airport proposals in view of an integrated development• If any other localities seem a better option in its overview these must be analysed and considered• When the area of influence for an alternative goes into a neighbouring County a report and consideration must happen in co-operation with the Traffic Authorities in that County•

7. The considerations must end in a preferential programme of treatment for the development• This must show how the expenses for the plan and the operation will be divided between the various finance sources and which authorities and or private institutions will administer the execution of the project•

22. The Planning and treatment of the Plans in the Counties:

1. The work with the County's Air Traffic Plan should be seen as a part of the Transport Planning in the County and be co-ordinated with other sectors through the County's work plan•

2. The scheme of work is assumed to be politically linked in that the Transport Council leads the work up to an approved Air Traffic Plan, and that the Transport Office is responsible for the practical execution•

3. Actual Airport proposals in the County must be analysed• The report must be prepared and carried through in close co-operation with the respective Counties where the proposals are localized•

4. The co-operation can be organized in several ways• If the Borough already has an Airport committee it may be useful to work with that• If it has not, the Council can elect one specially• Any way, it is important that those who participate locally are accepted by the local political authorities• When the proposal for an Air Traffic Plan for the County is ready the County Councils concerned should consider the proposal before it goes to the Transport Department and District Council for final treatment• Therefore, it is important that the local political authorities are kept informed about the plans, and that they will be able to express opinions during the planning on questions of special interest to the Borough•

5. All interests that will be affected to some degree of the individual Airport proposals must be clarified• It should happen through the co-operation with the public departments at Borough and County Council level, for instance agricultural authorities, forestry commissioners, nature conservation societies, etc• If individual private enterprises are affected strongly it may be necessary to involve these in the co- operation• When the individual Airport proposals are ready prepared, a co-operation process should be arranged so as to find an integrated development of the Airport in the County• In this process the Development Department in the County should take part because of the co-ordination with other overview plans in the County• Affected Boroughs and Public Departments can be included in the co-operation as needed• The co-operation can be limited to a few when one is going thoroughly into special interests, or to many when one wishes to find solutions across several interested parties•

6. The co-operation can be arranged as a series of discussion meetings where the participation can be adjusted to the needs as mentioned above•The Transport Committee will lead the work process, while the Transport Office carry out the practical tasks•

7. Nearly always in the first instance, it will be necessary to filter out some Airport proposals• These are the ones which compete for the same passengers, which do not fulfil technical requirements stated, or which are estimated to cause too much inconvenience to agriculture, nature conservation, residential areas or similar• The priorities of the remaining Airport proposals to be decided after careful consideration of what the individual proposal will mean for the planned development of the County•

8. A co-operation as described, should give the best conditions for agreement of most points• But even then there will always be dissent on some questions• The results of the planning as well as divergent points of view and proposals which have appeared on the way, should be introduced in the County's Air Traffic Plan•

9. At latest by the turn of the year 87-88 there should have been a proposal to the Air Traffic Plan for the County which can then be presented to the deciding authorities• The plan must be sent to the Boroughs for formal treatment before it is sent with the comments or approvals from the Boroughs to the Transport Department for final treatment• The planned proposals with possible alterations, have then to be sent to the

County Council for approval in the Spring 1988•

10. The Air Traffic Authorities consider the proposals from the Counties and suggest to the Ministry of Transport which priorities should be the basis for the Norwegian Air Traffic Plan• It is assumed that papers about the Norwegian Air Traffic Plan will be sent to Parliament for final treatment during the Spring session of 1990•

11. New development will then start up in the Counties in the new year 1991 and FIGURE 5.3.2.-16 illustrates the schedule of work as described above•

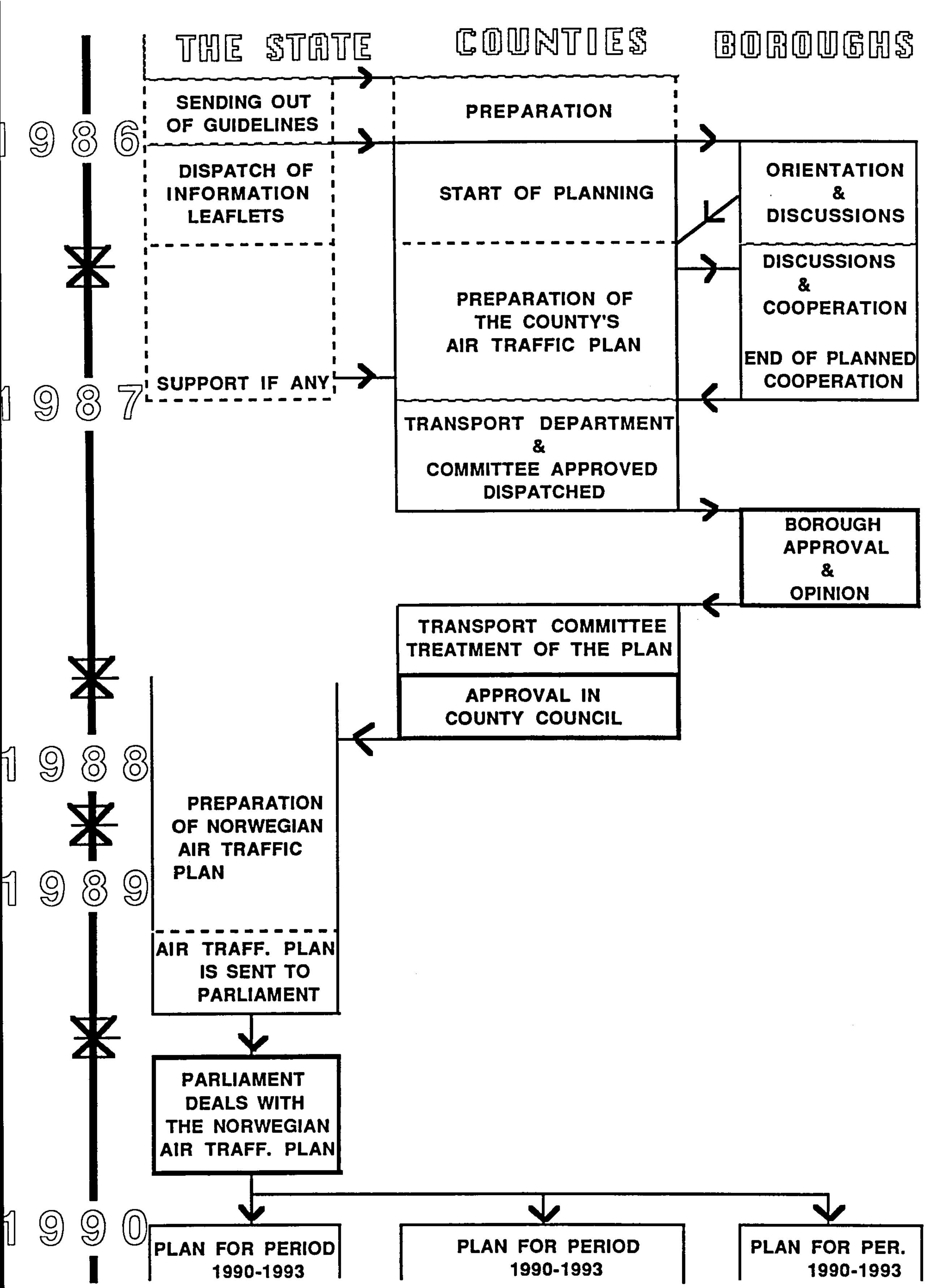


FIGURE 5.3.2.-16
SCHEMATIC OVERVIEW OF THE SCHEDULED FLOW GENERATION OF THE NORWEGIAN COUNTIES AIR TRAFFIC PLANS
(SOURCE-FYLKETS LUFTFARTSPLAN-NORWAY-1986)

5.3.3. The M.C.S.A.M. application test in the Norway N.A.S.P and interpretation of the results:

• After the Norwegian planning context and planning methods investigation, the M.C.S.A.M. has been applied to the Norway N.A.S.P., but to do so this researcher has taken the place of a hypothetical Norwegian multi-disciplinary planning actors team and simulate their planning behaviour to produce the M.C.S.A.M. application test in the Norwegian N.A.S.P.• Consequently, the interpretation of all the information, and the decisions that have to be taken within the application of this test are the translation of this researcher's own views about the Norwegian N.A.S.P., and the best of his own judgement that probably can be made about the Norwegian planning context and planning environment• It is important to point out that this is supposed to be an exercise of planning within the proposed normative general system planning methodology, which is firmly based on the procedural theory of planning to promote multi-disciplinary planning improvement• It is believed that this process of planning improvement should start with the planning behaviour, or more precisely, improvement at the level of the individual planner• Nevertheless, this planning exercise has been performed in two sections, these are; first the M.C.S.A.M. filling up process in the Norwegian N.A.S.P. when a matrix has been filled up as shown by TABLE 5.3.3.-1, and its outputs have been calculated using a PC Macintosh; second, is the interpretation of the results from the M.C.S.A.M. application test in the Norwegian N.A.S.P.• The computer data compilation from the Norwegian Matrix and from all the other countries have been enclosed in the Appendix to this dissertation•

1st. section: The M.C.S.A.M. filling up process in the Norwegian N.A.S.P.:

• For the fill up process the same routine has been adopted as was explained in the test explanation in part 5.2. of Chapter 5, and the following steps have been taken:

1st. step: The following operational adjustments have been made to the M.C.S.A.M. of the Norwegian N.A.S.P. case study:

1. Working Field Selection: The test will consider the Norwegian N.A.S.P. as an "investigation field" where it is expected to achieve the "emphatical understanding" of their N.A.S.P., which has been practiced within their planning context and planning environment•

2. Planning Level Selection: The test will be applied to the "National" organizational level of the Norwegian N.A.S.P., despite the fact that the information has been collected within all the Norwegian administrative levels•

3. Focused Planning Element or Sub-system: The test will focus the "airport" as one of the smallest parts of the major system of the "Norwegian Air Transport Industry", and also the resulting judgements obtained from the answers to the forthcoming questions will be taken from the airports point of view•

4. Focused Planning Scenario: The test will focus the "actual Norwegian parameters of growth" without taking in consideration any projection which could possibly be made over their standards of growth•

2nd. step: As input 1 for the Norwegian M.C.S.A.M. the supporting planning theories already selected have been adopted, as follows:

1. The "Interactive System Planning Analysis": As a permanent instrument of analysis proposed by this research to the M.C.S.A.M.•

2. The "Forms of planning identification": Based on Friedmann's(1973) planning theory and its internal scale of desirability•

3. The "Political Context & Planning Methods": Based on Breheny's(1986) theory and its internal scale of desirability•

4. The "Uncertainty in Planning": Based on Christensen's(1985) theory and its internal scale of desirability•

3rd. step: As input 2 for the Norwegian M.C.S.A.M. the same thirty two(32) planning factors and goals as has been listed in Chapter 4 have been adopted, which is supposed to be a real and significant sample of all the elements and sub-systems of the N.A.S.P. considered in this dissertation•

4th. step: The 32 planning factors and goals are now entered to the M.C.S.A.M. in a simple order after receiving their respective interactive numbers given by the Planning Tool 1 or Interactive System Planning Analysis• The results of this analysis can be seen on TABLE 5.3.3.-1 in the column named "Interactive Classification Numbers", and they have been obtained as follows:

1. The N.A.S.P. components and their respective levels of interaction considered in this dissertation are as follows: Context=1, Airline=2, Aircraft=3, and Airport=4 (as a referential point for this interactive analysis)•

2. Initially, all the planning factors and goals have received the interactive number "**1**" resulting from the fact that all them belong to the "Context", which is the permanent and natural component of the N.A.S.P. as a major system•

3. In order to define the other interactive levels the following question has been asked to all planning factors and goals: "*As far as the Norwegian N.A.S.P. is concerned, to what element, elements, sub-system or sub-systems of the major system does it belong in terms of natural influence and operationality* ?"• There are many responses which consequently will result in many different levels of interaction, as follows:

3.1. From the Airport point of view in Norway, twenty three of the thirty two entries have been considered as belonging simultaneously to all the defined elements of the interactive analysis, i.e., they have received the maximum level of interaction which is number "**10**"• That is due to the fact that in Norway all these twenty three entries have been considered as belonging simultaneously to the "Context=1", and also to all the other three components of the major system, as follows; the "Airline=2", the "Aircraft=3" and the "Airport=4"•

3.2. From the Airport point of view in Norway, two of the thirty two entries have received the level of interaction "**8**" because they have been considered as belonging naturally to the "Context=1", and also simultaneously to the components "Aircraft=3" and to the "Airport=4"• They are the "National pricing policy" and the "National propensity to fly", and according to the available information that is due to the fact that in Norway both the "National pricing policy" and the "National propensity to fly" are very sensitive to both the size of the "Aircraft" and the location of the "Airport" in terms of accessibility and airoute definition•

3.3. One entry received the level of interaction "**7**" because it has been considered as belonging to the "Context=1", and also simultaneously to the components "Airline=2" and to the "Airport=4"• The referred entry is the "Deregulation", and according to the Norwegian Air Traffic Authority Board deregulation in Norway would affect eventually the international airlines and consequently the international airports, due to the fact that both "pricing policy" and "national airoutes" are defined by the national authority represented by the mentioned board•

3.4. Two entries received the level of interaction "6" because they have been considered as belonging to the "Context=1", and also simultaneously to both components the "Airline=2" and the "Aircraft=3"• They are the "National air seat offer" and the "National air seat utilization", that is due to the fact in Norway both entries are naturally sensitive to the size of the aircraft and also to the operational costs defined by the airline•

3.5. Two entries received the level of interaction "5" because they have been considered as belonging to the "Context=1" and to the "Airport=4"• They are the "National population growth" and the "Airport System Profitability", that is due to the fact in Norway the former exerts large influence over the airports and the latter is naturally concerning to airports•

3.6. One entry received the level of interaction "4" because it has been considered as belonging to the "Context=1" and to the "Aircraft=3"• This is the "Aerospace Industry Profitability", and in Norway this enter would be concerned primarily to the aircraft•

3.7. One entry received the level of interaction "3" because it has been considered as belonging to the "Context=1" and to the "Airline=2"• This is the "Airline System Profitability" and in Norway this enter would be concerned initially to the airline•

5th. step: Each one of the thirty two planning factors and goals are now analysed within each one of the other three selected supporting planning theories, as follows:

1."Forms of Planning": Within this supporting planning theory the following question is addressed to each one of the 32 planning factors and goals: " *As far as the "forms of planning" are concerned, what are the Norwegian N.A.S.P. and Norwegian planning characteristics within which has this particular planning factor and goal been manipulated ?*"•

1.1. There are four possible different answers to each one of the 32 planning factors and goals, which will result in one of the four weights of the internal scale of desirability within the "forms of planning", as follows;

Central Planning or **CP1=1,**
Policies Planning or **PP1=2,**
Corporate Planning or **CP2=3,** and
Participatory Planning or **PP2=4.**

1.2. According to the interpretation given by the researcher to the evidences from the Norwegian N.A.S.P. and Norwegian planning context, and with the help of the two evaluative frameworks defined by Morris Hill(1985b), in Chapter 5, the answers are as follows:

1.2.1. There are 10 planning factors and goals classified within the "Central Planning" or "**CP1**", which means that they have received weight "**1**" according to the scale of desirability above, and this weight has been multiplied by the respective interactive classification numbers given to the entries, and plotted in the column "**CP1**" of the matrix(TABLE 5.3.3.-1)• The identified reason for that is both the Norwegian N.A.S.P. and the Norwegian planning context have been practiced under a strong "Central Planning" characteristics specially in respect to the central decision making process and no public participation on the planning process when dealing specifically with these planning factors and goals, as follows:

1. Accessibility policy,
2. Federal planning co-ordination,
3. G.N.P. growth,
4. National airport classification,
5. National airport network in terms of general number,
6. National capital investment in airport infrastructure,
7. National economic growth,
8. National pricing policy,
9. National supply policy, and
10. Deregulation.

1.2.2. There are 16 planning factors and goals classified within the "Policies Planning" or "**PP1**", which means that they have received weight "**2**" according to the scale of desirability of the "forms of planning", and this weight has been multiplied by the respective interactive classification number given to the entries, and plotted in column "**PP1**" of the matrix• They are as follows:

1. Aerospace industry profitability,
2. Airport system profitability,
3. Airline system profitability,
4. Income per capita,
5. National airport movement in terms of total aircraft movement,
6. National airport movement in terms of total passengers throughput,
7. National airport network per category number,
8. National airport network per number of city pair,
9. National fleet composition,
10. National air transport system economic growth,
11. National air seat offer,
12. National air seat utilization,
13. National population growth,
14. National propensity to fly,
15. National spatial distribution, and
16. National travellers characteristics.

1.2.3. From what was possible to identify, these 16 planning factors and goals have been manipulated by the Norwegian N.A.S.P. and Norwegian planning context under the roles of "Policies Planning" characteristics according to the following Hill's(1985b) parameters:

1. *There is a very limited opportunity for participation by interested or affected parties in respect to these planning factors and goals in Norway • For example; "National fleet composition", "National travellers characteristics", and "National spatial distribution" are planning factors and goal which tend to be totally independent of participation by interested or affected parties in any country of the world, specially in Norway •*

2. *There are specific central body-broad areas of responsibility and sectorial or regional areas of responsibility of subordinate bodies to deal with these problems in Norway • An example is the Norwegian Air Traffic Authority(FIGURE 5.3.2.-12),which is divided in three main areas, such as* ;

A. *Five main administration boards .*

B. *Eight regional airports administrations .*

C. *Four air traffic district service .*

3. *There is a natural consensus on basic policies in Norway when dealing with these planning factors and goals • For example the Air Traffic Plan in Norway is considered at County and National levels instead of just at the local level of planning where is originated the need for a new or an expansion of existing airports •*

4. *Planners in Norway play a role of advisor and simulation analyst in respect to these planning factors and goals •*

5. *In Norway, when dealing with these planning factors and goals, it is always given great emphasis firstly to the "process " of planning and then to the "product " resulting from the process of planning • The examples for this characteristics are; the Airport Plans and the time schedule for the proposed Superior Plans(FIGURE 5.3.2.-15), and the Norwegian Counties Air Traffic Plans(FIGURE 5.3.2.-16) •*

1.2.4. Just one of the planning factors and goals has been classified within the "Corporate Planning" or "**CP2**", which is "National demand to fly" and that means it has received weight "**3**" according to the scale of desirability of the "forms of planning", and this weight has been multiplied by the respective interactive classification number given to it and plotted into column "**CP2**" of the matrix• In fact "National demand to fly" in Norway is a planning factor which has been manipulated under the roles of "Corporate Planning" according to the following Hill's parameters:

1. *There is compliance by consent and mutual interest when dealing with "National demand to fly " in Norway •*

2. *There is an emphasis on the "process " of analysing the national demand to fly in Norway •*

3. *The number of planning actors involved in this process of analysis is potentially numerous in Norway when dealing with national demand to fly •*

4. *From the views of whose interests are served when analysing the national demand to fly in Norway, it can be said they are the corporate bodies and who they represent •*

5. *Consequently, there is a great opportunity for participation by corporate bodies in the planning process when dealing with national demand to fly in Norway •*

1.2.5. There are 5 planning factors and goals classified within the "Participatory Planning" or "**PP2**", which means they have received weight "**4**" according to the scale of desirability of the "forms of planning", and this weight has been multiplied by the respective interactive classification numbers given to the entries, and plotted in the column "**PP2**" of the matrix• They are as follows:

1. Federal planning implementation policy,
2. Federal planning agencies,
3. National environment issues,
4. National transport modal split, and
5. Public participation policy.

1.2.6. These five planning factors and goals have been manipulated under the roles of "Participatory Planning" in Norway according to the following Hill's parameters of observation:

1. *There is a voluntary compliance as far as the degree of control over the planning process when dealing with these planning factors and goals in Norway • Consequently, there is a dispersed degree of centralization concerning to the planning process when these planning factors and goals are involved •*

2. *There is an emphasis on both the planning process and the product resulting of the process when dealing with these planning factors and goals in Norway •*

3. *Concerning the question: "Who benefits with the planning process ?", specially when dealing with the above referred planning factors and goals in Norway, the response would be; "the active participants ", if they are representative of the entire constituency or all segments of society •*

4. *As far as consensus in the system is concerned, there is initially a potential for conflict which can facilitate consensus at the end of the planning process, when dealing with these planning factors and goals in Norway* •

5. *There is a clear opportunity for participation by interested parties in the Norwegian planning process, when dealing with these planning factors and goals* •

6. *The planners have been playing a role of advocate and facilitator within the planning process when focusing these planning factors and goals in Norway* •

7. *There is a patent accountability concerning the Norwegian planning process when dealing with the above referred planning factors and goals* •

2."Planning Context & Planning Methods": Within this supporting planning theory the following question is addressed to each one of the 32 planning factors and goals: "*As far as the "planning context & planning methods" are concerned, what are the planning context characteristics within which the Norwegian N.A.S.P. has taken place and what planning methods have been adopted within this planning context to deal with this particular planning factor and goal ?*"•

2.1. There are four possible different answers to each one of the 32 planning factors and goals, which will result in one of the four weights of the internal scale of desirability within the "planning context & planning methods", as follows:

Very Unlikely or **V=1,**
Possible or **P1=2.5,**
Possible or **P2=2.5,** and
Likely or **L=4.**

2.2. According to the interpretation given by the researcher to the evidences obtained from the Norwegian N.A.S.P. and Norwegian planning context, the answers are as follows:

2.2.1. There are 3 planning factors and goals classified within the "Very Unlikely" or "V", which means that they have received weight "**1**" according to the scale of desirability of the "planning context & planning methods", and this weight has been multiplied by the respective interactive classification numbers given to the entries, and the results have been plotted in column "V" of the matrix• They planning factors are as follows:

1. National demand to fly,
2. National transport modal split, and
3. Public participation policy.

2.2.2. From what was possible to identify within the Norwegian N.A.S.P. and Norwegian planning context, the three planning factors and goals from the above have been manipulated under a very unlikely balance between the political complexity of the planning context to attend all the interest which normally involves public participation in planning, and the also complex planning methods that have been adopted to deal with them, for example when dealing with national demand to fly•

2.2.3. There are 17 planning factors and goals classified within the "Possible balance" or "**P2**", which means that they have received weight "**2.5**" according to the scale of desirability of the "planning context & planning methods", and this weight has been multiplied by the respective interactive classification numbers given to the entries, and plotted in column "**P2**" of the matrix• They are as follows:

1. Accessibility policy,
2. Airport system profitability,
3. Airline system profitability,
4. Federal planning co-ordination,
5. Federal planning implementation policy,
6. Federal planning agencies,
7. G.N.P. growth,
8. Income per capita,
9. National airport classification,
10. National airport movement in terms of total aircraft movement,
11. National airport network per city pair number,
12. National pricing policy,
13. National propensity to fly,
14. National spatial distribution,
15. National supply policy,
16. National travellers characteristics, and
17. Deregulation.

2.2.4. From the researcher's point of view the above planning factors have been examined within the Norwegian N.A.S.P. and Norwegian planning context under what has been named by Breheny(1986), "possible balance" between the relatively simple planning context for the political point of view on one side, and the complex planning methods that have been adopted to deal with them on the other•

2.2.5. There are 12 planning factors and goals classified within the "Likely balance" or "**L**", which means that they have received weight "**4**" according to the scale of desirability of the "planning context & planning methods", and this weight has been multiplied by the respective interactive classification numbers given to the entries, and plotted into column "**L**" of the matrix• They are as follows:

1. Aerospace industry profitability,
2. National airport movement in terms of total passengers throughput,
3. National airport network in terms of general number,
4. National airport network per category number,
5. National capital investment in airport infrastructure,
6. National economic growth,
7. National environmental issue,
8. National fleet composition,
9. National air transport system economic growth,
10. National air seat offer,
11. National air seat utilization, and,
12. National population growth.

2.2.6. From the interpretation of what was possible to identify within the Norwegian N.A.S.P. and Norwegian planning context the above 12 planning factors and goals have been examined within a "likely balanced" circumstance between the relatively simple planning context from the political point of view, and the also relatively simple planning methods that have been adopted to deal with them•

2.2.7. There is no planning factor and goal classified within the "Possible balance" or "**P1**", which means that in Norway none of the selected planning factors and goals have been examined under a "possible balance" between the complex planning context for the political point of view, and the relatively simple planning methods to deal with them• In other words that circumstance has not been identified by this dissertation in the Norwegian N.A.S.P. nor in the Norwegian planning context•

3."Uncertainty in Planning: Within this supporting planning theory the following question is addressed to each one of the 32 planning factors and goals: "*As far as the level of uncertainty is concerned, what is the level of agreement about this particular planning factor and goal and what is the level of knowledge about it in terms of; its possible controlability, improvement of its performance, or knowledge as related to the level of technology which is required to deal with it* ?"•

3.1. There are four possible different answers to each one of the 32 planning factors and goals, which will result in one of the four weights of the internal scale of desirability of the "uncertainty in planning", as follows:

Chaos or **C=1,**
Bargaining or **B=2.5,**
Experimentation or **E=2.5**, and
Programming or **P=4.**

3.2. According to the interpretation and identification obtained by the researcher from the evidences of the Norwegian N.A.S.P. and Norwegian planning context, the answers are as follows:

3.2.1. There are 25 planning factors and goals classified within the "Experimentation" or "E", which means that they have received weight "**2.5**" according to the scale of desirability of the "uncertainty in planning", and this weight has been multiplied by the respective interactive classification numbers given to the entries, and the results have been plotted in column "E" of the matrix• They planning factors are as follows:

1. Aerospace industry profitability,
2. Airport system profitability,
3. Airline system profitability,
4. G.N.P. growth,
5. Income per capita,
6. National airport classification,
7. National airport movement in terms of total aircraft movement,

8. National airport movement in terms of total passengers throughput,
9. National airport network general number,
10. National airport network per category number,
11. National airport network per city pair number,
12. National demand to fly,
13. National economic growth,
14. National environmental issue,
15. National fleet composition,
16. National air transport system economic growth,
17. National air seat offer,
18. National air seat utilization,
19. National transport modal split,
20. National pricing policy,
21. National propensity to fly,
22. National spatial distribution,
23. National supply policy,
24. National travellers characteristics, and
25. Deregulation.

3.2.2. From what was possible to identify and according to the interpretation given to the available information about the Norwegian N.A.S.P. and Norwegian planning context the above planning factors and goals have been classified within the "Experimentation" characteristics of uncertainty in planning, which means that on one hand they are under the same level of agreement as far as their importance to the planning context and to the Norwegian N.A.S.P. are concerned, but on the other hand there is no agreement or knowledge in respect to the level of technology necessary to promote their improvement, nor agreement concerning to the required level of information necessary to improve knowledge about them• Hence, according to Christensen(1985), when dealing with the above planning factors and goals the Norwegian planning context and the Norwegian N.A.S.P., can be described by one of the main characteristics of "Experimentation", which is "innovation" concerning to their inventiveness and creative sensitivity to varying constraints• See for example the Norwegian STOL-port programme and their Air Traffic Plans•

3.2.3. There are 7 planning factors and goals classified within the "Programming" or "**P**", which means that they have received weight "**4**" according to the scale of desirability of the "uncertainty in planning", and this weight has been multiplied by the respective interactive classification numbers given to the entries, and the results have been plotted in column "**P**" of the matrix• They are as follows:

1. Accessibility policy,
2. Federal planning co-ordination,
3. Federal planning implementation policy,
4. Federal planning agencies,
5. National capital investment in airport infrastructure,
6. National population growth, and
7. Public participation policy.

3.2.4. The classification of the above planning factors and goals within the "Programming" level of uncertainty in planning has been based on Christensen's levels of uncertainty applied to the interpretation of the Norwegian N.A.S.P. and Norwegian planning context, and that means there is a dominant sense of agreement concerning the importance and values of these planning factors and goals, which is shared by a major consensus in respect to the required level of technology to improve them• Nevertheless, when dealing with the above planning factors and goals that positive circumstance of uncertainty within the Norwegian N.A.S.P. and Norwegian planning context can be described by five characteristics of "Programming" defined by Christensen; "predictability", "equity", "accountability", "efficiency" and "effectiveness"•

3.2.5. The level of uncertainty named "Bargaining" or "**B**" in planning has not been identified within the Norwegian N.A.S.P. and Norwegian planning context, nor has the level of uncertainty named "Chaos" or "**C**"• The inexistence of "**B**" or "Bargaining" is due perhaps to the fact that Norway is relatively small in terms of population and socio-economic inequalities practically do not exist in Norway, which perhaps suggest that there is a "small political tension" and consequently there is "no appetite for bargaining" in Norway• The existence of "**C**" or "Chaos" would necessarily imply the existence of total disagreement concerning to both, the goals to be achieved, and the necessary level of technology to achieve them, which definitely are not the circumstances within the Norwegian N.A.S.P.•

MULTIDISCIPLINARY ANALYSIS OF AIR TRANSPORT PLANNING METHODOLOGIES

MULTIPLE
CROSS
SYSTEM
ANALYSIS
MATRIX
= **M.C.S.A.M.**

M.C.S.A.M. APPLICATION TEST IN THE NORWAY N.A.S.P.

INVESTIGATION FIELD	•
APPLICATION FIELD	

FOCUSED PLANNING LEVEL	
NATIONAL	•
REGIONAL	
STATE	
AREA	
LOCAL	

SELECTED PLANNING FACTORS AND GOALS OF THE FOCUSED PLANNING FIELD

INTERACTIVE ANALYSIS

LEVELS OF PLANNING FACTORS AND GOALS INTERACTION: 1, 2, 3, 4, 5, 6, 7, 8, 10

IDENTIFIED ELEMENTS OR SUB-SYSTEMS WITHIN THE FOCUSED PLANNING FIELD

1	AIRPORT NETWORK	AIRPORT SYSTEM	AIRPORT •
2	AIRROUTE NETWORK	AIRROUTE	AIRLINE-SERVICE •
3	AEROSPACE INDUSTRY	AIRCRAFT FLEET	AIRCRAFT •
4	NATIONAL •	STATE REGIONAL	LOCAL AREA

	MULTI-OBJECTIVE PLANNING FACTORS AND GOALS	DIMENSIONAL EXPRESSION	INTERACTIVE COMBINATION SYMBOLS	INTERACTIVE CLASSIFICATION NUMBERS	FORMS OF PLANNING (FRIEDMANN-1973)				PLANNING CONTEXT X PLANNING METHODS (BREHENY-1986)				UNCERTAINTY IN PLANNING (CHRISTENSEN-1985)				CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	COMMENTS
					CP1	PP1	CP2	PP2	V	P2	P1	L	C	B	E	P			
					1	2	3	4	1	2.5	2.5	4	1	2.5	2.5	4			
1	ACCESSIBILITY POLICY	FREQUENCY AND JOURNEY COST		10	10					25						40	75	4°	
2	AEROSPACE INDUSTRY PROFITABILITY	ECONOMIC RATIO		4		8						16			12.5		36.5	13°	
3	AIRPORT SYSTEM PROFITABILITY	ECONOMIC RATIO		5		10				12.5					12.5		35	14°	
4	AIRLINE SYSTEM PROFITABILITY	ECONOMIC RATIO		3		6				7.5					7.5		21	15°	• LOWEST CUMULATIVE WEIGH
5	FEDERAL PLANNING CO-ORDINATION	G-B-M-NA		10	10					25						40	75	4°	
6	FEDERAL PLANNING IMPLEMENTATION POLICY	G-B-M-NA		10				40		25						40	105	1°	* HIGHEST CUMULATIVE WEIGH
7	FEDERAL PLANNING AGENCIES	G-B-M-NA		10				40		25						40	105	1°	* HIGHEST CUMULATIVE WEIGH
8	G.N.P.-US$ AND % GROWTH	H-M-L		10	10					25					25		60	7°	
9	INCOME PER CAPITA-US$ AND % GROWTH	H-M-L		10		20				25					25		70	5°	
10	NATIONAL AIRPORT CLASSIFICATION	G-B-M-NA		10	10					25					25		60	7°	
11	NAT.AIRPORT MOVEMENT AND AIRCRAFT MOVEMENT	H-M-L		10		20				25					25		70	5°	
12	NATIONAL AIRPORT MOVEMENT AND PAX THROUGHPUT	H-M-L		10		20						40			25		85	3°	
13	NATIONAL AIRPORT NETWORK-GENERAL NUMBER	H-M-L		10	10							40			25		75	4°	
14	NATIONAL AIRPORT NETWORK PER CATEGORY NUMBER	H-M-L		10		20						40			25		85	3°	
15	NATIONAL AIRPORT NETWORK PER CITY PAIR NUMBER	H-M-L		10		20				25					25		70	5°	
16	NAT.CAPITAL INVESTMENT IN AIRPORT INFRASTRUCT.	US$ AND % VARIATION PER YEAR		10	10							40				40	90	2°	
17	NATIONAL DEMAND TO FLY	PAX MOV.-AIR.MOV./L.F.-AIR.MIX		10			30		10						25		65	6°	
18	NATIONAL ECONOMIC GROWTH	ECONOMIC RATIO		10	10							40			25		75	4°	
19	NATIONAL ENVIRONMENTAL ISSUE	G-M-B-NA		10				40				40			25		105	1°	* HIGHEST CUMULATIVE WEIGH
20	NATIONAL FLEET COMPOSITION	A-B-C-D		10		20						40			25		85	3°	
21	NATIONAL AIR-TRANSPORT SYSTEM ECONOMIC GROW.	ECONOMIC RATIO		10		20						40			25		85	3°	
22	NATIONAL AIR SEAT OFFER	NR.SEATS/YEAR AND % VAR.		6		12						24			15		51	9°	
23	NATIONAL AIR SEAT UTILIZATION	NR.SEATS/PAX YEAR AND % VAR.		6		12						24			15		51	9°	
24	NATIONAL TRANSPORT MODAL SPLIT	% 1-% 2-% 3-% 4		10				40	10						25		75	4°	
25	NATIONAL POPULATION GROWTH	NR. INHABITANTS/YEAR AND % VAR.		5		10						20				20	50	10°	
26	NATIONAL PRICING POLICY	H-M-L-NA		8	8					20					20		48	11°	
27	NATIONAL PROPENSITY TO FLY	NR.INHABITANTS/YEAR AND % VAR.		8		16				20					20		56	8°	
28	NATIONAL SPATIAL DISTRIBUTION	NR.CITY AND AVERAGE DISTANCE		10		20				25					25		70	5°	
29	NATIONAL SUPPLY POLICY	H-M-L-NA		10	10					25					25		60	7°	
30	NATIONAL TRAVELLERS CHARACTERISTICS	BUSINESS-TOURISM-COMMUTER-OTHERS		10		20				25					25		70	5°	
31	PUBLIC PARTICIPATION POLICY	H-M-L-NA		10				40	10							40	90	2°	
32	DEREGULATION	H-M-L-NA		7	7					17.5					17.5		42	12°	
			88.1%	282	95	254	30	200	30	377.5	-	404	-	-	545	260	2195.5	-	◄TOTAL CUMULATIVE WEIGHT
		SUPPORTING THEORIES RANK →	-	-	3°	1°	4°	2°	3°	2°	-	1°	-	-	1°	2°	-	6°	◄ AVERAGE COM. FA. RANK
		AVERAGE CLASSIFICATION →	-	8.81	9.5	15.87	30	50	10	22.20	-	33.6	-	-	21.8	37.14	68.60	-	◄ AVERAGE CUMULATIVE W

FOCUSED PLANNING HORIZON			FOCUSED PLANNING SCENARIO			
ACTUAL	•	MEDIUM-TERM	CURRENT	•	MEDIUM GROWTH	
SHORT-TERM		LONG-STRATEGIC	HIGH GROWTH		LOW GROWTH	

• NORWAY N.A.S.P. METHODOLOGY HAS BEEN IDENTIFIED WITHIN A HIGHLY INTERACTIVE AND PLANNING POLICY TOWARDS A PARTICIPATORY PLANNING PRACTICES SOCIETY WITH A LIKELY AND POSSIBLE BALANCE BETWEEN THE RELATIVELY SIMPLE POLITICAL CONTEXT AND THE SLIGHTLY COMPLEX PLANNING METHODS, WHICH HAVE BEEN ADOPTED UNDER A PREDOMINANTLY EXPERIMENTATION LEVEL OF UNCERTAINTY •

TABLE 5.3.3-1
THE M.C.S.A.M. APPLICATION TEST IN THE NORWAY N.A.S.P.
(RESEARCH SOURCE)

2nd. section: The interpretation of the results from the M.C.S.A.M. application test in the Norwegian N.A.S.P.:

• **Introduction:** After the matrix filling up process, which was done in the 1st section of this part, the calculation of the Norwegian N.A.S.P. matrix has been made by a series of suitable softwares, and the results obtained are now analysed and interpreted within this exercise of procedural planning• The matrix's capacity to generate data has not been totally exhausted by the present analysis; on the contrary, the results which have been selected to be analysed and interpreted by this research are just an indication of its wide capacity of data generation• The main point to be stressed is that the M.C.S.A.M. is not a payoff matrix, but an open instrument of analysis, from where it is possible to obtain an enormous source of information through the interpretation of the available outputs, such as; the preferred planning factors and goals, and the preferred aspects of planning within the supporting planning theories, and consequently, their relationships with the planning context and the planning environment• The following interpretations have been made from the Norwegian N.A.S.P. matrix:

1. The preferred common planning factors and goals from the Norway N.A.S.P. matrix:

1.1. In this section the resulting ranking derived from the cumulative weights of the Norway N.A.S.P. matrix or, more specifically, the preferred common planning factors and goals, are identified and interpreted• This analysis was made in order to assess the whole range of planning factors and goals within the Norwegian N.A.S.P., which will probably express its strength and weaknesses through future performance measurements• At the present they will help with the identification of the Norwegian N.A.S.P. methodology framework, as follows:

1.1.1. The 32 entered items resulted in 15 ranking groups of entries and the average rank number was 6º, which correspond to the planning factor and goal with 65 weight points in the rank, and this is the nº17 or "National demand to fly"•

1.1.2. There are three with the highest cumulative weight or 105 points in the rank, and they are; nº6 or "Federal planning implementation policy", nº7 or "Federal planning agencies", and nº19 or "National environmental issues"• Assuming that these preferred planning factors and goals represent theoretically the common sense and democratic will of a Norwegian multi-disciplinary planning actors team, which per se express the will of the whole community directly or undirectly affected by the planning process, then it is possible to also state that they probably are the most effective ones for the Norwegian N.A.S.P.• According to this criteria it is possible to say that the next ones are gradually less effective within the Norwegian N.A.S.P.•

1.1.3. There are two with the second highest cumulative weight which are the nº31 or "Public participation policy" and nº16 or "National capital investment in airport infrastructure", with 90 points each in the rank•

1.1.4. There are four placed in third in the rank of cumulative weight with 85 points and they are;

nº21 or "National air transport system economic growth",
nº20 or "National fleet composition",
nº14 or "National airport network per category number", and
nº12 or "National airport movement in terms of total passengers throughput".

1.1.5. The fourth and fifth places in the rank of cumulative weight are the highest ones in terms of entries with five items each, and they have been classified with 75 and 70 points respectively• It is possible to say that these planning factors and goals share the same level of effectiveness within the Norwegian N.A.S.P. since they are in the same weight rank position, they are as follows:

nº24 or "National transport modal split",
nº18 or "National economic growth,
nº13 or "National airport network in terms of general number.
nº5 or "Federal planning co-ordination",
nº1 or "Accessibility policy",
nº30 or "National travellers characteristics",
nº28 or "National spatial distribution",
nº15 or "National airport network per city pair number",
nº11 or "National airport movement in terms of aircraft movement", and
nº9 or "Income per capita".

1.1.6. There is just one with 21 points which is the lowest weight in the rank, and it is the nº4 or "Airline system profitability"• Consequently, it is possible to assume that this planning factor and goal is the less effective within the Norwegian N.A.S.P., i.e., any attempt of improvement on it, would probably result in low benefit for both the community and for the N.A.S.P. as a system•

2. The identification of the Norway N.A.S.P. methodology framework:

2.1. Assuming that it is possible to identify any N.A.S.P. methodology framework through some of its basic characteristics, which may be expressed by different factors and different variables, such as for example: operational factors, economic indicators, policy-making issues, and by some specific planning aspects, this research has built up the Norwegian N.A.S.P. methodology framework based on the analysis of the above preferred common planning factors and goals identified by the matrix• The resulting characteristics of the Norwegian N.A.S.P. framework are as follows:

2.1.1. From the operational point of view the Norwegian N.A.S.P. methodology is heavily dependent on the following factors:

a. national fleet composition,
b. national airport network per category number,
c. national airport movement in terms of total passengers throughput,
d. national airport network in terms of general number, and
e. national airport network per city pair number.

2.1.2. From the economic point of view the Norwegian N.A.S.P. methodology framework is very sensitive to the following indicators:

f. national air transport system economic growth,
g. national economic growth,
h. national travellers characteristics, and
i. income per capita.

2.1.3. From the policy-making point of view the Norwegian N.A.S.P. methodology framework is very sensitive to the following issues:

j. national environmental issues, and
k. public participation policy.

2.1.4. As far as planning is concerned the Norway N.A.S.P. methodology framework is very sensitive to the following aspects:

l. federal planning implementation policy,
m. federal planning agencies,
n. national capital investment in airport infrastructure,
o. national transport modal split,
p. federal planning co-ordination, and
q. accessibility policy.

3. The preferred supporting planning theories from the Norway N.A.S.P. matrix:

3.1. In this section the cumulative weight rank from the Norwegian N.A.S.P. matrix or more specifically the preferred supporting planning theories are identified and interpreted• This analysis has been done with the objective of identifying all the planning aspects within the preferred supporting planning theories, which will possibly express the positive and negative characteristics of the Norwegian planning context, and the Norwegian planning environment• This information should be useful to understand the actual above identified Norwegian N.A.S.P. methodology framework, and perhaps to indicate possible improvements within their N.A.S.P. practices for the future• Assuming that it is possible to identify any planning context and planning environment through the interpretation of some of its basic characteristics, which may be expressed by aspects of a different nature, like for example: "*what sort of form of planning has been usually adopted within the focused context* ?"; *what sort of balance does exist between the identifiable political context and the complexity of the planning methods that has been adopted within it* ?"; and "*what level of agreement does exist about their goals and the consequent level of technology which has been adopted to achieve them* ?", this research has performed the following analysis on the resulting preferred supporting planning theories from the matrix:

3.1.1. The first analysis about the preferred supporting planning theories obtained from the Norwegian N.A.S.P. matrix is made on the "forms of planning", and the "**PP1**" or "policy planning" is the highest aspect with 254 points• The "**PP2**" or "participatory planning" is the second aspect with 200 points, and "**CP1**" or "central planning" is the third aspect with 95 points in the rank• The last aspect within this supporting planning theory is "**CP2**" or "corporate planning" with 30 points• These results mean that: first, the Norwegian N.A.S.P. is practiced within a planning context and planning environment which are dominantly under the "Policy Planning" characteristics according to Friedmann's theory; secondly, as expected, the "participatory planning" is a very influential planning practices within the Norwegian N.A.S.P.; finally, despite the fact that within Norway the "central planning" is still a strong planning characteristic they have managed to promote economic equity and social welfare with it•

3.1.2. The second analysis is made on the "planning context & planning methods", and the "**L**" or "likely balance" is the highest aspect with 404 points and "**P2**" or "possible balance" with 377.5 points is the second aspect• The "**V**" or "very unlikely balance" with 30 points is the third aspect• The "**P1**" or "possible balance" has not been quoted in the matrix perhaps due to the fact that it is most unlikely to adopt simple planning methods within the actual policy practices in Norway• It is important to point out that the "**L**" or "likely balance", which is the dominant aspect of planning in Norway is very compatible with the previously identified "**PP2**" or "participatory planning"•

3.1.3. The third analysis of the Norway N.A.S.P. preferred supporting planning theories is made on the "uncertainty in planning", and the "**E**" or "experimentation" is the highest aspect with 545 points• The second aspect is "**P**" or "programming" with 260 points• It is interesting to notice that neither "**B**" or "bargaining", nor "**C**" or "chaos" have been quoted by the matrix• These results may confirm the evidence from the literature where it is perfectly possible to identify the actual desire for technological improvement within Norway• Once more, this result is very compatible with the other two Norwegian planning characteristics previously identified by this analysis•

4. The interactive analysis from the Norway N.A.S.P. matrix:

4.1. In this section the interactive classification given to the Norway N.A.S.P. planning factors and goals are analysed and interpreted within the other results obtained in the matrix• These results may express the level of system planning interaction concerning to N.A.S.P. practices in Norway, as follows:

4.1.1. Before the matrix calculation, i.e., at the application stage of the Planning Analysis Tool 1, a total of 282 points were given by the interactive system planning analysis to the 32 entered items, which represents an average of 8.8.1 points per item within the different levels of interaction• After the matrix calculation a total of 2195.5 weight points were given to the items, with an average of 68,6 weight points to each item• These results do not represent too much at the moment but they will be much more useful when identifying the N.A.S.P. methodology Realist Model within the forthcoming Developed Countries comparative analysis•

5. The identification of the planning context and planning environment within which the Norway N.A.S.P. has been practiced:

5.1. The above analysis of the preferred supporting planning theories has produced the following Norway N.A.S.P. Methodology Label:

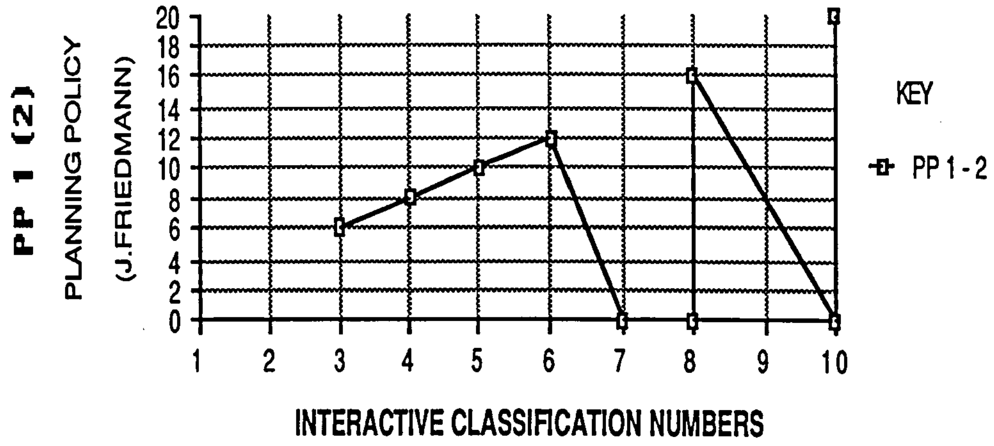
THE NORWAY N.A.S.P. LABEL

"The NORWAY N.A.S.P. methodology has been identified within a highly interactive and planning policy towards a participatory planning practices society, with a likely and possible balance between the relatively simple political context and the slightly complex planning methods, which have been adopted under a predominantly experimentation level of uncertainty"•

6. Exploratory interpretation over the Norway N.A.S.P. matrix:

6.1. A series of possible interpretation are made in this section with the objective to explore the matrix's capacity to deal with the N.A.S.P. planning practices within the given circumstances of the Norwegian planning context and planning environment:

6.1.1. FIGURE 5.3.3.-1 up to FIGURE 5.3.3.-3 shows the variation of the interactive classification numbers(**1.2.3...10**) against each one of the three identified preferred aspects of planning "**PP1**", "L", and "E", within the three supporting planning theories• Firstly, FIGURE 5.3.3.-1 shows that since "**PP1**" has weight **2** within the internal scale of desirability, then the maximum weight for the planning factors and goals within "**PP1**" will be **20** because the maximum interactive level is **10**• The zero values for "**PP1**" mean that there is no planning factor and goal with interactive classification numbers between **7** and **8** and also **10**• From the diagram it is possible to identify some gaps within the interactive levels, suggesting perhaps that there is no continuity between the interactive levels and the preferred aspect of planning "**PP1**"• These gaps may also suggest that there are some imperfections within the Norwegian N.A.S.P. concerning to interactive planning practices, which is perfectly compatible with "Planning Policy" practices as one of the main characteristics of the Norwegian planning context•



RESEARCH PROPOSAL

FIGURE 5.3.3.-1 • M.C.S.A.M. TEST IN NORWAY N.A.S.P.

Data from "NOR.-M.C.S.A.M.SAMPLE"

6.1.2. Secondly, FIGURE 5.3.3.-2 shows that since "L" or Likely Balance" has weight **4** within the internal scale of desirability, then the maximum weight for the planning factors and goals within "L" will be **40** because the maximum interactive level is **10**• The diagram also suggest that neither "L" has a continuous relationships with the interactive classification numbers, which means that there is no total balance between the political context and the adopted planning methods in Norway•

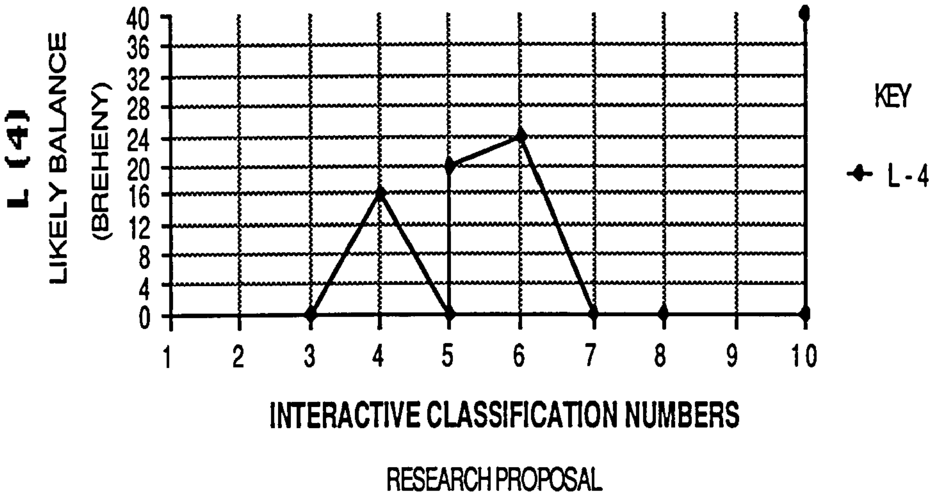


FIGURE 5.3.3.-2 • M.C.S.A.M. TEST IN NORWAY N.A.S.P.

Data from "NOR.-M.C.S.A.M.SAMPLE"

6.1.3. Thirdly, FIGURE 5.3.3.-3 shows that "E" or "Experimentation" has a weight **2.5**, consequently, the planning factors and goals within "E" will have the maximum weight equal **25** because the maximum interactive level is **10**• The diagram shows also that apart from the interactive classification numbers **5** and **10** the relationships between "E" and the interactive numbers are much more regular than the other two previous aspects• These results may suggest that the Norwegian planning context is generally conducted within the "Experimentation" level of uncertainty•

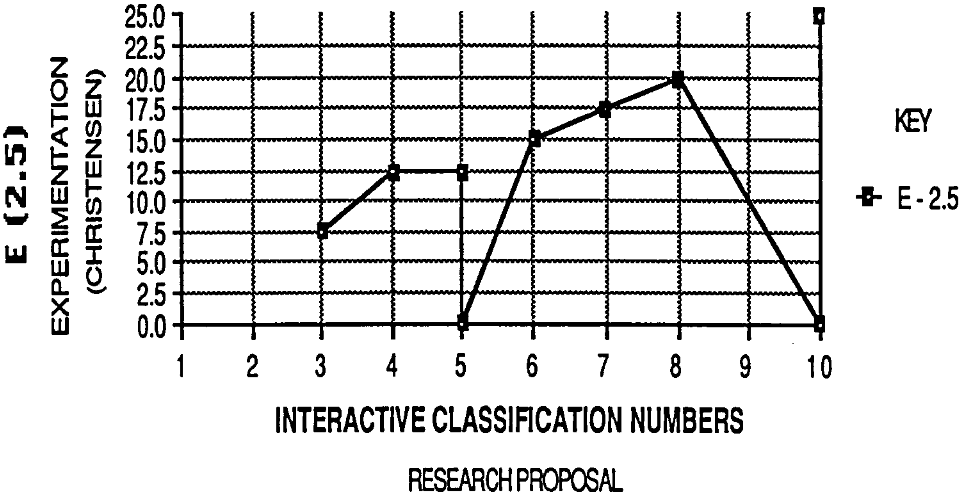


FIGURE 5.3.3.-3 • M.C.S.A.M TEST IN NORWAY N.A.S.P.

Data from "NOR.-M.C.S.A.M.SAMPLE"

6.1.4. FIGURE 5.3.3.-4 shows the different participation of the three identified planning aspects within the different levels of interaction defined by the Interactive Analysis• In the diagram, the numbers **6, 5,** and **4**, are the most equally shared by the three planning aspects suggesting that perhaps the ideal levels of interaction within the Norwegian N.A.S.P. are placed around these interactive numbers•

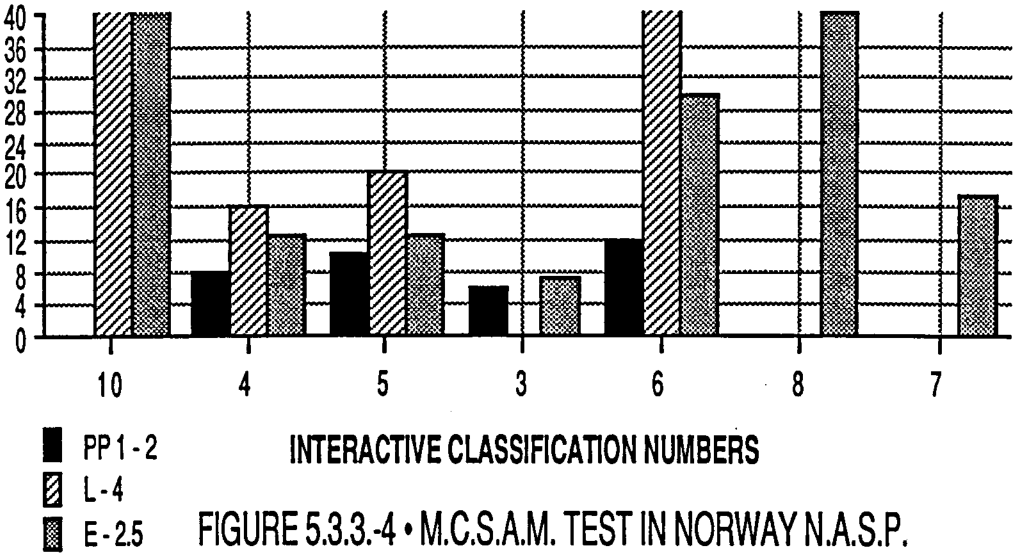


FIGURE 5.3.3.-4 • M.C.S.A.M. TEST IN NORWAY N.A.S.P.

Data from "NOR.-M.C.S.A.M.SAMPLE"

6.1.5. FIGURE 5.3.3.-5 up to FIGURE 5.3.3.-7 where obtained from the Norwegian N.A.S.P. matrix and they show the relationships between the resulting ranking of the entered planning factors and goals, and the three supporting planning theories• FIGURE 5.3.3.-5 shows that within "Forms of Planning" the maximum weight which can be given to the entries is **40**, because the maximum weight within the internal scale of desirability is **4** and the maximum interactive level is **10**• The maximum cumulative weight is **120** because the maximum which can be given within each one of the three supporting planning theories is **40**• In the Norwegian case study the lowest cumulative weight obtained by the planning factors and goals was **21** and the highest was **105**• In the diagram below it is possible to notice that the participation of "Forms of Planning" to the cumulative weight is steadily progressive between the weights **20** and **55**, but after that there are some considerable oscillation of values, which may suggest that concerning to "Forms of Planning" the Norwegian context of planning is more predictable under low cumulative weights, i.e., the planning environment is designed to operate under low levels of planning interaction• This is compatible with the main characteristics of "Planning Policy" previously identified in Norway•

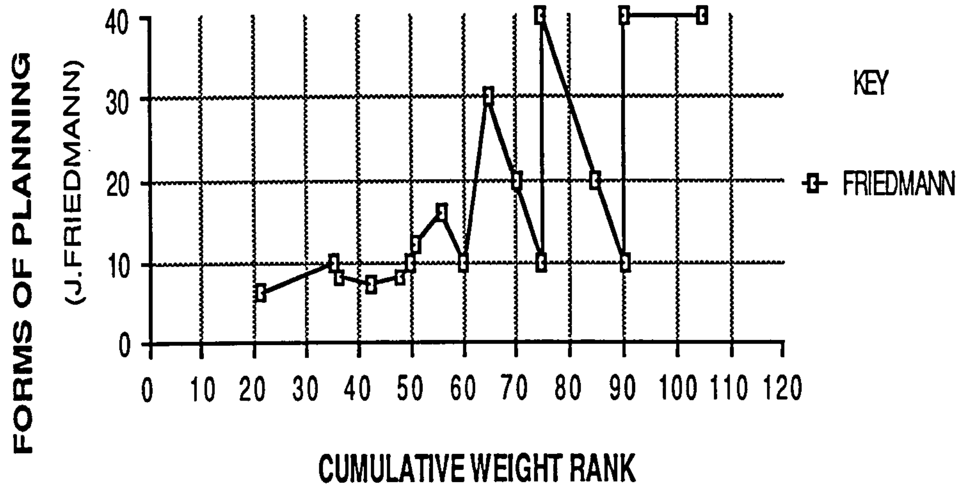


FIGURE 5.3.3.-5 • M.C.S.A.M. TEST IN NORWAY N.A.S.P.

Data from "NOR.-M.C.S.A.M.SAMPLE"

6.1.6. FIGURE 5.3.3.-6 shows that within the "Planning context & Planning methods" the maximum weight is also **40** and it is possible to notice that between the cumulative weights **20** and **60** there is a constant progression in terms of participation of this supporting planning theory to the cumulative weight• After that there are some considerable discontinuity, which may suggest that the Norwegian planning context does not maintain the same balance between the political context and the planning methods when subjected to certain levels of interactive planning practices• This is compatible with the fact that "**P1**" has not been quoted by the matrix, which means there is no possible balance between the simple planning methods and the actual policy practices in Norway•

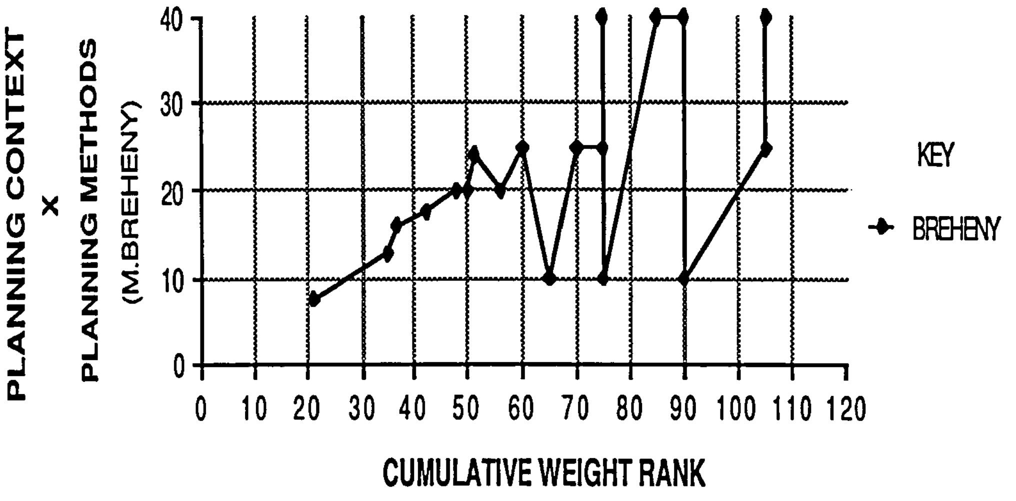


FIGURE 5.3.3.-6 • M.C.S.A.M. TEST IN NORWAY N.A.S.P.

Data from "NOR.-M.C.S.A.M.SAMPLE"

6.1.7. FIGURE 5.3.3.-7 shows that within "Uncertainty in Planning" the maximum weight is **40** and it is possible to notice that between weights **20** and **70** the participation of this supporting planning theory to the cumulative weight is quite constant, but after that there is a considerable oscilation, which may suggest that the Norwegian planning context works reasonably well concerning uncertainty in planning within medium levels of interaction but after that it becomes ineffective• These results seem to be compatible with the fact that "Experimentation" is a dominant characteristic of the Norwegian planning context, whereas "Bargaining" has not been quoted by the matrix•

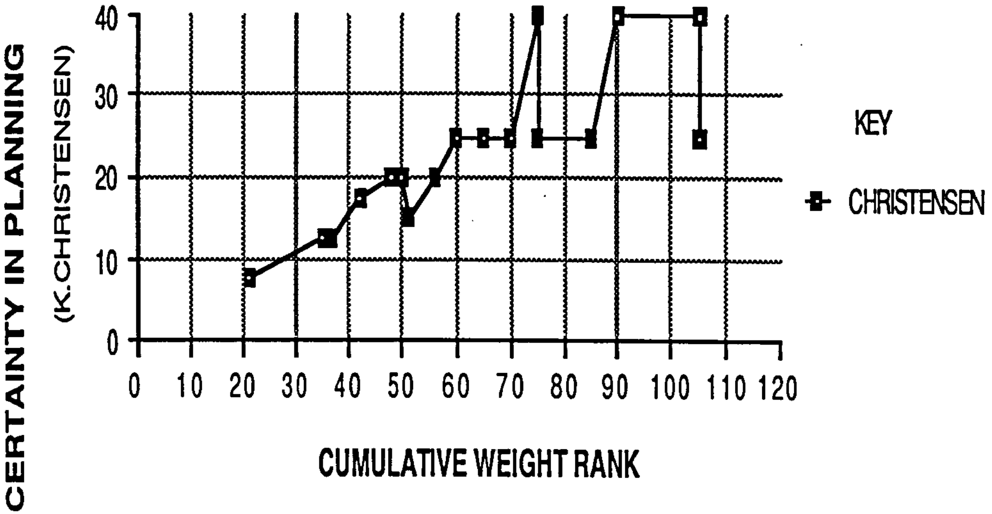


FIGURE 5.3.3.-7 • M.C.S.A.M. TEST IN NORWAY N.A.S.P.

Data from "NOR.-M.C.S.A.M.SAMPLE"

6.1.8. FIGURE 5.3.3-8 shows the major contribution of the three supporting planning theories to the cumulative weight ranking whose maximum weight is **120**• The "Planning context & Planning methods" has given significant contribution to the weights **85, 70, 105**, and **75** of the rank, which means that this particular planning theory has got more influence upon the resulting preferred common planning factors and goals with these cumulative weights• The diagram has shown that in general the Norwegian planning context has been very sensitive to "Planning context & Planning methods" as compared to the other two supporting planning theories, which have given equally less contribution to the cumulative weight rank• These results suggest that the Norwegian planning context is more likely under the roles of "Planning context & Planning methods", and less identified with the roles of "Uncertainty in Planning" and "Forms of Planning"• There is no evidence at all about the advantages ore disadvantages in being partially sensitive to one or to the other supporting planning theory, but it is important to notice that if one is looking for any possible changes within the Norwegian planning context, this diagram shows at least where to act•

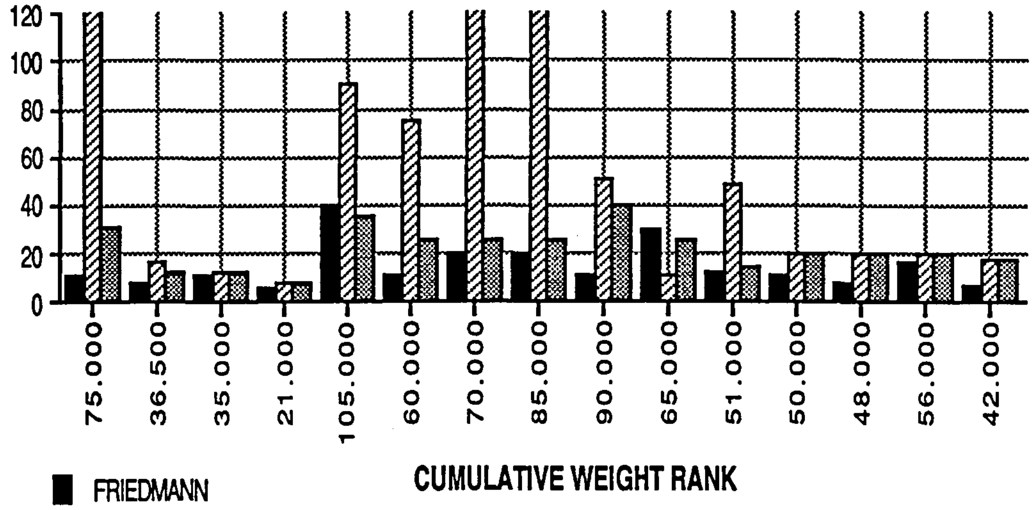


FIGURE 5.3.3.-8 • M.C.S.A.M. TEST IN NORWAY N.A.S.P.

Data from "NOR.-M.C.S.A.M.SAMPLE"

6.1.9. FIGURE 5.3.3.-9 is another representation of the analysis done on the cumulative weight rank and the supporting planning theories in the Norwegian planning context• The diagram shows the variation of the cumulative weight rank which starts with **20** and goes up to **105**• Two points should be noticed; first, is the fact that there is no cumulative weight below **20** which suggest that there is no interactive planning practices below that value in the Norwegian planning context; second, clear the uniform contribution of the three supporting planning theories is up to the cumulative weight **55** approximately, and also there is a clear discontinuity within the contribution given by the "Planning context & planning methods" around the cumulative weight **75**• That can be explained by the fact that there are **5** planning factors and goals with cumulative weight **75** where the "Planning context & Planning methods has contributed with different weights, such as **10**, **25**, and **40**•

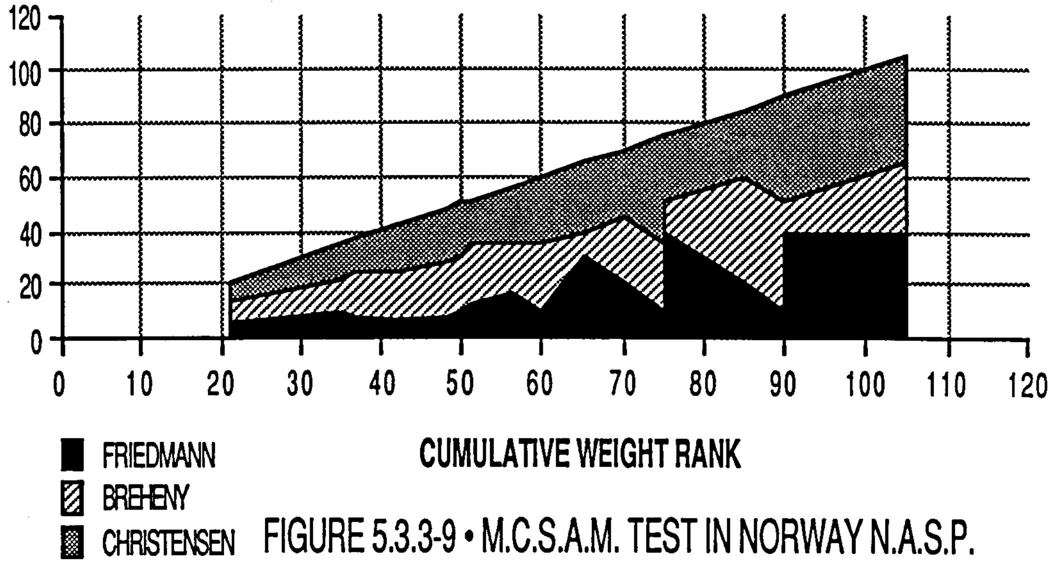


FIGURE 5.3.3-9 • M.C.S.A.M. TEST IN NORWAY N.A.S.P.

Data from "NOR.-M.C.S.A.M.SAMPLE"

6.1.10. The next series of diagrams from FIGURE 5.3.3.-10 up to FIGURE 5.3.3.-12 show the different weights given to the planning factors and goals within the preferred aspects of planning "**PP1**", "**L**", and "**E**"• These aspects of planning have been identified by the Norwegian N.A.S.P. matrix within the three supporting planning theories and the objective is showing the contribution of each one of them to the cumulative weight• The maximum value for the cumulative weight is **120** and the weights of the aspects of planning will vary depending on the internal scale of desirability of each one of the supporting planning theories, and naturally on the interactive number given to each one of the entries• FIGURE 5.3.3.-10 shows the first preferred aspect of planning which is "**PP1**" within "Forms of Planning" and its weight goes up to **20**• The zero values for "**PP1**" means that there is no planning factor and goal quoted within "**PP1**" for these values of cumulative weight, for example; **60, 65, 75,** and **90,** i.e., there is no contribution from "**PP1**" to these values of cumulative weight• Consequently, the other values given to "**PP1**" represents its contribution to the cumulative weight rank or specifically to the planning factors and goals within these values of the cumulative weight rank•

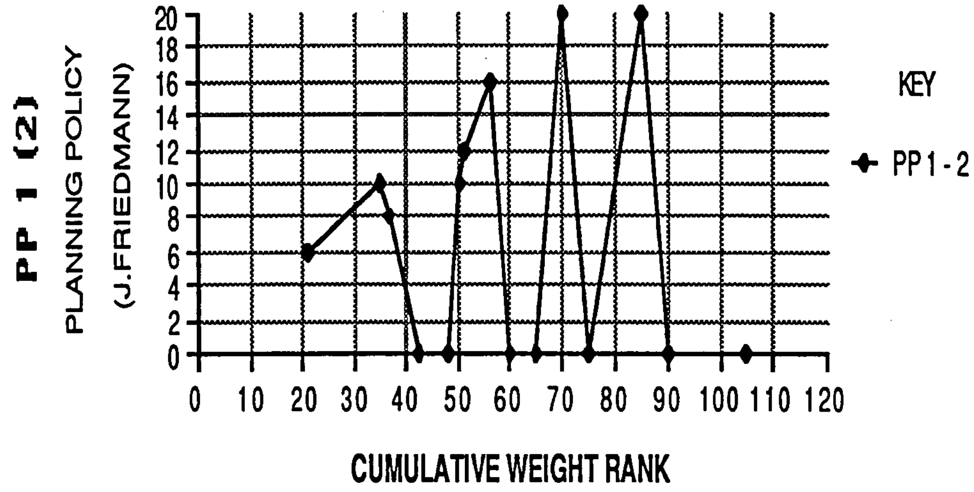


FIGURE 5.3.3.-10 • M.C.S.A.M. TEST IN NORWAY N.A.S.P.

Data from "NOR.-M.C.S.A.M.SAMPLE"

6.1.11. FIGURE 5.3.3.-11 shows the second preferred aspect of planning "**L**" within "Planning context & Planning methods" and its weight goes up to **40**• The diagram shows "why" the planning factors and goals within the Norwegian planning context are so sensitive to the "Planning context & Planning methods"; it is because they have received contribution from "L" which is the highest weight within the internal scale of desirability•

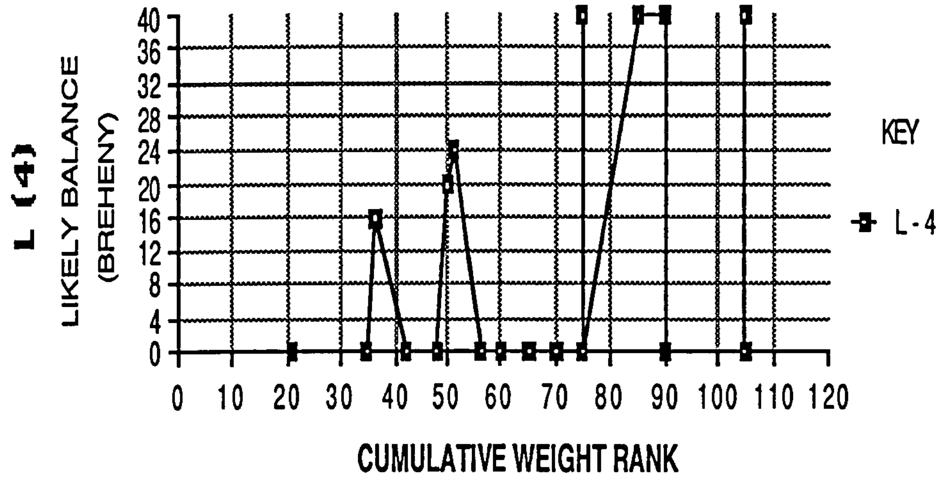


FIGURE 5.3.3.-11 • M.C.S.A.M. TEST IN NORWAY N.A.S.P.

Data from "NOR.-M.C.S.A.M.SAMPLE"

6.1.12. FIGURE 5.3.3.-12 shows the third preferred aspect of planning "E" within the "Uncertainty in Planning" and its weight goes up to **25•**

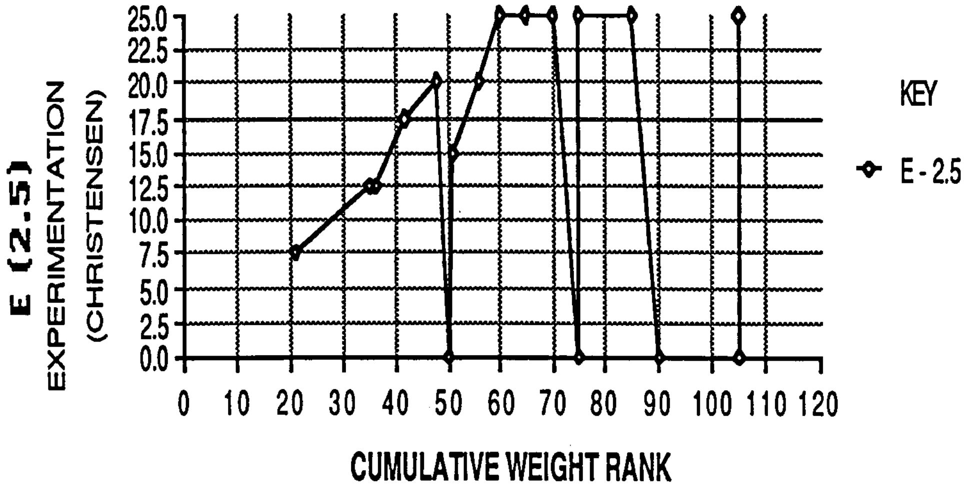


FIGURE 5.3.3.-12 • M.C.S.A.M. TEST IN NORWAY N.A.S.P.

Data from "NOR.-M.C.S.A.M.SAMPLE"

6.1.13. FIGURE 5.3.3.-13 shows the different contribution of the preferred aspects of planning towards the cumulative weight rank• The aspect "L" or "likely balance" from "Planning context & Planning methods" has given a major contribution to the cumulative weights; **75, 85, 51,** and **105,** which means that this particular aspect of planning has a significant influence over the preferred common planning factors and goals with these mentioned cumulative weights•

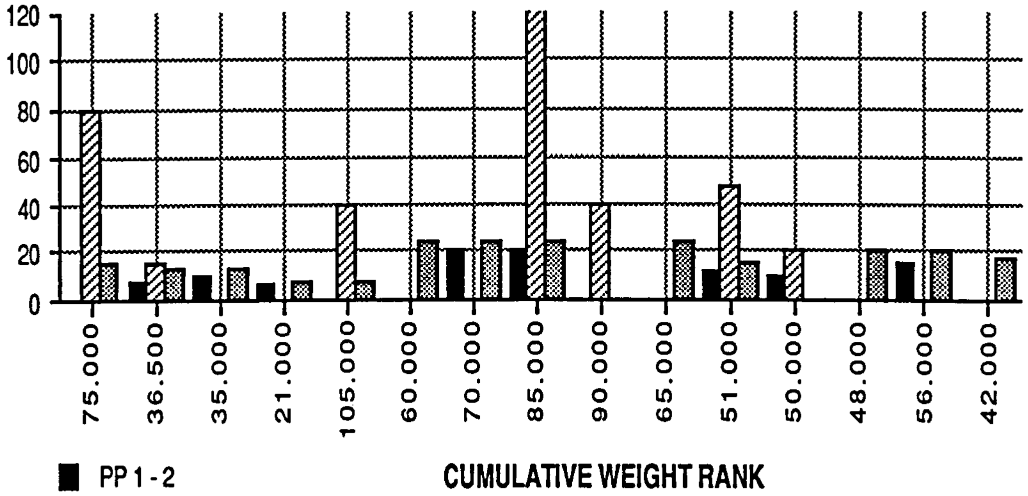


FIGURE 5.3.3.-13 • M.C.S.A.M. TEST IN NORWAY N.A.S.P.

Data from "NOR.-M.C.S.A.M.SAMPLE"

6.1.14. The diagram in FIGURE 5.3.3.-14 shows another representation for the different contribution given by the preferred aspects of planning to the cumulative weight rank• It is clear the major contribution given by all the three aspects to the highest cumulative weights, particularly between **75** and **90**• The discontinuity is due to the fact that each one of the planning factors and goals has received just one weight from the internal scale of desirability within the three supporting planning theories•

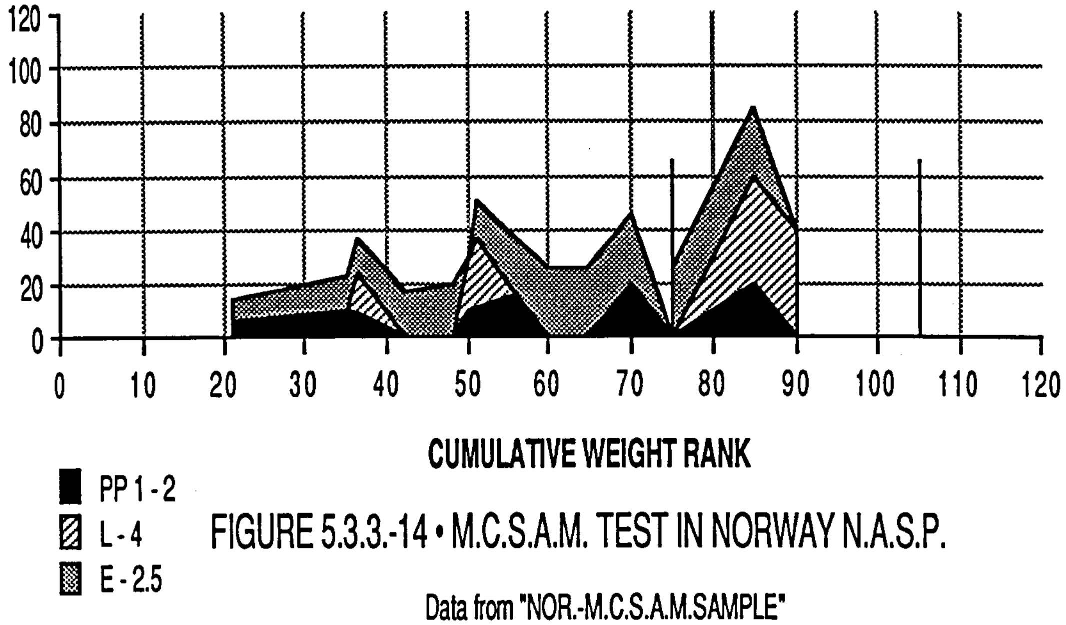


FIGURE 5.3.3.-14 • M.C.S.A.M. TEST IN NORWAY N.A.S.P.

Data from "NOR.-M.C.S.A.M.SAMPLE"

6.1.15. FIGURE 5.3.3.-15 shows the relationships between the interactive classification numbers and the cumulative weight rank within the Norwegian planning context• It is important to notice the discontinuity of the interactive classification numbers specially between the cumulative weights 50 and 60 which means that the planning factors and goals within these weights have been manipulated under a low level of interactive analysis within the Norwegian N.A.S.P. practices•

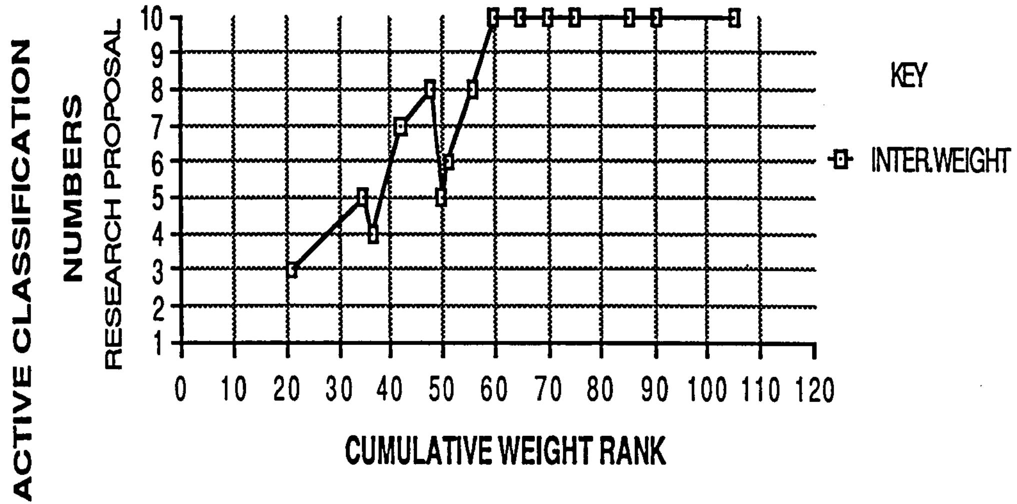


FIGURE 5.3.3.-15 • M.C.S.A.M. TEST IN NORWAY N.A.S.P.

Data from "NOR.-M.C.S.A.M.SAMPLE"

5.3.4. The M.C.S.A.M. application test in the U.S.A. N.A.S.P. and interpretation of the results:

• In this section the results of the M.C.S.A.M. application test in the U.S.A. N.A.S.P. are presented and a matrix has been produced in TABLE 5.3.4.-1, from where their N.A.S.P. methodology framework and their planning context have been identified according to the following analyses:

1. The preferred common planning factors and goals from the U.S.A. N.A.S.P. matrix:

1.1. The cumulative weight rank from the U.S.A. N.A.S.P. matrix or more specifically their preferred common planning factors and goals are identified and interpreted, as follows:

1.1.1. The 32 entered items resulted in 24 ranking groups of entries and the average rank number was 11º•

1.1.2. There is just one with the highest cumulative weight which is the nº 1 or "Accessibility policy" with 110 points•

1.1.3. There is just one with the second highest cumulative weight which is the nº12 or "National airport movement and PAX throughput" with 105 points•

1.1.4. Four received 95 points forming the third place in the rank, which are the highest number of common planning factors and goals within the same group in the rank, and they are:

nº30 or "National travellers characteristics",
nº21 or "National air transport system economic growth",
nº20 or "National fleet composition", and
nº11 or "National airport movement and aircraft movement"

1.1.5. Three received 90 points forming the fourth place in the rank and they are:

nº18 or "National economic growth",
nº9 or "Income per capita", and

nº8 or " G.N.P."

1.1.6. Three received 80 points forming the fifth place in the rank and they are:

nº29 or "National supply policy",
nº24 or " National transport modal split", and
nº15 or " National airport network per city pair number"

1.1.7. There is just one with the lowest cumulative weight under the twenty fourth place in the rank, which is the nº5 or "Federal planning co-ordination" with 3 points•

2. The identification of the U.S.A. N.A.S.P. methodology framework:

2.1. From the analysis of the resulting preferred common planning factors and goals from the U.S.A. N.A.S.P. matrix, it is possible to build up the following framework:

2.1.1. From the operational point of view the U.S.A. N.A.S.P. methodology is heavily dependent on the following factors:

a. pax. and aircraft movement,
b. aircraft fleet and aircraft characteristics, and
c. airport network and spatial distribution of cities.

2.1.2. From the economic point of view the U.S.A. N.A.S.P. methodology is very sensitive to the following indicators:

d. travellers characteristics
e. air transport system economic growth,
f. national income, G.N.P., and economic growth.

2.1.3. From the policy point of view the U.S.A. N.A.S.P. methodology is sensitive to the following issues:

g. accessibility policy (specially sensitive), and
h. national supply policy.

2.1.4. In terms of planning, the U.S.A. N.A.S.P. is less dependent upon any form of central co-ordination, such as:

i. federal planning co-ordination,
j. federal planning implementation policy, and
k. federal planning agencies.

3. The preferred supporting planning theories from the U.S.A. N.A.S.P. matrix:

3.1. In this section the cumulative weight rank given to the preferred supporting planning theories by the U.S.A. N.A.S.P. matrix are identified and interpreted:

3.1.1. Initially the analysis is made on the first supporting planning theory entered into the U.S.A. N.A.S.P. matrix which is "forms of planning", and the "**CP2**" or "corporate planning" is the highest aspect with 315 points• The "**PP2**" or "participatory planning" is the second aspect with 248 points, followed by "**PP1**" or "policies planning", and the last aspect within the forms of planning was "**CP1**" or "central planning"•

3.1.2. The second supporting planning theory entered into the U.S.A. N.A.S.P. matrix is "planning context & planning methods", and the "**L**" or "likely" is the highest aspect with 336 points• The second aspect is "**P2**" or "possible" with 117.5 points, followed by "**P1**" or "possible", and the last aspect within this supporting planning theory was "**V**" or "very unlikely"•

3.1.3. The third supporting planning theory entered into the U.S.A. N.A.S.P. matrix is "uncertainty in planning", and there are two aspects in first place; "**B**" or "bargaining" and "**E**" or "experimentation" both with 290 points• The third place aspect is "**P**" or "programming" with 64 points and the last aspect within "uncertainty in planning" was "**C**" or "chaos"•

4. The interactive analysis of the U.S.A. N.A.S.P. matrix:

4.1. In this section the interactive classification given to the U.S.A. N.A.S.P. planning factors and goals are analysed and interpreted within the other results obtained in the matrix:

4.1.1. Before the matrix calculation, a total of 249 points were given by the interactive system planning analysis to the 32 entered items, which represents an average of 7.78 points per item• After the matrix calculation a total of 1987 weight points were given to the items, with an average of 62.09 weight points to each item• These results will be useful within the forthcoming developed countries comparative analysis•

5. The identification of the planning context and planning environment within which the U.S.A. N.A.S.P. has been practiced:

5.1. The preferred supporting planning theories obtained from the matrix were analysed to produce the following U.S.A. N.A.S.P. Planning Methodology Label:

THE U.S.A. N.A.S.P. LABEL

"The U.S.A. N.A.S.P. methodology has been identified within a highly interactive and corporate planning practices society, with a likely balance between the political context and the adopted planning methods, under a permanent bargaining and experimentation level of uncertainty"•

MULTIDISCIPLINARY ANALYSIS OF AIR TRANSPORT PLANNING METHODOLOGIES

MULTIPLE
CROSS
SYSTEM
ANALYSIS
MATRIX
= **M.C.S.A.M.**

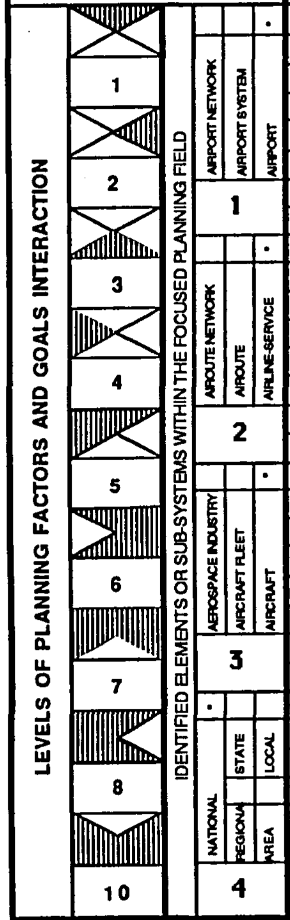
M.C.S.A.M. APPLICATION TEST IN THE U.S.A. N.A.S.P.

INVESTIGATION FIELD	•
APPLICATION FIELD	

FOCUSED PLANNING LEVEL	
NATIONAL	•
REGIONAL	
STATE	
AREA	
LOCAL	

SELECTED PLANNING FACTORS AND GOALS OF THE FOCUSED PLANNING FIELD

INTERACTIVE ANALYSIS



	MULTI-OBJECTIVE PLANNING FACTORS AND GOALS	DIMENSIONAL EXPRESSION	INTERACTIVE COMBINATION SYMBOLS	INTERACTIVE CLASSIFICATION NUMBERS	FORMS OF PLANNING (FRIEDMANN-1973)				PLANNING CONTEXT & PLANNING METHODS (BREHENY-1986)				UNCERTAINTY IN PLANNING (CHRISTENSEN-1985)				INTERACTIVE COMMON FACTORS		COMMENTS
					CP1	PP1	CP2	PP2	V	P2	P1	L	C	B	E	P	CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	
					1	2	3	4	1	2.5	2.5	4	1	2.5	2.5	4			
1	ACCESSIBILITY POLICY	FREQUENCY AND JOURNEY COST		10			30					40				40	110	1°	* HIGHEST CUMULATIVE WEIGH
2	AEROSPACE INDUSTRY PROFITABILITY	ECONOMIC RATIO		4			12					16		10			38	17°	
3	AIRPORT SYSTEM PROFITABILITY	ECONOMIC RATIO		6			15					20		12.5			47.5	14°	
4	AIRLINE SYSTEM PROFITABILITY	ECONOMIC RATIO		3			9					12		7.5			28.5	21°	
5	FEDERAL PLANNING CO-ORDINATION	G-B-M-NA		1	1				1				1				3	24°	• LOWEST CUMULATIVE WEIGH
6	FEDERAL PLANNING IMPLEMENTATION POLICY	G-B-M-NA		6		10			5					12.5			27.5	22°	
7	FEDERAL PLANNING AGENCIES	G-B-M-NA		5	5				5					12.5			22.5	23°	
8	G.N.P.-US$ AND % GROWTH	H-M-L		10				40			25			25			90	4°	
9	INCOME PER CAPITA-US$ AND % GROWTH	H-M-L		10				40			25			25			90	4°	
10	NATIONAL AIRPORT CLASSIFICATION	G-B-M-NA		10		20					25			25			70	7°	
11	NAT.AIRPORT MOVEMENT AND AIRCRAFT MOVEMENT	H-M-L		10			30					40			25		95	3°	
12	NATIONAL AIRPORT MOVEMENT AND PAX THROUGHPUT	H-M-L		10				40				40			25		105	2°	
13	NATIONAL AIRPORT NETWORK- GENERAL NUMBER	H-M-L		8		16			8					20			44	16°	
14	NATIONAL AIRPORT NETWORK PER CATEGORY NUMBER	H-M-L		8		16			8					20			44	16°	
15	NATIONAL AIRPORT NETWORK PER CITY PAIR NUMBER	H-M-L		10			30			25				25			80	5°	
16	NAT.CAPITAL INVESTMENT IN AIRPORT INFRASTRUCT	US$ AND % VARIATION PER YEAR		5	5						12.5			12.5			30	20°	
17	NATIONAL DEMAND TO FLY	PAX MOV.-AIR.MOV./L.F.-AIR.MIX		7				28		17.5					17.5		63	8°	
18	NATIONAL ECONOMIC GROWTH	ECONOMIC RATIO		10				40		25					25		90	4°	
19	NATIONAL ENVIRONMENTAL ISSUE	G-M-B-NA		10		20			10					25			55	11°	
20	NATIONAL FLEET COMPOSITION	A-B-C-D		10			30					40			25		95	3°	
21	NATIONAL AIRTRANSPORT SYSTEM ECONOMIC GROWTH	ECONOMIC RATIO		10			30					40			25		95	3°	
22	NATIONAL AIR SEAT OFFER	NR.SEATS/YEAR AND % VAR.		6		12						24			15		51	13°	
23	NATIONAL AIR SEAT UTILIZATION	NR.SEATS/PAX YEAR AND % VAR.		6		12						24				24	60	9°	
24	NATIONAL TRANSPORT MODAL SPLIT	% 1-% 2-% 3-% 4		10			30			25					25		80	5°	
25	NATIONAL POPULATION GROWTH	NR. INHABITANTS/YEAR AND % VAR.		5			15		5						12.5		32.5	19°	
26	NATIONAL PRICING POLICY	H-M-L-NA		8			24		8					20			52	12°	
27	NATIONAL PROPENSITY TO FLY	NR.INH./NR.SEAT UTIL. AND % VAR.		8		16					20				20		56	10°	
28	NATIONAL SPATIAL DISTRIBUTION	NR.CITY AND AVERAGE DISTANCE		10				40	10						25		75	6°	
29	NATIONAL SUPPLY POLICY	H-M-L-NA		10			30			25					25		80	5°	
30	NATIONAL TRAVELLERS CHARACTERISTICS	BUSINESS-TOURISM-COMMUTER-OTHERS		10			30					40			25		95	3°	
31	PUBLIC PARTICIPATION POLICY	H-M-L-NA		5				20	5					12.5			37.5	18°	
32	DEREGULATION	H-M-L-NA		10	10				10					25			45	15°	
		SUPPORTING	77.8%	249	21	122	315	248	75	117.5	107.5	336	1	290	290	64	1987	-	◄-TOTAL CUMULATIVE WEIGHT
		THEORIES RANK →	-	-	4°	3°	1°	2°	4°	2°	3°	1°	3°	1°	1°	2°	-	11°	◄- AVERAGE COM. FA RANK
		AVERAGE CLASSIFICATION →	-	7.78	5.25	15.25	24.23	0.57	6.8	23.5	21.5	30.5	1	18.12	22.30	32	62.09	-	◄- AVERAGE CUMULATIVE W.

FOCUSED PLANNING HORIZON			
ACTUAL	•	MEDIUM-TERM	
SHORT-TERM		LONG-STRATEGIC	

FOCUSED PLANNING SCENARIO			
CURRENT	•	MEDIUM GROWTH	
HIGH GROWTH		LOW GROWTH	

• THE U.S.A. N.A.S.P. METHODOLOGY HAS BEEN IDENTIFIED WITHIN A HIGHLY INTERACTIVE AND CORPORATE PLANNING PRACTICES SOCIETY WITH A LIKELY BALANCE BETWEEN THE POLITICAL CONTEXT AND THE ADOPTED PLANNING METHODS, UNDER A PERMANENT BARGAINING AND EXPERIMENTATION LEVEL OF UNCERTAINTY •

TABLE 5.3.4-1
THE M.C.S.A.M. APPLICATION TEST IN THE U.S.A. N.A.S.P.
(RESEARCH SOURCE)

5.3.5. The M.C.S.A.M. application test in the United Kingdom N.A.S.P. and interpretation of the results:

• The resulting matrix of the M.C.S.A.M. application test in the U.K. N.A.S.P. is presented in TABLE 5.3.5.-1 from where the methodology framework of the U.K. N.A.S.P. and its planning context have been identified according to the following analyses:

1. The preferred common planning factors and goals from the U.K. N.A.S.P. matrix:

1.1. In this section the cumulative weights rank from the U.K. N.A.S.P. matrix or their preferred common planning factors and goals are identified and interpreted:

1.1.1. The 32 entered items resulted in 14 ranking groups of entries and the average rank number was 7º•

1.1.2. There are two with the highest cumulative weight or 110 points, and they are; nº11 or "National airport movement in terms of aircraft movements" and nº12 or "National airport movement in terms of total passengers throughput"•

1.1.3. There is just one with the second highest cumulative weight which is the nº 20 or "National fleet composition", with 95 points•

1.1.4. Five received 80 points forming the third place in the rank and they are:

nº30 or "National travellers characteristics",
nº29 or "National supply policy",
nº26 or "National pricing policy",
nº23 or "National air seat utilization", and
nº17 or "National demand to fly"

1.1.5. The fourth and fifth places had just one each with 70 and 66.5 points respectively in the rank, and they are:

nº24 or "National transport modal split", and
nº14 or "National airport network per category number"

1.1.6. The nineth place with 55 points had 10 entries and that was the highest number of preferred common entries in the rank•

1.1.7. There is just one with the lowest cumulative weight under the fourteenth place in the rank, which is the nº4 "Airline system profitability" with 28.5 points•

2. The identification of the United Kingdom N.A.S.P. methodology framework:

2.1. After the analysis of the resulting preferred common planning factors and goals from the U.K. N.A.S.P., it is possible to build up the following framework:

2.1.1. From the operational point of view the U.K. N.A.S.P. methodology is heavily dependent on the following factors:

a. national airport movement in terms of aircraft movements,
b. national airport movement in terms of passengers throughput,
c. national fleet composition,
d. national transport modal split, and
e. national airport network per category number.

2.1.2. Despite the fact that the entry nº4 or "Airline system profitability" was the lowest cumulative weight in the rank, it was possible to identified from the economic point of view that the U.K. N.A.S.P. methodology is sensitive to the following indicators:

f. travellers characteristics,
g. national demand to fly, and
h. national air seat utilization.

2.1.3. From the policy point of view the U.K. N.A.S.P. methodology is sensitive to the following issues:

i national pricing policy, and
j. national supply policy.

2.1.4. As far as planning is concerned, it is important to point out the fact that the U.K. N.A.S.P. methodology is very sensitive to the ten identified preferred common planning factors and goals which have been placed in nineth place in the rank, and they are as follows:

k. deregulation,
l. national spatial distribution,
m. national population growth,
n. national economic growth,
o. income per capita,
p. G.N.P. growth,
q. federal planning agencies,
r. federal planning implementation policy,
s. federal planning co-ordination, and
t. accessibility policy.

3. The preferred supporting planning theories from the U.K. N.A.S.P. matrix:

3.1. In this section the cumulative weight rank from the U.K. N.A.S.P. matrix or their preferred supporting planning theories are identified and interpreted:

3.1.1. The first analysis of the U.K. N.A.S.P. preferred supporting planning theories is made over the "forms of planning", and the "**CP2**" or "corporate planning" is the highest aspect with 411 points• The "**PP1**" or "policy planning" is the second aspect with 286 points, and it is interesting to notice that the other two aspects "**CP1**" or "central planning" and "**PP2**" or "participatory planning" have not been quoted within this test•

3.1.2. The second analysis of the U.K. N.A.S.P. preferred supporting planning theories is made on the "planning context & planning methods", and the "**L**" or "likely" is the highest aspect with 224 points• The second aspect is "**P2**" or "possible" with 217.5 points, followed by "**V**" or "very unlikely" and the last aspect within this supporting theory was "**P1**" or "possible"•

3.1.3. The third analysis of the U.K. N.A.S.P. preferred supporting planning theories is made on the "uncertainty in planning", and the "**B**" or "bargaining" is the highest aspect with 317.5 points• The second aspect is "E" or "experimentation" with 315 points• The third and last aspect is "P" or "programming" with 108 points and the "C" or "chaos" has not been quoted in this test•

4. The interactive analysis of the U.K. N.A.S.P. matrix:

4.1. In this section the interactive classification given to the U.K. N.A.S.P. planning factors and goals are analysed and interpreted within the other results obtained in the matrix:

4.1.1. Before the matrix calculation, a total of 280 points were given by the interactive system planning analysis to the 32 entered items, which represents an average of 8.75 points per item• After the matrix calculation a total of 2026.5 weight points were given to the items, with an average of 63.32 weight points to each item• These results will be used to identify the N.A.S.P. methodology realist model within the forthcoming developed countries comparative analysis•

5. The identification of the planning context and planning environment within which the U.K. N.A.S.P. has been practiced:

5.1. The preferred supporting planning theories obtained from the matrix were analysed to produce the following U.K. N.A.S.P. Methodology Label:

THE U.K. N.A.S.P. LABEL

"The U.K. N.A.S.P. methodology has been identified within a highly interactive and planning policy towards a corporate planning practices society with a likely balance between the political context and the adopted planning methods, under almost shared bargaining and experimentation level of uncertainty"•

MULTIDISCIPLINARY ANALYSIS OF AIR TRANSPORT PLANNING METHODOLOGIES

MULTIPLE
CROSS
SYSTEM
ANALYSIS
MATRIX
= **M.C.S.A.M.**

M.C.S.A.M. APPLICATION TEST IN THE UNITED KINGDOM N.A.S.P.

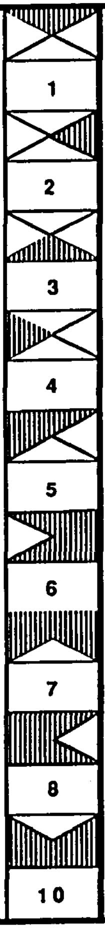
FOCUSED PLANNING LEVEL	
NATIONAL	•
REGIONAL	
STATE	
AREA	
LOCAL	

INVESTIGATION FIELD	•
APPLICATION FIELD	

INTERACTIVE ANALYSIS

SELECTED PLANNING FACTORS AND GOALS OF THE FOCUSED PLANNING FIELD

LEVELS OF PLANNING FACTORS AND GOALS INTERACTION



IDENTIFIED ELEMENTS OR SUB-SYSTEMS WITHIN THE FOCUSED PLANNING FIELD

			•
1	AIRPORT NETWORK	AIRPORT SYSTEM	AIRPORT
			•
2	AIROUTE NETWORK	AIROUTE	AIRLINE-SERVICE
			•
3	AEROSPACE INDUSTRY	AIRCRAFT FLEET	AIRCRAFT
	•		
4	NATIONAL	STATE REGIONAL	LOCAL AREA

	MULTI-OBJECTIVE PLANNING FACTORS AND GOALS	DIMENSIONAL EXPRESSION	INTERACTIVE COMBINATION SYMBOLS	INTERACTIVE CLASSIFICATION NUMBERS	FORMS OF PLANNING (FRIEDMANN-1973)				PLANNING CONTEXT & PLANNING METHODS (BREHENY-1986)				UNCERTAINTY IN PLANNING (CHRISTENSEN-1985)				INTERACTIVE COMMON FACTORS		COMMENTS
					CP1	PP1	CP2	PP2	V	P2	P1	L	C	B	E	P	CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	
					1	2	3	4	1	2.5	2.5	4	1	2.5	2.5	4			
1	ACCESSIBILITY POLICY	FREQUENCY AND JOURNEY COST	▨	10		20			10					25			55	9°	
2	AEROSPACE INDUSTRY PROFITABILITY	ECONOMIC RATIO	▨	4			12					16			10		38	13°	
3	AIRPORT SYSTEM PROFITABILITY	ECONOMIC RATIO	▨	5		10						20			12.5		42.5	12°	
4	AIRLINE SYSTEM PROFITABILITY	ECONOMIC RATIO	▨	3			9					12			7.5		28.5	14°	• LOWEST CUMULATIVE WEIGH
5	FEDERAL PLANNING CO-ORDINATION	G-B-M-NA	▨	10		20			10					25			55	9°	
6	FEDERAL PLANNING IMPLEMENTATION POLICY	G-B-M-NA	▨	10		20			10					25			55	9°	
7	FEDERAL PLANNING AGENCIES	G-B-M-NA	▨	10		20			10					25			55	9°	
8	G.N.P.-US$ AND % GROWTH	H-M-L	▨	10		20			10						25		55	9°	
9	INCOME PER CAPITA-US$ AND % GROWTH	H-M-L	▨	10		20			10					25			55	9°	
10	NATIONAL AIRPORT CLASSIFICATION	G-B-M-NA	▨	7		14					17.5				17.5		49	10°	
11	NAT.AIRPORT MOVEMENT AND AIRCRAFT MOVEMENT	H-M-L	▨	10			30					40				40	110	1°	* HIGHEST CUMULATIVE WEIGH
12	NATIONAL AIRPORT MOVEMENT AND PAX THROUGHPUT	H-M-L	▨	10			30					40				40	110	1°	* HIGHEST CUMULATIVE WEIGH
13	NATIONAL AIRPORT NETWORK-GENERAL NUMBER	H-M-L	▨	7		14						28			17.5		59.5	7°	
14	NATIONAL AIRPORT NETWORK PER CATEGORY NUMBER	H-M-L	▨	7			21					28			17.5		66.5	5°	
15	NATIONAL AIRPORT NETWORK PER CITY PAIR NUMBER	H-M-L	▨	7		14				17.5					17.5		49	10°	
16	NAT.CAPITAL INVESTMENT IN AIRPORT INFRASTRUCT.	US$ AND % VARIATION PER YEAR	▨	7		14				17.5						28	59.5	7°	
17	NATIONAL DEMAND TO FLY	PAX MOV.-AIR.MOV./L.F.-AIR.MIX	▨	10			30			25					25		80	3°	
18	NATIONAL ECONOMIC GROWTH	ECONOMIC RATIO	▨	10		20			10					25			55	9°	
19	NATIONAL ENVIRONMENTAL ISSUE	G-M-B-NA	▨	10			30		10					25			65	6°	
20	NATIONAL FLEET COMPOSITION	A-B-C-D	▨	10			30					40			25		95	2°	
21	NATIONAL AIR-TRANSPORT SYSTEM ECONOMIC GROW.	ECONOMIC RATIO	▨	10			30		10						25		65	6°	
22	NATIONAL AIR SEAT OFFER	NR.SEATS/YEAR AND % VAR.	▨	6			18			15					15		48	11°	
23	NATIONAL AIR SEAT UTILIZATION	NR.SEATS/PAX YEAR AND % VAR.	▨	10			30			25					25		80	3°	
24	NATIONAL TRANSPORT MODAL SPLIT	% 1-% 2-% 3-% 4	▨	10		20				25					25		70	4°	
25	NATIONAL POPULATION GROWTH	NR. INHABITANTS/YEAR AND % VAR.	▨	10		20			10					25			55	9°	
26	NATIONAL PRICING POLICY	H-M-L-NA	▨	10			30			25				25			80	3°	
27	NATIONAL PROPENSITY TO FLY	NR.INH./NR.SEAT UTIL. AND % VAR.	▨	7			21			17.5				17.5			56	8°	
28	NATIONAL SPATIAL DISTRIBUTION	NR.CITY AND AVERAGE DISTANCE	▨	10		20			10						25		55	9°	
29	NATIONAL SUPPLY POLICY	H-M-L-NA	▨	10			30			25					25		80	3°	
30	NATIONAL TRAVELLERS CHARACTERISTICS	BUSINESS-TOURISM-COMMUTER-OTHERS	▨	10			30			25				25			80	3°	
31	PUBLIC PARTICIPATION POLICY	H-M-L-NA	▨	10			30		10					25			65	6°	
32	DEREGULATION	H-M-L-NA	▨	10		20			10					25			55	9°	
	FOCUSED PLANNING SCENARIO	SUPPORTING THEORIES RANK →	87.5%	280	-	286	411	-	130	217.5	17.5	224	-	317.5	315	108	2026.5	-	◄-TOTAL CUMULATIVE WEIGHT
			-	-	-	2°	1°	-	3°	2°	4°	1°	-	1°	2°	3°	-	7°	◄- AVERAGE COM. FA. RANK
		AVERAGE CLASSIFICATION →	-	8.75	-	17.87	25.68	-	10	21.75	17.5	28	-	24.42	19.68	36	63.32	-	◄- AVERAGE CUMULATIVE W.

FOCUSED PLANNING HORIZON

ACTUAL	•	MEDIUM-TERM	
SHORT-TERM		LONG-STRATEGIC	

FOCUSED PLANNING SCENARIO

CURRENT	•	MEDIUM GROWTH	
HIGH GROWTH		LOW GROWTH	

• THE U.K. N.A.S.P. METHODOLOGY HAS BEEN IDENTIFIED WITHIN A HIGHLY INTERACTIVE AND PLANNING POLICY TOWARDS A CORPORATE PLANNING PRACTICES SOCIETY WITH A LIKELY BALANCE BETWEEN THE POLITICAL CONTEXT AND THE ADOPTED PLANNING METHODS, UNDER ALMOST EQUALLY SHARED BARGAINING AND EXPERIMENTATION LEVEL OF UNCERTAINTY •

TABLE 5.3.5-1
THE M.C.S.A.M. APPLICATION IN THE U.K. N.A.S.P.
(RESEARCH SOURCE)

5.3.6. The M.C.S.A.M. application test in the Federal Republic of Germany N.A.S.P. and interpretation of the results:

• The resulting matrix of the M.C.S.A.M. application test in the Federal Republic of Germany N.A.S.P. is now presented through TABLE 5.3.6.-1, from where the framework of its N.A.S.P. methodology has been identified as follows:

1. The preferred common planning factors and goals from the Federal Republic of Germany N.A.S.P. matrix:

1.1. In this section the cumulative weight rank from the F.R.Germany N.A.S.P. matrix or their preferred common planning factors and goals are identified and interpreted:

1.1. The 32 entered items resulted in 17 ranking groups of entries and the average rank number was 8º•

1.2. There is one with the highest cumulative weight or 95 points, which is the nº1 or "Accessibility policy"•

1.3. There are three with 90 points in the second highest cumulative weight rank, which are; nº31 or "Public participation policy", nº25 or "National population growth", and nº18 or "National economic growth"•

1.4. Four received 80 points forming the third place in the rank and they are:

nº32 or "Deregulation",
nº30 or "National travellers characteristics",
nº21 or "National air transport system economic growth", and
nº20 or "National fleet composition".

1.5. The fourth place had three entries with 75 points in the rank and they are:

nº19 or "National environmental issues",
nº9 or "Income per capita", and
nº8 or "G.N.P. growth".

1.6. The tenth place with 48 points had 5 entries and that was the highest number of preferred common entries within the same group in the rank, and they are:

nº29 or "National supply policy",
nº27 or "National propensity to fly",
nº23 or "National air seat utilization",
nº22 or "National air seat offer", and
nº17 or "National demand to fly".

1.7. There just one with the lowest cumulative weight under the seventeen place in the rank, which is the nº6 or "Federal planning implementation policy"•

2. The identification of the Federal Republic of Germany N.A.S.P. methodology framework:

2.1. After the analysis of the resulting preferred common planning factors and goals from the F.R.G. N.A.S.P. matrix, it is possible to build up the following framework:

2.1.1. From the operational point of view the F.R.G. N.A.S.P. methodology is heavily dependent on the following factors:

a. national fleet composition,
b. national air seat offer, and
c. national air seat utilization.

2.1.2. Despite the fact that "national population growth" is not a problem in F.R.Germany, this is still one of the main aspect identified by the matrix as concerned to the economic point of view within their N.A.S.P. methodology framework, and the following indicators have been identified:

d. national population growth,
e. national travellers characteristics,
f. national air transport system economic growth,
g. income per capita,
h. G.N.P. growth,
i. national propensity to fly, and

j. national demand to fly.

2.1.3. From the policy point of view the F.R.Germany N.A.S.P. methodology is very sensitive to some of the most controversial and difficult planning issues such as:

k. accessibility policy,
l. national participation policy,
m. national environmental policy, and
n. national supply policy.

2.1.4. From the planning point of view the F.R.Germany N.A.S.P. methodology framework has shown that they are not so dependent upon the "federal planning implementation policy" due to their political and economic organization as far as their organization of Länders(states) are concerned•

3. The preferred supporting planning theories from the Federal Republic of Germany N.A.S.P. matrix:

3.1. In this section the cumulative weight rank from the F.R.Germany N.A.S.P. matrix or their preferred supporting planning theories are identified and interpreted:

3.1.1. The first analysis of the F.R.G. N.A.S.P. preferred supporting planning theories is made on the "forms of planning", and the "**PP2**" or "participatory planning" is the highest aspect with 288 points• The "**CP2**" or "corporate planning" is the second aspect with 270 points and the "**PP1**" or "planning policy" is the third aspect with 154 points, and the "**CP1**" or "central planning" has not been quoted by the matrix•

3.1.2. The second analysis of the preferred supporting planning theories within the F.R.G. N.A.S.P. matrix is done on the "planning context & planning methods", and the "P2" or "possible balance" is the highest aspect with 350 points• The second aspect is "**V**" or "very unlikely balance" with 82 points and "**L**" or "likely balance" is the third aspect with 52 points• The "P1" or "possible balance within very complex political context" has not been quoted by the matrix•

3.1.3. The third analysis done on the F.R.Germany N.A.S.P. preferred supporting planning theories was the "uncertainty in planning", and "**E**" or "experimentation" was the highest aspect with 257.5 points• The second aspect was "**B**" or "bargaining" with 210 points and "**P**" or "programming" was the third aspect with 208 points• The "**C**" or "chaos" has not been quoted by the F.R.Germany N.A.S.P. matrix•

4. The interactive analysis of the F.R.Germany N.A.S.P. matrix:

4.1. In this section the interactive classification given to the F.R.Germany N.A.S.P. planning factors and goals is analysed and interpreted within the other results obtained in the matrix:

4.1.1. Before the matrix calculation, a total of 239 points were given by the interactive system planning analysis to the 32 entered items, which represents an average of 7.46 points per item• After the matrix calculation a total of 1871.5 points were given to the items, with an average of 58.48 points per item• These results will be applied to identify the N.A.S.P. methodology realist model within the forthcoming developed countries comparative analysis•

5. The identification of the planning context and planning environment within which the F.R.Germany N.A.S.P. has been practiced:

5.1. The preferred supporting planning theories obtained from the matrix were analysed to produce the following F.R.Germany N.A.S.P. Methodology Label:

THE FED.REP. OF GERMANY N.A.S.P. LABEL

"The FED.REP. OF GERMANY N.A.S.P. methodology has been identified within a highly interactive and more likely participatory planning practices society, with a possible balance between the limited political context and the slightly complex planning methods which have been adopted under a constant experimentation level of uncertainty"•

MULTIDISCIPLINARY ANALYSIS OF AIR TRANSPORT PLANNING METHODOLOGIES

MULTIPLE
CROSS
SYSTEM
ANALYSIS
MATRIX
= **M.C.S.A.M.**

M.C.S.A.M. APPLICATION TEST IN THE FED. REP. OF GERMANY N.A.S.P.

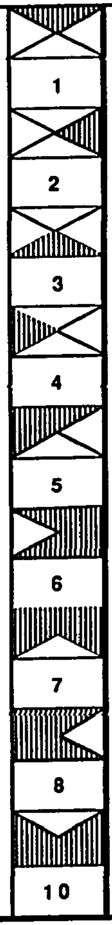
INVESTIGATION FIELD	•
APPLICATION FIELD	

FOCUSED PLANNING LEVEL	
NATIONAL	•
REGIONAL	
STATE	
AREA	
LOCAL	

SELECTED PLANNING FACTORS AND GOALS OF THE FOCUSED PLANNING FIELD

INTERACTIVE ANALYSIS

LEVELS OF PLANNING FACTORS AND GOALS INTERACTION



IDENTIFIED ELEMENTS OR SUB-SYSTEMS WITHIN THE FOCUSED PLANNING FIELD

1	AIRPORT NETWORK	AIRPORT SYSTEM	• AIRPORT
2	AIROUTE NETWORK	AIROUTE	• AIRLINE-SERVICE
3	AEROSPACE INDUSTRY	AIRCRAFT FLEET	• AIRCRAFT
4	• NATIONAL REGIONAL	STATE	LOCAL AREA

	MULTI-OBJECTIVE PLANNING FACTORS AND GOALS	DIMENSIONAL EXPRESSION	INTERACTIVE COMBINATION SYMBOLS	INTERACTIVE CLASSIFICATION NUMBERS	FORMS OF PLANNING (FRIEDMANN-1973)				PLANNING CONTEXT & PLANNING METHODS (BREHENY-1986)				UNCERTAINTY IN PLANNING (CHRISTENSEN-1985)				INTERACTIVE COMMON FACTORS		COMMENTS
					CP1	PP1	CP2	PP2	V	P2	P1	L	C	S	E	P	CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	
					1	2	3	4	1	2.5	2.5	4	1	2.5	2.5	4			
1	ACCESSIBILITY POLICY	FREQUENCY AND JOURNEY COST		10			30			25						40	95	1°	* HIGHEST CUMULATIVE WEIGH
2	AEROSPACE INDUSTRY PROFITABILITY	ECONOMIC RATIO		4		8						16				16	40	14°	
3	AIRPORT SYSTEM PROFITABILITY	ECONOMIC RATIO		5		10				12.5				12.5			35	15°	
4	AIRLINE SYSTEM PROFITABILITY	ECONOMIC RATIO		3			9					12				12	33	16°	
5	FEDERAL PLANNING CO-ORDINATION	G-B-M-NA		5		10						20		12.5			42.5	12°	
6	FEDERAL PLANNING IMPLEMENTATION POLICY	G-B-M-NA		5		10						4		12.5			26.5	17°	• LOWEST CUMULATIVE WEIGH
7	FEDERAL PLANNING AGENCIES	G-B-M-NA		5				20	5							20	45	11°	
8	G.N.P.-US$ AND % GROWTH	H-M-L		10				40	10					25			75	4°	
9	INCOME PER CAPITA-US$ AND % GROWTH	H-M-L		10				40	10					25			75	4°	
10	NATIONAL AIRPORT CLASSIFICATION	G-B-M-NA		5		10				12.5					12.5		35	15°	
11	NAT.AIRPORT MOVEMENT AND AIRCRAFT MOVEMENT	H-M-L		5		10				12.5					12.5		35	15°	
12	NATIONAL AIRPORT MOVEMENT AND PAX THROUGHPUT	H-M-L		5		10				12.5				12.5			35	15°	
13	NATIONAL AIRPORT NETWORK- GENERAL NUMBER	H-M-L		7			21			17.5					17.5		56	6°	
14	NATIONAL AIRPORT NETWORK PER CATEGORY NUMBER	H-M-L		7		14				17.5				17.5			49	9°	
15	NATIONAL AIRPORT NETWORK PER CITY PAIR NUMBER	H-M-L		6		12				15					15		42	13°	
16	NAT.CAPITAL INVESTMENT IN AIRPORT INFRASTRUCT.	US$ AND % VARIATION PER YEAR		7				28	7					17.5			52.5	8°	
17	NATIONAL DEMAND TO FLY	PAX MOV.-AIR.MOV./L.F.-AIR.MIX		6			18			15					15		48	10°	
18	NATIONAL ECONOMIC GROWTH	ECONOMIC RATIO		10				40	10							40	90	2°	
19	NATIONAL ENVIRONMENTAL ISSUE	G-M-B-NA		10				40	10					25			75	4°	
20	NATIONAL FLEET COMPOSITION	A-B-C-D		10			30			25					25		80	3°	
21	NATIONAL AIR-TRANSPORT SYSTEM ECONOMIC GROW.	ECONOMIC RATIO		10			30			25					25		80	3°	
22	NATIONAL AIR SEAT OFFER	NR.SEATS/YEAR AND % VAR.		6			18			15					15		48	10°	
23	NATIONAL AIR SEAT UTILIZATION	NR.SEATS/PAX YEAR AND % VAR.		6			18			15					15		48	10°	
24	NATIONAL TRANSPORT MODAL SPLIT	% 1-% 2-% 3-% 4		10		20				25					25		70	5°	
25	NATIONAL POPULATION GROWTH	NR. INHABITANTS/YEAR AND % VAR.		10				40	10							40	90	2°	
26	NATIONAL PRICING POLICY	H-M-L-NA		10		20				25					25		70	5°	
27	NATIONAL PROPENSITY TO FLY	NR.INH./NR.SEAT UTIL. AND % VAR.		6			18			15					15		48	10°	
28	NATIONAL SPATIAL DISTRIBUTION	NR.CITY AND AVERAGE DISTANCE		10		20			10					25			55	7°	
29	NATIONAL SUPPLY POLICY	H-M-L-NA		6			18			15					15		48	10°	
30	NATIONAL TRAVELLERS CHARACTERISTICS	BUSINESS-TOURISM-COMMUTER-OTHERS		10			30			25					25		80	3°	
31	PUBLIC PARTICIPATION POLICY	H-M-L-NA		10				40	10							40	90	2°	
32	DEREGULATION	H-M-L-NA		10			30			25				25			80	3°	
	FOCUSED PLANNING SCENARIO	SUPPORTING THEORIES RANK →	74.6%	239	-	154	270	288	82	350	-	52	-	210	257.5	208	1871.5	-	← TOTAL CUMULATIVE WEIGHT
			-	-	-	3°	2°	1°	2°	1°	-	3°	-	2°	1°	3°	-	8°	← AVERAGE COM. FA. RANK
		AVERAGE CLASSIFICATION →	-	7.46	-	12.83	22.5	36	9.11	18.42	-	13	-	19.09	18.39	29.7	58.48	-	← AVERAGE CUMULATIVE W

FOCUSED PLANNING HORIZON			
ACTUAL	•	MEDIUM-TERM	
SHORT-TERM		LONG-STRATEGIC	

FOCUSED PLANNING SCENARIO			
CURRENT	•	MEDIUM GROWTH	
HIGH GROWTH		LOW GROWTH	

• THE F.R.G. N.A.S.P. METHODOLOGY HAS BEEN IDENTIFIED WITHIN A HIGHLY INTERACTIVE AND MORE LIKELY PARTICIPATORY PLANNING PRACTICES SOCIETY WITH A POSSIBLE BALANCE BETWEEN THE LIMITED POLITICAL CONTEXT AND THE SLIGHTLY COMPLEX PLANNING METHODS, WHICH HAVE BEEN ADOPTED UNDER A CONSTANT EXPERIMENTATION LEVEL OF UNCERTAINTY•

TABLE 5.3.6.-1
THE M.C.S.A.M. APPLICATION TEST IN THE FEDERAL REPUBLIC OF GERMANY N.A.S.P.
(RESEARCH SOURCE)

5.3.7. The M.C.S.A.M. application test in the Canada N.A.S.P. and interpretation of the results:

• The resulting matrix of the M.C.S.A.M. application test in the Canadian N.A.S.P. is presented in TABLE 5.3.7.-1 from where the framework of its N.A.S.P. methodology, and also their planning context were identified, as follows:

1. The preferred common planning factors and goals from the Canada N.A.S.P. matrix:

1.1. In this section the cumulative weight rank from the Canada N.A.S.P. matrix or their preferred common planning factors and goals are identified and interpreted:

1.1.1. The 32 entered items resulted in 19 ranking groups of entries and the average rank number was 8º•

1.1.2. There are two with the highest cumulative weight or 120 points, and they are; nº7 or "Federal planning agencies" and nº6 or "Federal planning implementation policy"•

1.1.3. There is just one with the second highest cumulative weight which is the nº25 or "National population growth", with 100 points•

1.1.4. Two entries received 95 points forming the third place in the rank and they are:

nº30 or "National travellers characteristics", and
nº20 or "National fleet composition".

1.1.5. The fourth place had just one with 85 points in the rank and it is the nº21 or "National air transport system economic growth"•

1.1.6. The fifth and the sixth place in the cumulative rank with 80 and 70 points respectively, are the two major groups of five preferred common planning factors each, and they are as follows:

nº27 or "National propensity to fly",

nº17 or "National demand to fly",
nº9 or "Income per capita",
nº8 or "G.N.P. growth",
nº5 or "Federal planning co-ordination",
nº32 or "Deregulation",
nº31 or "Public participation policy",
nº26 or "National pricing policy",
nº24 or "National transport modal split", and
nº19 or "National environmental issue".

1.1.7. There is just one entry with the lowest cumulative weight under the nineteenth place in the rank with 28.5 points, which is the nº4 or "Airline system profitability"•

2. The identification of the Canada N.A.S.P. methodology framework:

2.1. After the analysis of the resulting preferred common planning factors and goals from the Canadian N.A.S.P. matrix, it is possible to build up the following framework:

2.1.1. From the operational point of view the Canada N.A.S.P. methodology framework is heavily dependent on the following factors:

a. national fleet composition, and
b. national transport modal split.

2.1.2. From the economic point of view the Canada N.A.S.P. methodology framework has been based upon the following indicators:

c. national population growth,
d. national travellers characteristics,
e. national air transport system economic growth,
f. national propensity to fly,
g. national demand to fly.
h. income per capita, and
i. G.N.P. growth,

2.1.3. From the policy point of view the Canada N.A.S.P. methodology framework is heavily sensitive to the following issues;

j. public participation policy,
k. national pricing policy, and
l. national environment issue.

2.1.4. From the planning point of view the Canada N.A.S.P. methodology framework has been heavily based upon the following aspects:

m. federal planning agencies,
n. federal implementation policy,
o. federal planning co-ordination, and
p. deregulation.

3. The preferred supporting planning theories from the Canada N.A.S.P. matrix:

3.1. In this section the cumulative weight rank from the Canadian N.A.S.P. matrix or their preferred supporting planning theories are identified and interpreted:

3.1.1. The first analysis of the Canada N.A.S.P. preferred supporting planning theories is made on the "forms of planning", and the "**CP2**" or "corporate planning" is the highest aspect with 372 points• The "**PP1**" or "policy planning" is the second aspect with 196 points, and the "**PP2**" or "participatory planning" with 80 points is the third aspect, with the "**CP1**" or "central planning" coming in last place of the rank with 27 points•

3.1.2. The second analysis of the Canada N.A.S.P. preferred supporting planning theories is made on the "planning context & planning methods", and the "**L**" or "likely balance" is the highest aspect with 392 points• The second aspect is "**P1**" or "possible balance" with 222.5 points, follow by "**P2**" or "possible balance" with 155 points, and the last aspect within this supporting planning theory was "**V**" or "very unlikely balance" with 20 points in the rank•

3.1.3. The third analysis of the Canada N.A.S.P. preferred supporting planning theories is made on the "uncertainty in planning", and the "**B**" or "bargaining" is the highest aspect with 292.5 points• The second aspect is "**E**" or "experimentation" with 260 points• The third and last aspect is "**P**" or "programming" with 192 points• The aspect "**C**" or "chaos" has not been quoted by the matrix•

4. The interactive analysis from the Canada N.A.S.P. matrix:

4.1. In this section the interactive classification given to the Canada N.A.S.P. planning factors and goals are analysed and interpreted within the other results obtained in the matrix:

4.1.1. Before the matrix calculation a total of 269 points were given by the interactive system planning analysis to the 32 entered items, which represents an average of 8.4 points per item• After the matrix calculation a total of 2209 weight points were given to the items, with an average of 69.03 weight points to each item• These results will be used to identify the N.A.S.P. methodology realist model within the forthcoming developed countries comparative analysis•

5. The identification of the planning context and planning environment within which the Canada N.A.S.P. has been practiced:

5.1. The preferred supporting planning theories obtained from the matrix were analysed to produce the following Canada N.A.S.P. Methodology Label:

THE CANADA N.A.S.P. LABEL

"The CANADA N.A.S.P. methodology has been identified within a highly interactive and corporate planning practices society with a likely balance between the political context and the adopted planning methods, under a constant bargaining level of uncertainty"•

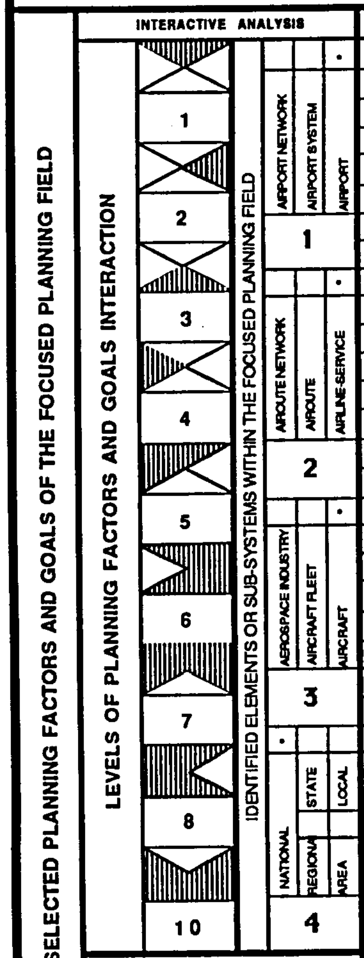
MULTIDISCIPLINARY ANALYSIS OF AIR TRANSPORT PLANNING METHODOLOGIES

MULTIPLE
CROSS
SYSTEM
ANALYSIS
MATRIX
= **M.C.S.A.M.**

M.C.S.A.M APPLICATION TEST IN THE CANADA N.A.S.P.

INVESTIGATION FIELD	•
APPLICATION FIELD	

FOCUSED PLANNING LEVEL	
NATIONAL	•
REGIONAL	
STATE	
AREA	
LOCAL	



	MULTI-OBJECTIVE PLANNING FACTORS AND GOALS	DIMENSIONAL EXPRESSION	INTERACTIVE COMBINATION SYMBOLS	INTERACTIVE CLASSIFICATION NUMBERS	FORMS OF PLANNING (FRIEDMANN-1973) CP1	PP1	CP2	PP2	PLANNING CONTEXT X PLANNING METHODS (BREHENY-1986) V	P 2	P 1	L	UNCERTAINTY IN PLANNING (CHRISTENSEN-1985) C	B	E	P	CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	COMMENTS
					1	2	3	4	1	2.5	2.5	4	1	2.5	2.5	4			
1	ACCESSIBILITY POLICY	FREQUENCY AND JOURNEY COST		10	10						25				25		60	10º	
2	AEROSPACE INDUSTRY PROFITABILITY	ECONOMIC RATIO		4			12			10					10		32	18º	
3	AIRPORT SYSTEM PROFITABILITY	ECONOMIC RATIO		5		10				12.5					12.5		35	17º	
4	AIRLINE SYSTEM PROFITABILITY	ECONOMIC RATIO		3			9					12			7.5		28.5	19º	• LOWEST CUMULATIVE WEIGH.
5	FEDERAL PLANNING CO-ORDINATION	G-B-M-NA		10			30				25				25		80	5º	
6	FEDERAL PLANNING IMPLEMENTATION POLICY	G-B-M-NA		10				40				40				40	120	1º	* HIGHEST CUMULATIVE WEIGH
7	FEDERAL PLANNING AGENCIES	G-B-M-NA		10				40				40				40	120	1º	* HIGHEST CUMULATIVE WEIGH
8	G.N.P.-US$ AND % GROWTH	H-M-L		10			30				25			25			80	5º	
9	INCOME PER CAPITA-US$ AND % GROWTH	H-M-L		10			30				25			25			80	5º	
10	NATIONAL AIRPORT CLASSIFICATION	G-B-M-NA		5		10					12.5					20	42.5	15º	
11	NAT.AIRPORT MOVEMENT AND AIRCRAFT MOVEMENT	H-M-L		7			21					28			17.5		66.5	8º	
12	NATIONAL AIRPORT MOVEMENT AND PAX THROUGHPUT	H-M-L		7			21					28			17.5		66.5	8º	
13	NATIONAL AIRPORT NETWORK- GENERAL NUMBER	H-M-L		8		16						32			20		68	7º	
14	NATIONAL AIRPORT NETWORK PER CATEGORY NUMBER	H-M-L		7			21				17.5				17.5		56	11º	
15	NATIONAL AIRPORT NETWORK PER CITY PAIR NUMBER	H-M-L		7			21				17.5					28	66.5	8º	
16	NAT.CAPITAL INVESTMENT IN AIRPORT INFRASTRUCT.	US$ AND % VARIATION PER YEAR		7	7					17.5					17.5		42	16º	
17	NATIONAL DEMAND TO FLY	PAX MOV.-AIR.MOV./L.F.-AIR.MIX		10			30			25				25			80	5º	
18	NATIONAL ECONOMIC GROWTH	ECONOMIC RATIO		10	10				10					25			45	14º	
19	NATIONAL ENVIRONMENTAL ISSUE	G-M-B-NA		10		20					25			25			70	6º	
20	NATIONAL FLEET COMPOSITION	A-B-C-D		10			30					40			25		95	3º	
21	NATIONAL AIR-TRANSPORT SYSTEM ECONOMIC GROW.	ECONOMIC RATIO		10		20						40			25		85	4º	
22	NATIONAL AIR SEAT OFFER	NR.SEATS/YEAR AND % VAR.		6			18			15					15		48	13º	
23	NATIONAL AIR SEAT UTILIZATION	NR.SEATS/PAX YEAR AND % VAR.		7			21					28		17.5			66.5	8º	
24	NATIONAL TRANSPORT MODAL SPLIT	% 1-% 2-% 3-% 4		10		20					25			25			70	6º	
25	NATIONAL POPULATION GROWTH	NR. INHABITANTS/YEAR AND % VAR.		10		20						40				40	100	2º	
26	NATIONAL PRICING POLICY	H-M-L-NA		10		20				25				25			70	6º	
27	NATIONAL PROPENSITY TO FLY	NR.INH./NR.SEAT UTIL. AND % VAR.		10			30			25				25			80	5º	
28	NATIONAL SPATIAL DISTRIBUTION	NR.CITY AND AVERAGE DISTANCE		10		20			10					25			55	12º	
29	NATIONAL SUPPLY POLICY	H-M-L-NA		6			18					24				24	66	9º	
30	NATIONAL TRAVELLERS CHARACTERISTICS	BUSINESS-TOURISM-COMMUTER-OTHERS		10			30					40			25		95	3º	
31	PUBLIC PARTICIPATION POLICY	H-M-L-NA		10		20					25			25			70	6º	
32	DEREGULATION	H-M-L-NA		10		20				25				25			70	6º	
		SUPPORTING THEORIES RANK	84.0%	269	27	196	372	80	20	155	222.5	392	-	292.5	260	192	2209	-	◄-TOTAL CUMULATIVE WEIGHT
		→	-	-	4º	2º	1º	3º	4º	3º	2º	1º	-	1º	2º	3º	-	8º	◄- AVERAGE COM. FA. RANK
		AVERAGE CLASSIFICATION →	-	8.40	9	17.8	23.25	40	10	19.37	22.25	32.66	-	24.37	18.57	32	69.03	-	◄- AVERAGE CUMULATIVE W.

FOCUSED PLANNING HORIZON			
ACTUAL	•	MEDIUM-TERM	
SHORT-TERM		LONG-STRATEGIC	

FOCUSED PLANNING SCENARIO			
CURRENT	•	MEDIUM GROWTH	
HIGH GROWTH		LOW GROWTH	

•THE CANADA N.A.S.P. METHODOLOGY HAS BEEN IDENTIFIED WITHIN A HIGHLY INTERACTIVE AND CORPORATE PLANNING PRACTICES SOCIETY WITH A LIKELY BALANCE BETWEEN THE POLITICAL CONTEXT AND THE ADOPTED PLANNING METHODS, UNDER A CONSTANT BARGAINING LEVEL OF UNCERTAINTY•

TABLE 5.3.7.-1
THE M.C.S.A.M. APPLICATION TEST IN THE CANADA N.A.S.P.
(RESEARCH SOURCE)

5.3.8 The comparative analysis and interpretation of the M.C.S.A.M. application test in the Developed Countries N.A.S.P or the investigation field:

• **Introduction:** In this section the results of the M.C.S.A.M application test in the N.A.S.P. of the five countries of the investigation field are analysed, and the M.C.S.A.M. comparative table has been produced to illustrate this analysis as shown in TABLE 5.3.8.-1• This analysis and interpretation are based on the five matrixes of the investigation field, or more specifically based on the values and weights given to the 32 entries of all the five developed countries of the sample defined within the investigation field• This analysis has been done with the help of a PC Macintosh with suitable softwares from where a series of graphs and diagrams can be produced in order to have the results enlightened•

1. The Realist N.A.S.P. methodology model from Developed Countries:

1.1. The above mentioned outputs have been analysed to produce what was called the "Realist N.A.S.P. methodology model from Developed Countries", which is supposed to be the expression of the common N.A.S.P. methodology within the selected sample of developed countries• The following results have been collected from the outputs of the five matrixes and plotted into the M.C.S.A.M. Comparative Table(TABLE 5.3.8.-1) which will produce the Realist N.A.S.P. methodology model:

1.1.1. The interactive system analysis numbers:

• Are the mean values given to the interactive classification numbers of the five matrixes of the investigation field•

1.1.2. Cumulative weight rank from the preferred common planning factors and goals:

• Are the mean values given to the cumulative weight rank of the five matrixes of the investigation field•

1.1.3. Common factors rank defined from the cumulative weight rank:

• Are the mean values given to the common factor rank of the five matrixes of the investigation field•

1.1.4. Average values defined from the individual weights and interactive numbers given to the entries of the five matrixes:

• They have been obtained from; the interactive analysis, the cumulative weight rank, and the common factors rank•

1.1.5. The simple classificatory order of the above outputs are plotted into the M.C.S.A.M. Comparative Table•

1.1.6. The number of preferred common planning factors and goals identified within each matrix of the sample are plotted in the M.C.S.A.M. comparative table, and as well their respective position within the common factor rank•

1.1.7. From the analysis and interpretation of TABLE 5.3.8-1, it is possible to come up with the following conclusions:

a. Norway is the country with the highest interactive analysis number, whereas United Kingdom is in second place in terms of interactive analysis, and Canada is in third place, with the U.S.A. in fourth, and finally F.R.Germany coming in last• It is possible to conclude that the Norwegian N.A.S.P. methodology has been designed within a very interactive system planning context, and practiced within a very interactive planning environment, what is perfectly true as compared with the evidence shown in the available literature•

b. As far as cumulative weight rank is concerned, Canada has got the highest weight, with Norway in second, and United Kingdom in third, with U.S.A. in fourth, whereas F.R.Germany is coming in last place• This result is perfectly compatible as compared to the evidences, since Canada for example is investing largely, in terms of planning with the objective to achieve a better physical interaction within its large territory•

c. As far as common factors rank is concerned, which express the preferred common planning factors and goals, it is possible to come up with the following results; United Kingdom has got 10 common planning factors and goals, which is the highest number within one single place of the weight rank as compared to the other countries of the sample; both of them Norway and Canada have 10 common planning factors and goals as well, but split up in two different places in the weight rank; F.R.Germany has 5 common planning factors and goals, and U.S.A. has 4 common planning factors and goals• The interpretation of the common planning factors and goals should be combined with the characteristics of each one of the countries planning context and planning environment, which are given by their N.A.S.P. Labels• Nevertheless, one point is possible to identify quite easily, which is that, the higher the number of common planning factors and goals, the more interactive are the planning practices, which means that the number of planning actors to be satisfied is higher as well•

1.1.8. FIGURE 5.3.8.-1 from the Comparative Table shows the possible relationships between the average cumulative weight rank which goes up to **120**, and the average interactive classification numbers which vary from **1** up to **10**• The diagram also shows that probably the most effective interactive levels should be the ones above **6**, and most the effective common planning factors and goals should be the ones placed above **50** within the cumulative weight rank•

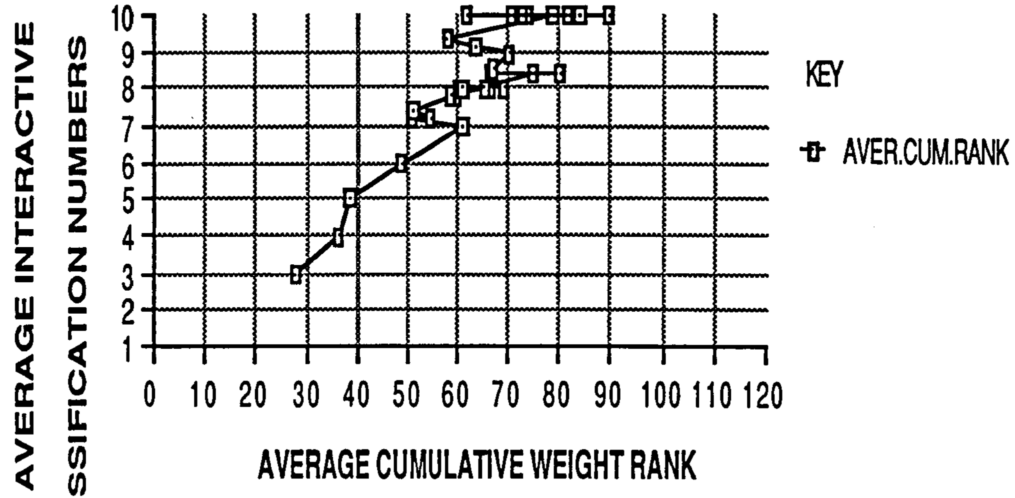


FIGURE 5.3.8.-1 • M.C.S.A.M. COMPARATIVE ANALYSIS 1

Data from M.C.S.A.M. COMPARATIVE TABLE

1.1.9. FIGURE 5.3.8.-2 from the Comparative Table shows the possible relationships between the average cumulative weight rank which goes up to **120**, and the average common factors rank which goes up to **32** because that is the number of entries to the matrix• The diagram shows that probably the most effective planning factors and goals should be the ones between the first and the eleventh place in the common factors rank•

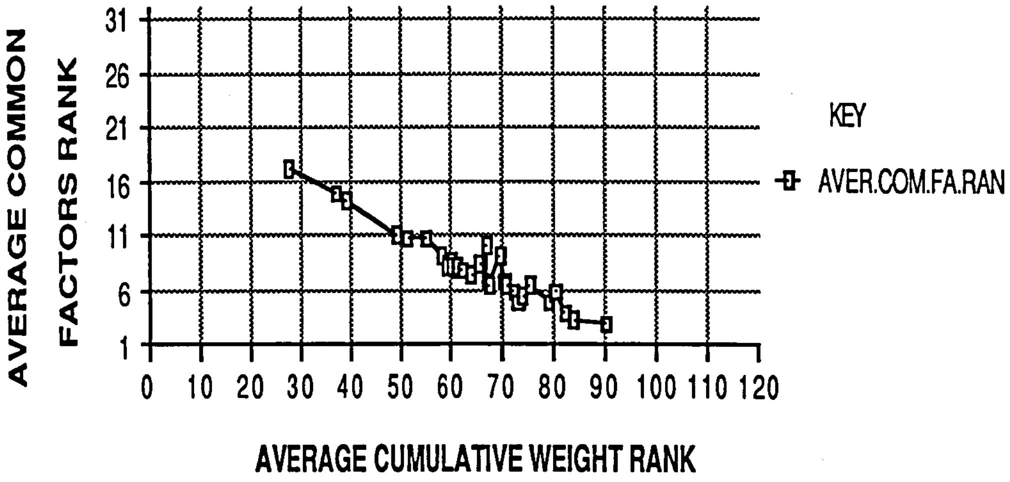


FIGURE 5.3.8.-2 • M.C.S.A.M. COMPARATIVE ANALYSIS 2

Data from M.C.S.A.M. COMPARATIVE TABLE

M.C.S.A.M. COMPARATIVE TABLE

TABLE 5.3.8.-1
M.C.S.A.M. COMPARATIVE RESULTS FROM THE APPLICATION TEST IN THE DEVELOPED COUNTRIES N.A.S.P.
(RESEARCH SOURCE)

FOCUSED PLANNING LEVEL
- NATIONAL ●
- REGIONAL
- STATE
- AREA
- LOCAL

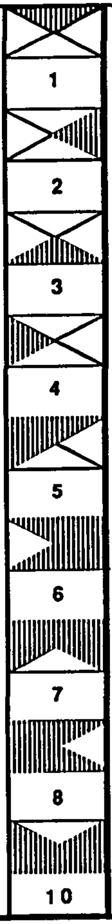
INVESTIGATION FIELD ●

APPLICATION FIELD

SELECTED PLANNING FACTORS AND GOALS OF THE FOCUSED PLANNING FIELD

INTERACTIVE ANALYSIS

LEVELS OF PLANNING FACTORS AND GOALS INTERACTION



IDENTIFIED ELEMENTS OR SUB-SYSTEMS WITHIN THE FOCUSED PLANNING FIELD

- 1 (factors 1–8): AIRPORT NETWORK, AIRPORT SYSTEM, AIRPORT ●
- 2 (factors 9–16): AIRROUTE NETWORK, AIRROUTE, AIRLINE-SERVICE ●
- 3 (factors 17–24): AEROSPACE INDUSTRY, AIRCRAFT FLEET, AIRCRAFT ●
- 4 (factors 25–32): NATIONAL ●, REGIONAL, STATE, LOCAL, AREA

COMPARATIVE RESULTS FROM THE M.C.S.A.M. APPLICATION TEST IN THE DEVELOPED COUNTRIES N.A.S.P. OR INVESTIGATION FIELD

	MULTI-OBJECTIVE PLANNING FACTORS AND GOALS	DIMENSIONAL EXPRESSION	USA			UK			F.R.GERMANY			NORWAY			CANADA			REALIST NASP METHODOLOGY MODEL OF DEVEL. COUNTR.			COMMENTS
			INTERACTIVE ANALYSIS	CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	INTERACTIVE ANALYSIS	CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	INTERACTIVE ANALYSIS	CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	INTERACTIVE ANALYSIS	CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	INTERACTIVE ANALYSIS	CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	INTERACTIVE ANALYSIS	CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	
1	ACCESSIBILITY POLICY	FREQUENCY AND JOURNEY COST	10	110	1°	10	55	9°	10	95	1°	10	75	4°	10	60	10°	10	79	5°	
2	AEROSPACE INDUSTRY PROFITABILITY	ECONOMIC RATIO	4	38	17°	4	38	13°	4	40	14°	4	36.5	13°	4	32	18°	4	36.9	15°	
3	AIRPORT SYSTEM PROFITABILITY	ECONOMIC RATIO	5	47.5	14°	6	42.5	12°	5	35	15°	5	35	14°	5	35	17°	6	39	14°	
4	AIRLINE SYSTEM PROFITABILITY	ECONOMIC RATIO	3	28.5	21°	3	28.5	14°	3	33	16°	3	21	15°	3	28.5	19°	3	27.9	17°	
5	FEDERAL PLANNING CO-ORDINATION	G-B-M-NA	1	3	24°	10	55	9°	5	42.5	12°	10	75	4°	10	80	6°	7.2	51.1	10°	
6	FEDERAL PLANNING IMPLEMENTATION POLICY	G-B-M-NA	5	27.5	22°	10	55	9°	5	26.5	17°	10	105	1°	10	120	1°	8	66.8	10°	
7	FEDERAL PLANNING AGENCIES	G-B-M-NA	5	22.5	23°	10	55	9°	5	45	11°	10	105	1°	10	120	1°	8	69.5	9°	
8	G.N.P.-US$ AND % GROWTH	H-M-L	10	90	4°	10	55	9°	10	75	4°	10	60	7°	10	80	5°	10	72	6°	
9	INCOME PER CAPITA-US$ AND % GROWTH	H-M-L	10	90	4°	10	55	9°	10	75	4°	10	70	5°	10	80	5°	10	74	5°	
10	NATIONAL AIRPORT CLASSIFICATION	G-B-M-NA	10	70	7°	7	49	10°	5	35	15°	10	60	7°	5	42.5	15°	7.4	51.3	11°	
11	NAT.AIRPORT MOVEMENT AND AIRCRAFT MOVEMENT	H-M-L	10	95	3°	10	110	1°	5	35	15°	10	70	5°	7	66.5	8°	8.4	75.3	6°	
12	NATIONAL AIRPORT MOVEMENT AND PAX THROUGHPUT	H-M-L	10	105	2°	10	110	1°	5	35	15°	10	85	3°	7	66.5	8°	8.4	80.3	6°	
13	NATIONAL AIRPORT NETWORK-GENERAL NUMBER	H-M-L	8	44	16°	7	59.5	7°	7	56	6°	10	75	4°	8	68	7°	8	60.5	8°	
14	NATIONAL AIRPORT NETWORK PER CATEGORY NUMBER	H-M-L	8	44	16°	7	66.5	5°	7	49	9°	10	85	3°	7	56	11°	7.8	60.1	9°	
15	NATIONAL AIRPORT NETWORK PER CITY PAIR NUMBER	H-M-L	10	80	5°	7	49	10°	6	42	13°	10	70	5°	7	66.5	8°	8	61.5	8°	
16	NAT.CAPITAL INVESTMENT IN AIRPORT INFRASTRUCT.	US$ AND % VARIATION PER YEAR	5	30	20°	7	59.5	7°	7	52.5	8°	10	90	2°	7	42	16°	7.2	54.8	11°	
17	NATIONAL DEMAND TO FLY	PAX MOV.-AIRC. MOV./L.F.-AIRC.MIX	7	63	8°	10	80	3°	6	48	10°	10	65	6°	10	80	5°	8.6	67.2	6°	
18	NATIONAL ECONOMIC GROWTH	ECONOMIC RATIO	10	90	4°	10	55	9°	10	90	2°	10	75	4°	10	45	14°	10	71	7°	
19	NATIONAL ENVIRONMENTAL ISSUE	G-B-M-NA	10	55	11°	10	65	6°	10	75	4°	10	105	1°	10	70	6°	10	74	6°	
20	NATIONAL FLEET COMPOSITION	A-B-C-D	10	95	3°	10	95	2°	10	80	3°	10	85	3°	10	95	3°	10	90	3°	
21	NATIONAL AIR-TRANSPORT SYSTEM ECONOMIC GROW.	ECONOMIC RATIO	10	95	3°	10	65	6°	10	80	3°	10	85	3°	10	85	4°	10	82	4°	
22	NATIONAL AIR SEAT OFFER	NR.SEATS OF./PAX YEAR AND % VAR.	6	51	13°	6	48	11°	6	48	10°	6	51	9°	6	48	13°	6	49.2	11°	
23	NATIONAL AIR SEAT UTILIZATION	NR.SEATS UT./PAX YEAR AND % VAR.	6	60	9°	10	80	3°	6	48	10°	6	51	9°	7	66.5	8°	7	61.1	8°	
24	NATIONAL TRANSPORT MODAL SPLIT	% 1+% 2+% 3+ % 4...	10	80	5°	10	70	4°	10	70	5°	10	75	4°	10	70	6°	10	73	5°	
25	NATIONAL POPULATION GROWTH	NR.INHABITANTS/YEAR AND % VAR.	5	32.5	19°	10	55	9°	10	90	2°	5	50	10°	10	100	2°	8	65.5	8°	
26	NATIONAL PRICING POLICY	H-M-L-NA	8	52	12°	10	80	3°	10	70	5°	8	48	11°	10	70	6°	9.2	64	7°	
27	NATIONAL PROPENSITY TO FLY	NR.INH./NR.SEAT UTIL. AND % VAR.	8	56	10°	7	56	8°	6	48	10°	8	56	8°	10	80	5°	7.8	59.2	8°	
28	NATIONAL SPATIAL DISTRIBUTION	NR.CITY AND AVERAGE DISTANCE	10	75	6°	10	55	9°	10	55	7°	10	70	5°	10	55	12°	10	62	8°	
29	NATIONAL SUPPLY POLICY	H-M-L-NA	10	80	5°	10	80	3°	6	48	10°	10	60	7°	6	66	9°	8.4	66.8	7°	
30	NATIONAL TRAVELLERS CHARACTERICTICS	BUSINESS-TOURISM-COMMUTER-OTHERS	10	95	3°	10	80	3°	10	80	3°	10	70	5°	10	95	3°	10	84	3°	
31	PUBLIC PARTICIPATION POLICY	H-M-L-NA	5	37.5	18°	10	65	6°	10	90	2°	10	90	2°	10	70	6°	9	70.5	7°	
32	DEREGULATION	H-M-L-NA	10	45	15°	10	55	9°	10	80	3°	7	42	12°	10	70	6°	9.4	58.4	9°	
			7.78	62.09	11°	8.75	63.32	7°	7.46	58.8	8°	8.81	68.60	6°	8.40	69.03	8°	8.25	64.3	8°	← AVERAGE
	FOCUSED PLANNING SCENARIO	SAMPLE CLASSIFICATION →	4°	4°	-	2°	3°	-	6°	5°	-	1°	2°	-	3°	1°	-				
		NUMBER OF COMMON FACTORS →	4C.F. IN 3°			10C.F. IN 9°			5C.F. IN 10°			5+5C.F. 4°AND5			5+5C.F. 5°AND6°						

FOCUSED PLANNING HORIZON			
ACTUAL	●	MEDIUM-TERM	
SHORT-TERM		LONG-STRATEGIC	

FOCUSED PLANNING SCENARIO			
CURRENT	●	MEDIUM GROWTH	
HIGH GROWTH		LOW GROWTH	

2. The interpretation of the Realist N.A.S.P. methodology model obtained from the M.C.S.A.M. Comparative Table:

2.1. In this part all the information obtained in TABLE 5.3.8.-1 has been used to identify the "Realist N.A.S.P. methodology model" which will be expressed by a M.C.S.A.M. matrix• The values and weights compiled from the sample, and plotted in TABLE 5.3.8.-1 have been used to fill up a M.C.S.A.M. matrix, as shown in TABLE 5.3.8.-2• The following interpretation have been made from the matrix of the "Realist N.A.S.P methodology model":

2.1.1. The preferred common planning factors and goals from the Realist N.A.S.P. matrix:

2.1.1.1. In this section the cumulative weight rank from the Realist N.A.S.P. matrix or their preferred common factors and goals are identified and interpreted:

2.1.1.2. The 32 entered items resulted in 30 ranking groups of entries and the average rank number was 15º•

2.1.1.3. There is just one with the highest cumulative weight, or 90 points, and it is the nº20 or "National fleet composition"•

2.1.1.4. There is just one classified in each one of the consecutive places in the cumulative rank, i.e., second, third, fourth, fifth, and they are as follows:

nº30 or "National travellers characteristics", with 84 points,
nº21 or "National air transport system economic growth, with 82 points,
nº12 or "National airport movement in terms of total number of passengers throughput", with 80.3 points, and
nº1 or "Accessibility policy", with 79 points.

2.1.1.5. The seventh and the fourteenth places in the rank of cumulative weight are the highest ones in terms of entries numbers, i.e., two entries each, and they are as follows:

nº19 or "National environmental issues", with 74 points,

nº9 or "Income per capita", with 74 points,
nº29 or "National supply policy", with 66.8. points, and
nº6 or "Federal planning implementation policy", with 66.8. points.

2.1.1.6. There is just one with 27.9 points which is the lowest weight in the rank, and it is the nº4 or "Airline system profitability"•

3. The identification of the methodology model framework from the Realist N.A.S.P. matrix:

3.1. After the analysis of the resulting preferred common factors and goals from the Realist N.A.S.P. matrix , it is possible to build up the following framework:

3.1.1. From the operational point of view the Realist N.A.S.P. methodology model is heavily dependent on the following factors:

a. national fleet composition, and
b. national airport movement in terms of total number of passengers throughput.

3.1.2. From the economic point of view the Realist N.A.S.P. methodology model is very sensitive to the following indicators:

c. national travellers characteristics,
d. national air transport system economic growth, and
e. income per capita.

3.1.3. From the policy-making point of view the Realist N.A.S.P. methodology model is very sensitive to the following issues:

f. national environmental issues, and
g. national supply policy.

3.1.4. As far as planning are concerned the Realist N.A.S.P. methodology model is very sensitive to the following aspects:
h. accessibility policy, and
i. federal planning implementation policy.

MULTIDISCIPLINARY ANALYSIS OF AIR TRANSPORT PLANNING METHODOLOGIES

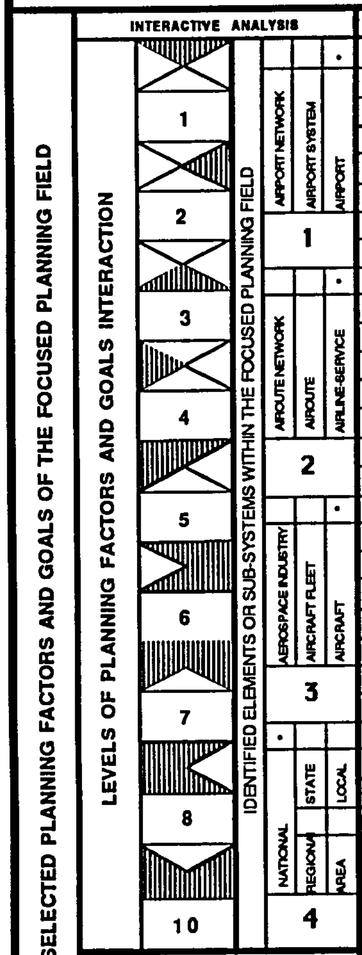
MULTIPLE
CROSS
SYSTEM
ANALYSIS
MATRIX
= **M.C.S.A.M.**

REALIST N.A.S.P. METHOLOGOLY MODEL OF THE DEVELOPED COUNTRIES OR INVESTIGATION FIELD

INVESTIGATION FIELD	•
APPLICATION FIELD	

FOCUSED PLANNING LEVEL	
NATIONAL	•
REGIONAL	
STATE	
AREA	
LOCAL	

INTERACTIVE ANALYSIS



	MULTI-OBJECTIVE PLANNING FACTORS AND GOALS	DIMENSIONAL EXPRESSION	INTERACTIVE COMBINATION SYSTEM	INTERACTIVE CLASSIFICATION NUMBERS	FORMS OF PLANNING (FRIEDMANN-1973)				PLANNING CONTEXT X PLANNING METHODS (BREHENY-1986)				UNCERTAINTY IN PLANNING (CHRISTENSEN-1985)				INTERACTIVE COMMON FACTORS		COMMENTS
					CP1	PP1	CP2	PP2	V	P2	P1	L	C	B	E	P	CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	
					1	2	3	4	1	2.5	2.5	4	1	2.5	2.5	4			
1	ACCESSIBILITY POLICY	FREQUENCY AND JOURNEY COST		10	10	20	30	40	10	25	25	40	10	25	25	40	79	5°	
2	AEROSPACE INDUSTRY PROFITABILITY	ECONOMIC RATIO		4	4	8	12	16	4	10	10	16	4	10	10	16	36.9	29°	
3	AIRPORT SYSTEM PROFITABILITY	ECONOMIC RATIO		5	5	10	15	20	5	12.5	12.5	20	5	12.5	12.5	20	37	28°	
4	AIRLINE SYSTEM PROFITABILITY	ECONOMIC RATIO		3	3	6	9	12	3	7.5	7.5	12	3	7.5	7.5	12	27.9	30°	• LOWEST CUMULATIVE WEIGH
5	FEDERAL PLANNING CO-ORDINATION	G-B-M-NA		7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	51.1	26°	
6	FEDERAL PLANNING IMPLEMENTATION POLICY	G-B-M-NA		8	8	16	24	32	8	20	20	32	8	20	20	32	66.8	14°	
7	FEDERAL PLANNING AGENCIES	G-B-M-NA		8	8	16	24	32	8	20	20	32	8	20	20	32	69.5	12°	
8	G.N.P.-US$ AND % GROWTH	H-M-L		10	10	20	30	40	10	25	25	40	10	25	25	40	72	9°	
9	INCOME PER CAPITA-US$ AND % GROWTH	H-M-L		10	10	20	30	40	10	25	25	40	10	25	25	40	74	7°	
10	NATIONAL AIRPORT CLASSIFICATION	G-B-M-NA		7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	51.3	25°	
11	NAT.AIRPORT MOVEMENT AND AIRCRAFT MOVEMENT	H-M-L		8	8	16	24	32	8	20	20	32	8	20	20	32	75.3	6°	
12	NATIONAL AIRPORT MOVEMENT AND PAX THROUGHPUT	H-M-L		8	8	16	24	32	8	20	20	32	8	20	20	32	80.3	4°	
13	NATIONAL AIRPORT NETWORK- GENERAL NUMBER	H-M-L		8	8	16	24	32	8	20	20	32	8	20	20	32	60.5	20°	
14	NATIONAL AIRPORT NETWORK PER CATEGORY NUMBER	H-M-L		8	8	16	24	32	8	20	20	32	8	20	20	32	60.1	21°	
15	NATIONAL AIRPORT NETWORK PER CITY PAIR NUMBER	H-M-L		8	8	16	24	32	8	20	20	32	8	20	20	32	61.5	18°	
16	NAT.CAPITAL INVESTMENT IN AIRPORT INFRASTRUCT.	US$ AND % VARIATION PER YEAR		7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	54.8	24°	
17	NATIONAL DEMAND TO FLY	PAX MOV.-AIR.MOV./L.F.-AIR.MIX		8	8	16	24	32	8	20	20	32	8	20	20	32	67.2	13°	
18	NATIONAL ECONOMIC GROWTH	ECONOMIC RATIO		10	10	20	30	40	10	25	25	40	10	25	25	40	71	10°	
19	NATIONAL ENVIRONMENTAL ISSUE	G-M-B-NA		10	10	20	30	40	10	25	25	40	10	25	25	40	74	7°	
20	NATIONAL FLEET COMPOSITION	A-B-C-D		10	10	20	30	40	10	25	25	40	10	25	25	40	90	1°	* HIGHEST CUMULATIVE WEIGH
21	NATIONAL AIR-TRANSPORT SYSTEM ECONOMIC GROW.	ECONOMIC RATIO		10	10	20	30	40	10	25	25	40	10	25	25	40	82	3°	
22	NATIONAL AIR SEAT OFFER	NR.SEATS/YEAR AND % VAR.		6	6	12	18	24	6	15	15	24	6	15	15	24	49.2	27°	
23	NATIONAL AIR SEAT UTILIZATION	NR.SEATS/PAX YEAR AND % VAR.		7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	61.1	19°	
24	NATIONAL TRANSPORT MODAL SPLIT	% 1-% 2-% 3-% 4		10	10	20	30	40	10	25	25	40	10	25	25	40	73	8°	
25	NATIONAL POPULATION GROWTH	NR. INHABITANTS/YEAR AND % VAR.		8	8	16	24	32	8	20	20	32	8	20	20	32	65.5	15°	
26	NATIONAL PRICING POLICY	H-M-L-NA		10	10	20	30	40	10	25	25	40	10	25	25	40	64	16°	
27	NATIONAL PROPENSITY TO FLY	NR.INH./NR.SEAT UTIL. AND % VAR.		8	8	16	24	32	8	20	20	32	8	20	20	32	59.2	22°	
28	NATIONAL SPATIAL DISTRIBUTION	NR.CITY AND AVERAGE DISTANCE		10	10	20	30	40	10	25	25	40	10	25	25	40	62	17°	
29	NATIONAL SUPPLY POLICY	H-M-L-NA		8	8	16	24	32	8	20	20	32	8	20	20	32	66.8	14°	
30	NATIONAL TRAVELLERS CHARACTERISTICS	BUSINESS-TOURISM-COMMUTER-OTHERS		10	10	20	30	40	10	25	25	40	10	25	25	40	84	2°	
31	PUBLIC PARTICIPATION POLICY	H-M-L-NA		10	10	20	30	40	10	25	25	40	10	25	25	40	70.5	11°	
32	DEREGULATION	H-M-L-NA		10	10	20	30	40	10	25	25	40	10	25	25	40	58.4	23°	
	FOCUSED PLANNING SCENARIO	SUPPORTING THEORIES RANK →	82.5%	264	264	528	792	1056	264	660	660	1056	264	660	660	1056	2057.9	-	◄ TOTAL CUMULATIVE WEIGHT
			-	-													-	15°	◄ REALIST AVER.COM.FA.
		AVERAGE CLASSIFICATION →	-	8.25	8.25	16.5	24.75	33	8.25	20.62	20.62	33	8.25	20.62	20.62	33	64.30	-	◄ AVERAGE CUMULATIVE W.

FOCUSED PLANNING HORIZON

ACTUAL	•	MEDIUM-TERM	
SHORT-TERM		LONG-STRATEGIC	

FOCUSED PLANNING SCENARIO

CURRENT	•	MEDIUM GROWTH	
HIGH GROWTH		LOW GROWTH	

• THE REALIST N.A.S.P. METHODOLOGY MODEL CAN BE IDENTIFIED WITHIN THE MEAN VALUES OF THE INTERACTIVE CLASSIFICATION NUMBERS THROUGH DIFFERENT COMBINATIONS OF THE ASPECTS OF PLANNING TO MEET THE TOTAL CUMULATIVE WEIGHT OF 2057.9 POINTS, WHICH HAVE BEEN OBTAINED FROM THE DEVELOPED COUNTRIES SAMPLE•

TABLE 5.3.8-2
THE REALIST N.A.S.P. METHODOLOGY MODEL OF THE DEVELOPED COUNTRIES OR INVESTIGATION FIELD
(RESEARCH SOURCE)

4. The preferred supporting planning theories from the Realist N.A.S.P. model matrix:

4.1. Since the Realist N.A.S.P. model belongs to an hypothetical planning context, which can be described as a resulting combination of different contexts within the developed countries sample, and the planning context can be expressed by the combination of aspects of planning from the supporting planning theories, then it is possible to conclude that the hypothetical planning context may be expressed by different combination of aspects of planning from the same supporting planning theories• Assuming that the cumulative weight rank is the resulting addition of the weights given by the aspects of planning within the matrix, then it is possible to conclude that any combination of aspects of planning from the same supporting planning theories, which end up with the same cumulative results plotted in the matrix of the Realist N.A.S.P. model will correspond to hypothetical planning contexts of other developed countries• These aspects of planning combined in such a way will define the preferred supporting planning theories of the Realist N.A.S.P. model matrix, which should be useful to identify different planning contexts and different N.A.S.P. methodologies from the sample•

5. The interactive analysis from the Realist N.A.S.P. model matrix:

5.1. In this section the interactive classification given to the planning factors and goals of the Realist N.A.S.P. model are analysed and interpreted within the other results obtained in the matrix:

5.1.1. A total of 264 points have been obtained from the five interactive classification numbers of the five matrixes of the investigation field, which represents an average of 8.25 points to each one of the 32 entered items• A total of 2057.9 points have been obtained from the five cumulative weight rank of the five matrixes of the investigation field, which represents an average of 64.3 weight points to each one of the 32 entered items•

6. The identification of the hypothetical planning context and planning environment within which the Realist N.A.S.P. model would be practiced:

6.1. The possible combination of planning aspects within the supporting planning theories, as described above, gives to the M.C.S.A.M. the necessary flexibility to identify different planning contexts and different planning environments• This flexibility can be expressed by the following Realist N.A.S.P. Model Label:

THE REALIST N.A.S.P. MODEL LABEL

"The Realist N.A.S.P. methodology model can be identified within the mean values of the interactive classification numbers through different combinations of the aspects of planning to meet the total cumulative weight of 2057.9 points, which have been obtained from the developed countries sample"•

7. The exploratory interpretation on the Realist N.A.S.P. matrix:

7.1. A series of possible interpretation are made in this section with the objective to explore the matrix capacity to deal with the selected planning field at the given circumstances of the sample, and they have been obtained from the matrix of the Realist N.A.S.P. Model:

7.1.1. FIGURE 5.3.8.-3 shows the shape of the relationships between the realist cumulative weight which goes up to **120** and the realist interactive classification numbers which vary between **1** and **10**• The diagram shows that probably the most effective interactive levels should the ones above **7** and also the most effective planning factors and goals should be the ones placed above **50** on the cumulative weight rank•

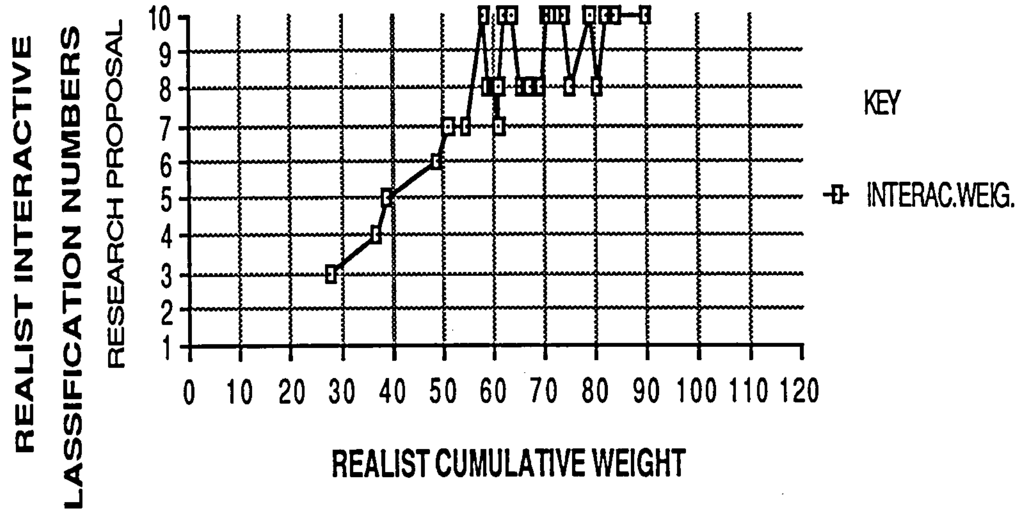


FIGURE 5.3.8.-3 • REALIST N.A.S.P. MODEL ANALYSIS 1

Data from REALIST N.A.S.P. MODEL

7.1.2. FIGURE 5.3.8.-4 up to FIGURE 5.3.8.-6 show the relationships between the "possible" realist cumulative weights and the "possible" realist weights of the supporting planning theories within the Realist N.A.S.P. Model matrix• The first diagram below shows the different weights that may be assumed by the different aspects of planning within the first supporting planning theory which is "Forms of Planning" according to its internal scale of desirability• As far as their forms of planning are concerned this diagram is an exercise to identify different planning contexts of the developed countries sample •

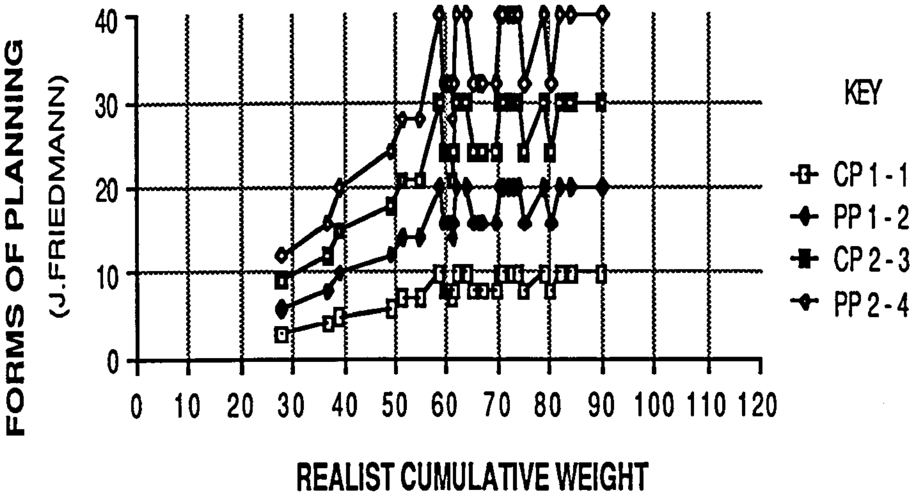


FIGURE 5.3.8.-4 • REALIST N.A.S.P. MODEL ANALYSIS 2

Data from REALIST N.A.S.P. MODEL

7.1.3. FIGURE 5.3.8.-5 shows the different weights that may be assumed by the aspects of planning within the second supporting planning theory which is "Planning Context & Planning Methods" according to its internal scale of desirability• This diagram is an exercise of planning context identification concerning the balance between the political context and the adopted planning methods•

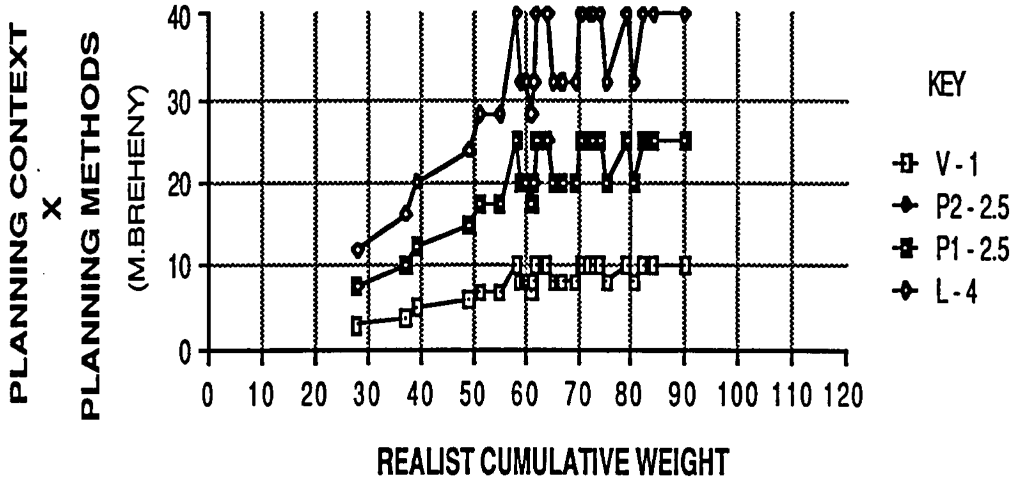


FIGURE 5.3.8.-5 • REALIST N.A.S.P. MODEL ANALYSIS 3

Data from REALIST N.A.S.P. MODEL

7.1.4. FIGURE 5.3.8.-6 shows the possible weights that may be assumed by the aspects of planning within the third supporting planning theory which is "Uncertainty in Planning" according to its internal scale of desirability• This diagram is an exercise of planning context identification concerning the level of uncertainty in planning•

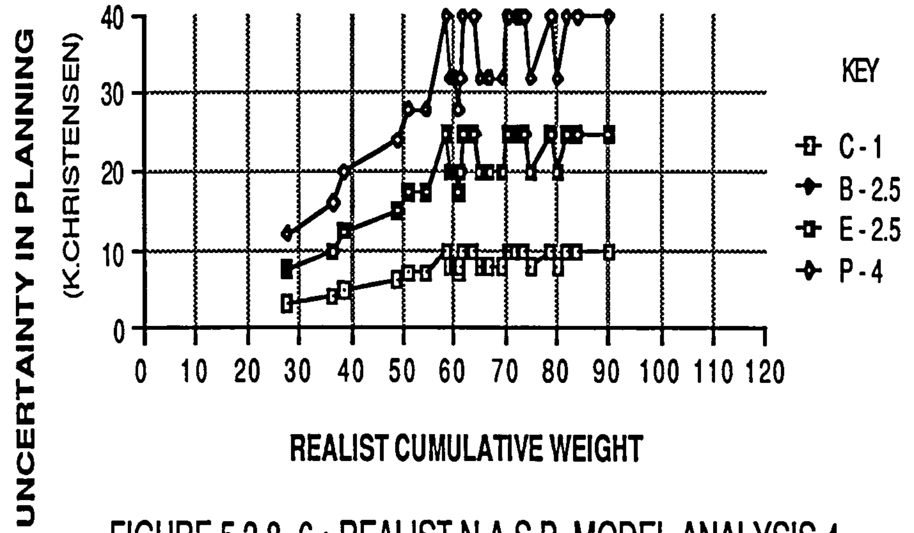


FIGURE 5.3.8.-6 • REALIST N.A.S.P. MODEL ANALYSIS 4

Data from REALIST N.A.S.P. MODEL

CHAPTER 6

CHAPTER 6:

6. Selection of the Application Field Sample within the M.I.E.A.C - Middle Income and Economically Active Countries and the M.C.S.A.M. application test in their N.A.S.P.:

6.1. Introduction:

• The Application Field sample is constituted by four different Brazilian Scenarios, these are: Brazil Actual Growth Scenario, Brazil Low Growth Scenario, Brazil Medium Growth Scenario, and Brazil High Growth Scenario• In this part of the work a matrix for each one of the scenarios will be filled up according to the same process applied to the investigation field and the interpretation of the results will contain the identification of the N.A.S.P. methodology framework for all the Brazilian Scenarios of the sample• Their planning context and planning environment will be identified concerning to the same adopted supporting planning theories, i.e., "Forms of Planning", "Planning policy & Planning methods", and "Uncertainty in Planning" • A thorough investigation has been made of the Brazil Actual Growth Scenario, in order to be qualified to assume the position of a hypothetical Brazilian multi-disciplinary planning actors team in order to do this part of the application test properly• The available Scenario Writing Processes has been investigated and the "Developmental Approach of Scenario Writing"(Hirschhorn-1980) has been chosen to develop the three hypothetical Brazilian Scenarios, and to test the M.C.S.A.M. in their hypothetical N.A.S.P.•

• According to Hirschhorn(1980), "Developmental Scenarios Writing" has the following description; "Developmental scenarios are process based, beginning state driven, and used primarily for planning purposes"• They enable the scenario writer to become more sensitive to the problem of alternative contexts, and in contrast to simulations they need not be developed with the statistical and numerical complexity required of predictive instruments• No clearly developed technique for constructing them has been found, but based on "Morphology of scenarios" in FIGURE 6.1.-1, a tree structure indicates that the developmental scenario begins with an initial state and describes a process through which a particular social system can arrive at one or a series of end states that are not specified prior to the construction of the scenario itself• Planners can use such scenarios to enrich their understanding of the social system they are studying so that they might make better decisions about future plans, investments, regulations, and policies•

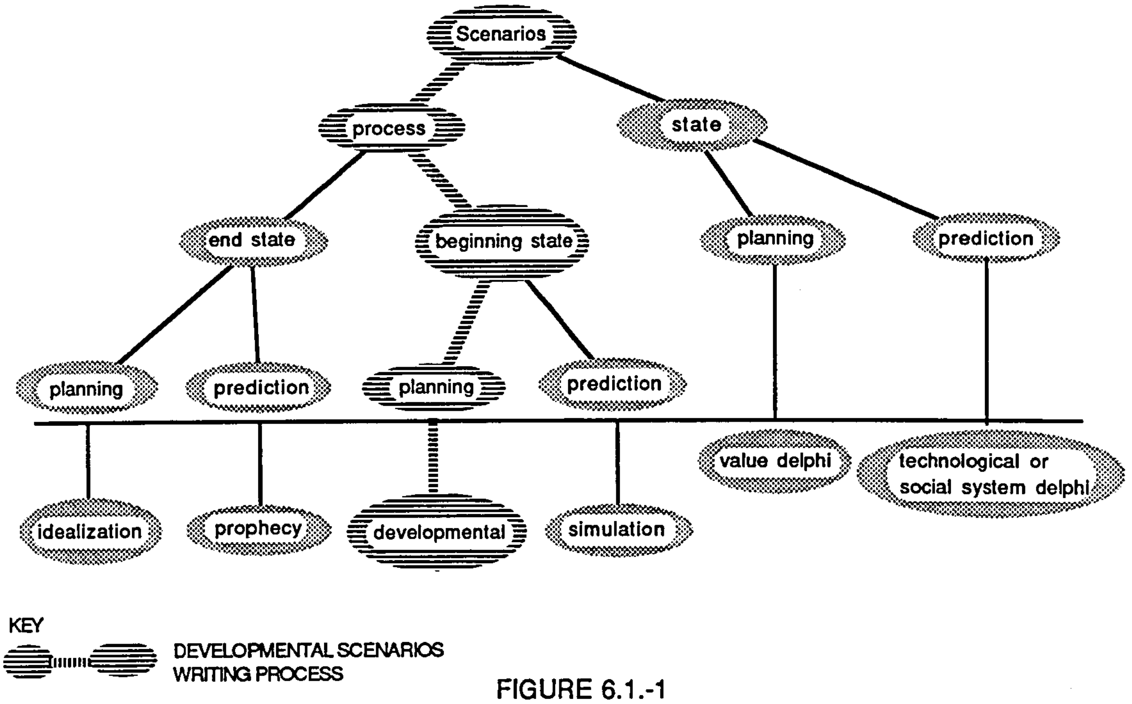


FIGURE 6.1.-1
MORPHOLOGY OF SCENARIOS
BASED ON HIRSCHHORN(1980)

• Furthermore, the developmental scenarios are process based, this means that they describe the "history of the future" by linking events in a chain of cause and effect sequences• Nevertheless, not all cause and effect chains have a developmental character• Three kinds of chains can be distinguished; random chains, linear growth or decay chains, and three structure chains• The developmental chains are composed of linear chains that are related to each other through a developmental sequence• A single developmental sequence can create a "tree of scenarios" because there is always more than one way to move out of the previous chain• Thus, a developmental scenario consists of chains which reach their limits, and then branch out into several alternative chains which in turn reach their limits, etc• The resultant tree is isomorphic with the familiar decision tree used to evaluate investment projects•

• Based on the above developmental scenarios writing process, three different scenarios have been designed from the base of the Brazilian Actual Growth Scenario to criate the M.I.E.A.C. sample for the M.C.S.A.M. application test in their N.A.S.P.• The Brazilian Actual Growth Scenario has been defined by the indicators and growth rates from the World Bank Report(1986) where Brazil has the economic classification number 78• The other three scenarios have been designed according to the growth rates and indicators which have been adopted in the "G.S.P.M. Comparative Table" (TABLE 3.4.2.-1) in **Chapter 3**•

6.2. The M.C.S.A.M. application test in the N.A.S.P. of Brazil Actual Growth Scenario(B.A.G.S.) and interpretation of the results:

• The Brazil Actual Growth Scenario(B.A.G.S.) has been based on the indicators and growth rates from the World Bank Report(19860)• The Brazil Actual Growth(B.A.G.S.) N.A.S.P. matrix has been filled up as shown in TABLE 6.2.-1• The N.A.S.P. methodology of the Brazilian Actual Growth Scenario and its planning context have been identified from the resulting matrix• The following interpretation have been done over this matrix:

1. The preferred planning factors and goals from the N.A.S.P. matrix of the Brazil Actual Growth Scenario(B.A.G.S):

1.1. In this section the cumulative weights from the preferred common planning factors and goals of the matrix of the B.A.G.S. N.A.S.P. are identified and interpreted:

1.1.1. The 32 entered items resulted in 16 ranking groups and the average rank number was 8º•

1.1.2. There are two with the highest cumulative weight which are the nº25 or "National population growth", and nº26 or "National pricing policy", both with 45 points•

1.1.3. There are two with 42 and two with 31 points, respectively the second and the third highest cumulative weight, and they are;

nº27 or "National propensity to fly",
nº23 or "National air seat utilization",
nº12 or "National airport movement in terms of total passengers throughput", and
nº11 or "National airport movement in terms of total number or aircraft movement".

1.1.4. Seven entries received 30 points in fourth place in the cumulative weight rank, which is the highest number of preferred common planning factors and goals within the same group in the rank, and they are as follows:

MULTIDISCIPLINARY ANALYSIS OF AIR TRANSPORT PLANNING METHODOLOGIES

MULTIPLE
CROSS
SYSTEM
ANALYSIS
MATRIX

= **M.C.S.A.M.**

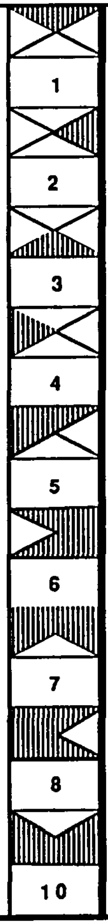
M.C.S.A.M. APPLICATION TEST IN THE BRAZIL N.A.S.P. WITHIN THE ACTUAL SCENARIO OF GROWTH

INVESTIGATION FIELD	
APPLICATION FIELD	•

FOCUSED PLANNING LEVEL	
NATIONAL	•
REGIONAL	
STATE	
AREA	
LOCAL	

SELECTED PLANNING FACTORS AND GOALS OF THE FOCUSED PLANNING FIELD

LEVELS OF PLANNING FACTORS AND GOALS INTERACTION



IDENTIFIED ELEMENTS OR SUB-SYSTEMS WITHIN THE FOCUSED PLANNING FIELD

INTERACTIVE ANALYSIS		MULTI-OBJECTIVE PLANNING FACTORS AND GOALS	DIMENSIONAL EXPRESSION	INTERACTIVE CLASSIFICATION NUMBERS	INTERACTIVE COMBINATION SYMBOLS	FORMS OF PLANNING (FRIEDMANN-1973)				PLANNING CONTEXT X PLANNING METHODS (BREHENY-1986)				UNCERTAINTY IN PLANNING (CHRISTENSEN-1985)				INTERACTIVE COMMON FACTORS		COMMENTS
						CP1	PP1	CP2	PP2	V	P2	P1	L	C	B	E	P	CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	
						1	2	3	4	1	2.5	2.5	4	1	2.5	2.5	4			
1 AIRPORT NETWORK AIRPORT SYSTEM AIRPORT •	1	ACCESSIBILITY POLICY	FREQUENCY AND JOURNEY COST		1	1				1				1				3	16º	• LOWEST CUMULATIVE WEIGH
	2	AEROSPACE INDUSTRY PROFITABILITY	ECONOMIC RATIO		1	1					2.5					2.5		6	13º	
	3	AIRPORT SYSTEM PROFITABILITY	ECONOMIC RATIO		1	1					2.5					2.5		6	13º	
	4	AIRLINE SYSTEM PROFITABILITY	ECONOMIC RATIO		3		6			3				3				12	10º	
	5	FEDERAL PLANNING CO-ORDINATION	G-B-M-NA		10	10				10				10				30	4º	
	6	FEDERAL PLANNING IMPLEMENTATION POLICY	G-B-M-NA		10	10				10				10				30	4º	
	7	FEDERAL PLANNING AGENCIES	G-B-M-NA		10	10				10				10				30	4º	
	8	G.N.P.-US$ AND % GROWTH	H-M-L		10	10				10				10				30	4º	
2 AIRROUTE NETWORK AIRROUTE AIRLINE-SERVICE •	9	INCOME PER CAPITA-US$ AND % GROWTH	H-M-L		10	10				10				10				30	4º	
	10	NATIONAL AIRPORT CLASSIFICATION	G-B-M-NA		5	5				5						12.5		22.5	5º	
	11	NAT.AIRPORT MOVEMENT AND AIRCRAFT MOVEMENT	H-M-L		7	7					17.5			7				31.5	3º	
	12	NATIONAL AIRPORT MOVEMENT AND PAX THROUGHPUT	H-M-L		7	7					17.5			7				31.5	3º	
	13	NATIONAL AIRPORT NETWORK- GENERAL NUMBER	H-M-L		3	3					7.5					7.5		18	7º	
	14	NATIONAL AIRPORT NETWORK PER CATEGORY NUMBER	H-M-L		3	3					7.5					7.5		18	7º	
	15	NATIONAL AIRPORT NETWORK PER CITY PAIR NUMBER	H-M-L		3	3					7.5					7.5		18	7º	
	16	NAT.CAPITAL INVESTMENT IN AIRPORT INFRASTRUCT.	US$ AND % VARIATION PER YEAR		5	5				5				5				15	9º	
3 AEROSPACE INDUSTRY AIRCRAFT FLEET AIRCRAFT •	17	NATIONAL DEMAND TO FLY	PAX MOV.-AIR.MOV./L.F.-AIR.MIX		3	3				3				3				9	11º	
	18	NATIONAL ECONOMIC GROWTH	ECONOMIC RATIO		10	10				10				10				30	4º	
	19	NATIONAL ENVIRONMENTAL ISSUE	G-M-B-NA		1	1				1				1				3	16º	• LOWEST CUMULATIVE WEIGH
	20	NATIONAL FLEET COMPOSITION	A-B-C-D		3		6				7.5			3				16.5	8º	
	21	NATIONAL AIR-TRANSPORT SYSTEM ECONOMIC GROW.	ECONOMIC RATIO		10	10				10				10				30	4º	
	22	NATIONAL AIR SEAT OFFER	NR.SEATS/YEAR AND % VAR.		3		6				7.5					7.5		21	6º	
	23	NATIONAL AIR SEAT UTILIZATION	NR.SEATS/PAX YEAR AND % VAR.		6		12				15					15		42	2º	
	24	NATIONAL TRANSPORT MODAL SPLIT	% 1-% 2-% 3-% 4		5	5				5				5				15	9º	
4 NATIONAL • REGIONAL STATE AREA LOCAL	25	NATIONAL POPULATION GROWTH	NR. INHABITANTS/YEAR AND % VAR.		10	10				10						25		45	1º	• HIGHEST CUMULATIVE WEIGH
	26	NATIONAL PRICING POLICY	H-M-L-NA		10	10				10						25		45	1º	• HIGHEST CUMULATIVE WEIGH
	27	NATIONAL PROPENSITY TO FLY	NR.INH./NR.SEAT UTIL. AND % VAR.		6		12				15					15		42	2º	
	28	NATIONAL SPATIAL DISTRIBUTION	NR.CITY AND AVERAGE DISTANCE		1	1				1				1				3	16º	• LOWEST CUMULATIVE WEIGH
	29	NATIONAL SUPPLY POLICY	H-M-L-NA		1		2				2.5			1				5.5	14º	
	30	NATIONAL TRAVELLERS CHARACTERISTICS	BUSINESS-TOURISM-COMMUTER-OTHERS		1		2				2.5					2.5		7	12º	
	31	PUBLIC PARTICIPATION POLICY	H-M-L-NA		1	1				1				1				3	16º	• LOWEST CUMULATIVE WEIGH
	32	DEREGULATION	H-M-L-NA		1	1					2.5			1				4.5	15º	
				50.3%	161	138	46	-	-	115	115	-	-	109	-	130	-	653	-	◄ TOTAL CUMULATIVE WEIGHT
			SUPPORTING THEORIES RANK →	-	-	1º	2º	-	-	1º	1º	-	-	2º	-	1º	-	-	8º	◄ AVERAGE COM. FA. RANK
			AVERAGE CLASSIFICATION →	-	5.03	5.52	6.57	-	-	6.38	8.21	-	-	5.45	-	10.83	-	20.40	-	◄ AVERAGE CUMULATIVE W.

FOCUSED PLANNING HORIZON			
ACTUAL	•	MEDIUM-TERM	
SHORT-TERM		LONG-STRATEGIC	

FOCUSED PLANNING SCENARIO		
CURRENT	•	MEDIUM GROWTH
HIGH GROWTH		LOW GROWTH

• THE BRAZILIAN N.A.S.P. METHODOLOGY HAS BEEN IDENTIFIED WITHIN THE ACTUAL SCENARIO AS A LOW INTERACTIVE IN CONTRAST TO A HIGHLY CENTRALPLANNING PRACTICES SOCIETY WITH A SHARED VERY UNLIKELY AND POSSIBLE BALANCE BETWEEN THE POLITICAL CONTEXT AND THE COMPLEX PLANNING METHODS WHICH HAVE BEEN ADOPTED UNDER A MAJOR EXPERIMENTATION TOWARDS A CHAOTICAL LEVEL OF UNCERTAINTY •

TABLE 6.2-1
THE M.C.S.A.M. APPLICATION TEST IN THE BRAZIL N.A.S.P. WITHIN THE ACTUAL SCENARIO OF GROWTH
(RESEARCH SOURCE)

nº21 or "National air transport system economic growth",
nº18 or "National economic growth,
nº9 or "Income per capita",
nº8 or "G.N.P. growth",
nº7 or "Federal planning agencies",
nº6 or "Federal planning implementation policy", and
nº5 or "Federal planning co-ordination.

1.1.5. Four received 3 points, which is the lowest weight within the cumulative weight rank, and they are as follows;

nº31 or "Public participation",
nº28 or "National spatial distribution",
nº19 or "National environmental issues", and
nº1 or "Accessibility policy".

2. The identification of the B.A.G.S. N.A.S.P. methodology framework:

2.1. After the analysis of the resulting preferred common planning factors and goals from the B.A.G.S. N.A.S.P., it is possible to build up the following framework:

2.1.1. From the operational point of view the B.A.G.S. N.A.S.P. methodology is heavily dependent on the following factors:

a. national air seat utilization,
b. national airport movements in terms of total passengers throughput, and
c. national airport movement in terms of total number of aircraft movement.

2.1.2. From the economic point of view the B.A.G.S. N.A.S.P. methodology is sensitive to the following indicators:

d. national population growth,
e. national propensity to fly,
f. national air transport system economic growth,

g. national economic growth,
h. income per capita, and
i. G.N.P. growth.

2.1.3. From the policy point of view the B.A.G.S. N.A.S.P. methodology is not sensitive at all to the selected entries, on the contrary, the cumulative weight rank indicates the following aspects as being the less sensitive ones to the actual N.A.S.P. methodology:

j. public participation, and
k. environmental issues.

2.1.4. In fact the above indication from the matrix is strictly compatible with the evidences from the reality within the actual Brazilian N.A.S.P. methodology, i.e., there is neither public participation nor environmental concern within the actual Brazilian planning context• Other important aspects are as well in the lower place of the cumulative weight rank, these are:

l. national spatial distribution, and
m. accessibility policy.

2.1.5. From the above indication and from the planning point of view it is possible to conclude that the actual Brazilian N.A.S.P. methodology has not taken to much in consideration the above aspects, which seams to be perfectly true as compared to the evidences in the literature about their actual planning practices• These are the sort of conclusion that a multi-disciplinary planning actors team should come up when analysing the actual Brazilian N.A.S.P. whether using the M.S.C.A.M. within their planning practices

3. The preferred supporting planning theories of the B.A.G.S. N.A.S.P. matrix:

3.1. In this section the cumulative weight rank from the preferred supporting planning theories of the B.A.G.S. N.A.S.P. matrix are identified and interpreted:

3.1.1. Initially the analysis is made on the first supporting planning theory entered into the B.A.G.S. N.A.S.P. matrix which is "forms of planning", and the "**CP1**" or "central planning" is the highest aspect with 138 points• The "**PP1**" or "policies planning" with 46 points is the second highest aspect within the "forms of planning", and neither "corporate planning" nor "participatory planning" have been quoted by the matrix• In fact, reality has shown that the actual Brazilian N.A.S.P. methodology has been practiced within a strong central planning framework• This may be acceptable, provided that other positive aspects are taken in consideration as well, e.g.;

1. Cultural and socio-economic equity,
2. Public participation in planning,
3. Rational decision, and
4. Real income grown.

3.1.1.1. Nevertheless, if on the one hand the natural difficulty of having all these above positive aspects immediately achieved is evident, on the other hand, the starting point to get there seem to be the promotion of the other "forms of planning", which have not been quoted by the matrix of the Brazilian Actual Growth N.A.S.P., i.e., "corporate planning" and "participatory planning"• This long process of improvement should start by rethinking the actual planning context and reorganizing the actual planning environment•

3.1.2. The second supporting planning theory entered into the B.A.G.S. N.A.S.P. matrix is "planning context & planning methods", and the results have presented a very interesting feature in that; two of the four aspects have been quoted in first place within the weight rank, and they are the "**V**" or "very unlikely balance", and the "**P2**" or "possible balance within a simple political context", both of them with 115 points• None of the other two aspects within this supporting planning theory have been quoted by the matrix, neither "possible balance within a complex political context" nor "likely balance"•

3.1.2.1. The simple fact that just two of the alternative aspects of planning have been quoted within the above supporting planning theory should be per se an indication of the limited planning context within the actual Brazilian N.A.S.P. methodology practices, but the worst point is that both of the frequently quoted aspects belong to the complex planning methods quadrants according to Breheny(1985), i.e., complex planning methods have been adopted within a complex political context•

3.1.3. The third supporting planning theory entered into the B.A.G.S. N.A.S.P. matrix is "uncertainty in planning", and "E" or "experimentation" is the highest aspect in the internal rank with 130 points• The "C" or "chaos" is the second aspect with 109 points• The other two aspects "bargaining" and "programming" have not been quoted by the matrix•

3.1.3.1. Once more just two aspects have been quoted in the matrix which reinforces the impression of the real limitation within the actual Brazilian N.A.S.P. planning context• Nevertheless, both aspects "experimentation" and "chaos" are within the "unknown technology or unknown planning means", and as far as "uncertainty in planning" is concerned, it is evidence of lack of adequate technology to promote the goals• Since there is no disagreement about the planning goals (in a good sense), which should lead towards "bargaining" in planning, it is possible to infer a strong indication of lack of political practices• If that is confirmed then it is possible to assume two circumstances for the actual Brazilian planning context; first, the goals have been simply imposed upon society; second, the society has no minimum level of information required to promote "bargaining"•

4. The interactive analysis of the B.A.G.S. N.A.S.P. matrix:

4.1. In this section the interactive classification given to the planning factors and goals of the B.A.G.S. N.A.S.P. matrix are analysed and interpreted within the others results obtained in the matrix;

4.1.1. Before the matrix calculation, a total of 161 points were given by the interactive system planning analysis to the 32 entered items, which represents an average of 5.03 points per item• After the matrix calculation a total of 653 weight points were given to the items, with an average of 20.4 weight points to each item• These results will be useful within the forthcoming comparative analysis•

5. The identification of the planning context and planning environment within which the B.A.G.S. N.A.S.P. has been practiced:

5.1. The preferred supporting planning theories obtained from the matrix were analysed to produce the following B.A.G.S. N.A.S.P. Planning Methodology Label:

THE BRAZIL ACTUAL SCENARIO N.A.S.P. LABEL

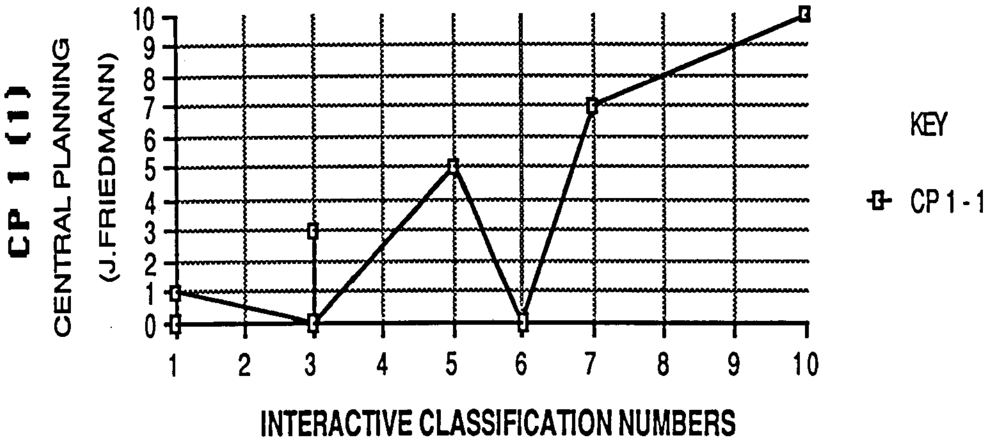
"The Brazilian N.A.S.P. methodology has been identified within the actual scenario as a low interactive, in contrast to a highly central planning practices society, with a shared very unlikely and possible balance between the political context and the complex planning methods, which have been adopted under a major experimentation towards a chaotical level of uncertainty"•

6. Exploratory interpretation over the B.A.G.S. N.A.S.P. matrix:

6.1. A series of possible interpretation are made in this section with the objective of exploring the matrix capacity to deal with the selected planning field at the given circumstances of the sample:

6.1.1. FIGURE 6.2.-1 up to FIGURE 6.2.-4 show the variation of the interactive classification numbers against the four identified preferred aspects of planning, such as; "**CP1**", "**V**", "**P2**", and "**E**" from the supporting planning theories•

6.1.2. FIGURE 6.2.-1 shows the variation of "**CP1**" which goes from **0** up to **10** because its weight within the scale of desirability is **1** and the maximum interactive level is **10**• The zero value means that some planning factors have not been quoted by "**CP1**" but by some other aspect of planning within the "forms of planning"•

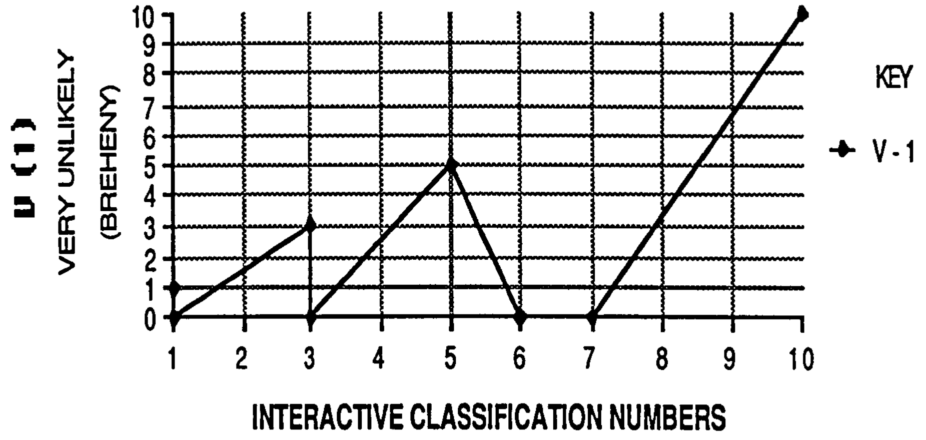


RESEARCH PROPOSAL

FIGURE 6.2.-1 • M.C.S.A.M. TEST IN B.A.G.S. N.A.S.P.

Data from "BRAZIL-A.S.-M.C.S.A.M.-SAMPLE"

6.1.3. FIGURE 6.2.-2 shows the variation of "V" and the interactive classification numbers• This diagram shows how the "very unlikely balance" aspect of planning may respond to the interactive analysis when the political context for planning is proposed to change within the actual Brazilian N.A.S.P.•

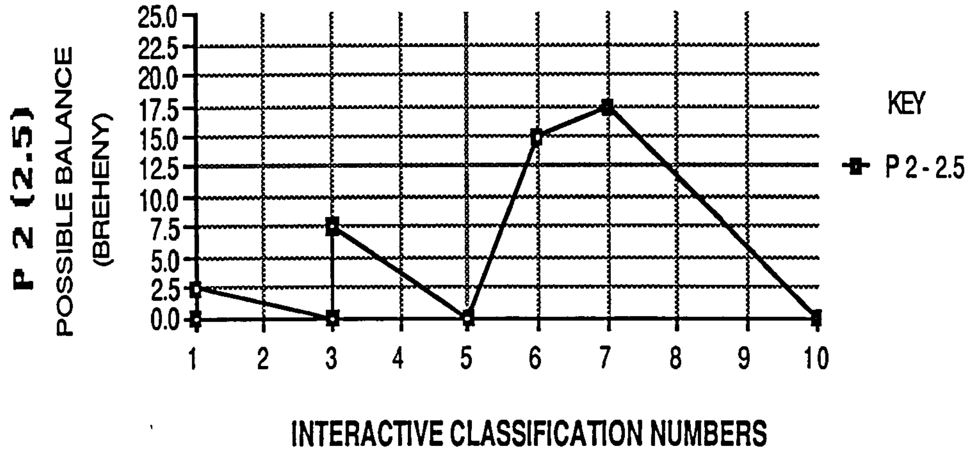


RESEARCH PROPOSAL

FIGURE 6.2.-2 • M.C.S.A.M. TEST IN B.A.G.S. N.A.S.P.

Data from "BRAZIL-A.S.-M.C.S.A.M.-SAMPLE"

6.1.4. FIGURE 6.2.-3 shows the variation of "**P2**" and the interactive classification numbers• This diagram shows how the "possible balance" between the political context and the planning methods may react against the interactive analysis within the actual Brazilian N.A.S.P.•

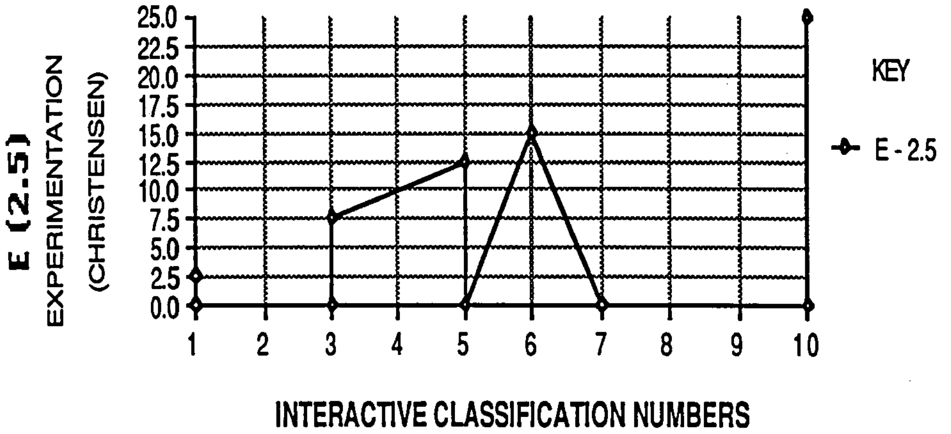


RESEARCH PROPOSAL

FIGURE 6.2.-3 • M.C.S.A.M. TEST IN B.A.G.S. N.A.S.P.

Data from "BRAZIL-A.S.-M.C.S.A.M.-SAMPLE"

6.1.5. FIGURE 6.2.-4 shows the variation of "**E**" and the interactive classification numbers• This diagram shows how the "experimentation" in planning may respond to an interactive analysis within the actual Brazilian N.A.S.P.•



RESEARCH PROPOSAL

FIGURE 6.2.-4 • M.C.S.A.M. TEST IN B.A.G.S. N.A.S.P.

Data from "BRAZIL-A.S.-M.C.S.A.M.-SAMPLE"

6.1.6. FIGURE 6.2.-5 shows the major concentration of interactive numbers given to the four identified preferred planning aspects of the supporting planning theories, i.e., numbers **1, 3, 10** and **5**• From this diagram it is possible to identify a major concentration around the interactive number **1,** which means all preferred aspects had a low level of interactive number due to the low level of interactive planning analysis within the actual Brazilian N.A.S.P. practices• The high concentration of the aspect "very unlikely balance" around interactive numbers **10** and **5** means the high domain of this aspect of planning over the few high interactive numbers given to the planning factors and goals, i.e., even the existence of some few high interactive planning factors and goals within the actual Brazilian N.A.S.P. planning practices still have high influence over the "very unlikely balance between the necessary planning sensitivity towards the political context, and the choice of the adequate planning methods"•

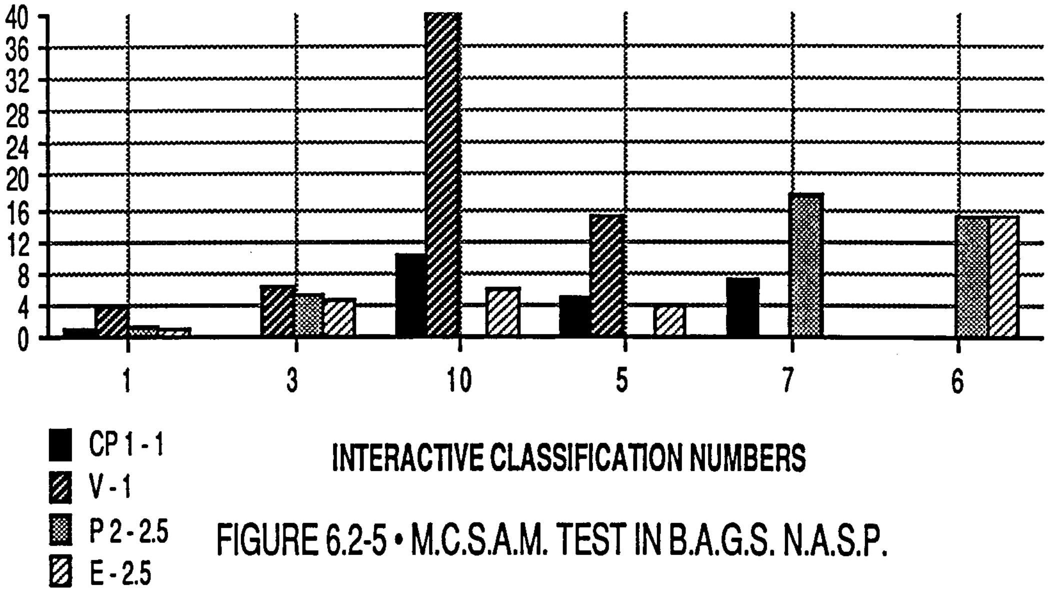


FIGURE 6.2-5 • M.C.S.A.M. TEST IN B.A.G.S. N.A.S.P.

Data from "BRAZIL-A.S.-M.C.S.A.M.-SAMPLE"

6.1.6. FIGURE 6.2.-6 up to FIGURE 6.2.-8 show the relationships between the resulting cumulative weight rank, and the three supporting theories• The diagrams express the ways which the different supporting planning theories may respond differently to the same cumulative weight rank• This may indicate that the characteristics of both the planning context and the planning environment can be altered without necessarily changing the cumulative weight rank, i.e., it is possible to promote considerable changes within the actual Brazilian N.A.S.P. planning context and the planning environment, within a relatively small interactive analysis or low cumulative weight•

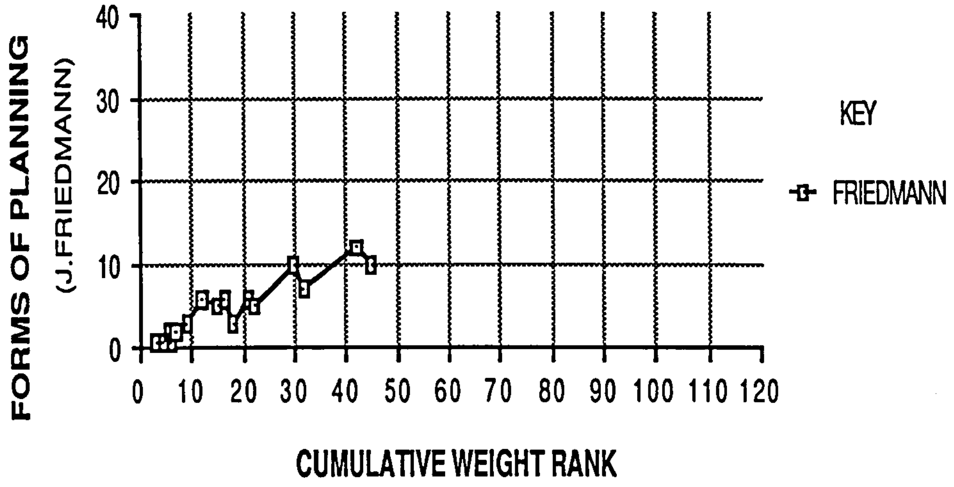


FIGURE 6.2.-6 • M.C.S.A.M. TEST IN B.A.G.S. N.A.S.P.

Data from "BRAZIL-A.S.-M.C.S.A.M.-SAMPLE"

6.1.7. FIGURE 6.2.7. shows the variation of "Planning context & Planning methods" within the cumulative weight rank•

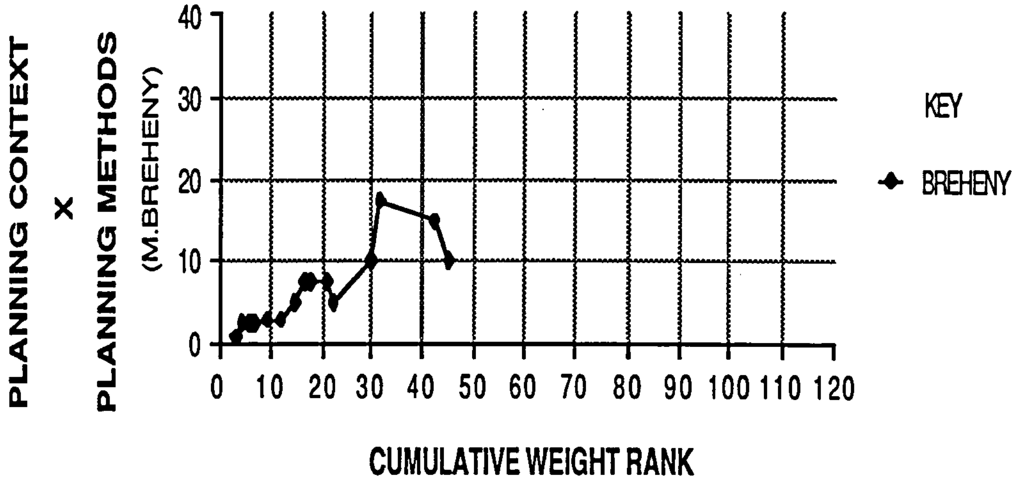


FIGURE 6.2.-7 • M.C.S.A.M. TEST IN B.A.G.S. N.A.S.P.

Data from "BRAZIL-A.S.-M.C.S.A.M.-SAMPLE"

6.1.8. FIGURE 6.2.-8 shows the variation of "Uncertainty in Planning" within the cumulative weight rank•

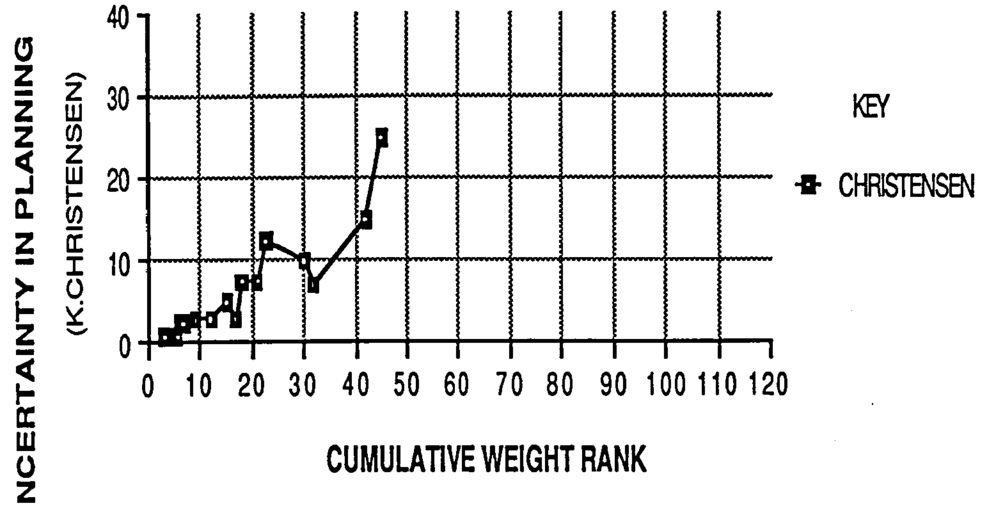


FIGURE 6.2.-8 • M.C.S.A.M. TEST IN B.A.G.S. N.A.S.P.

Data from "BRAZIL-A.S.-M.C.S.A.M.-SAMPLE"

6.1.9. FIGURE 6.2.-9 shows the major contribution of the different supporting planning theories towards the cumulative weight rank• The "Planning context & Planning methods" has significant contribution to **30, 31.5, 18,** and **42** points of the rank, which means that this particular planning theory has more influence upon these mentioned preferred common planning factors and goals• The "Planning context & Planning methods", and "Uncertainty in Planning" are the two most influential supporting planning theories within the actual Brazilian N.A.S.P. practices, and any change should necessarily take in consideration these theories, specially concerning the indication the adequacy of planning methods, and a better level of information about "bargaining"•

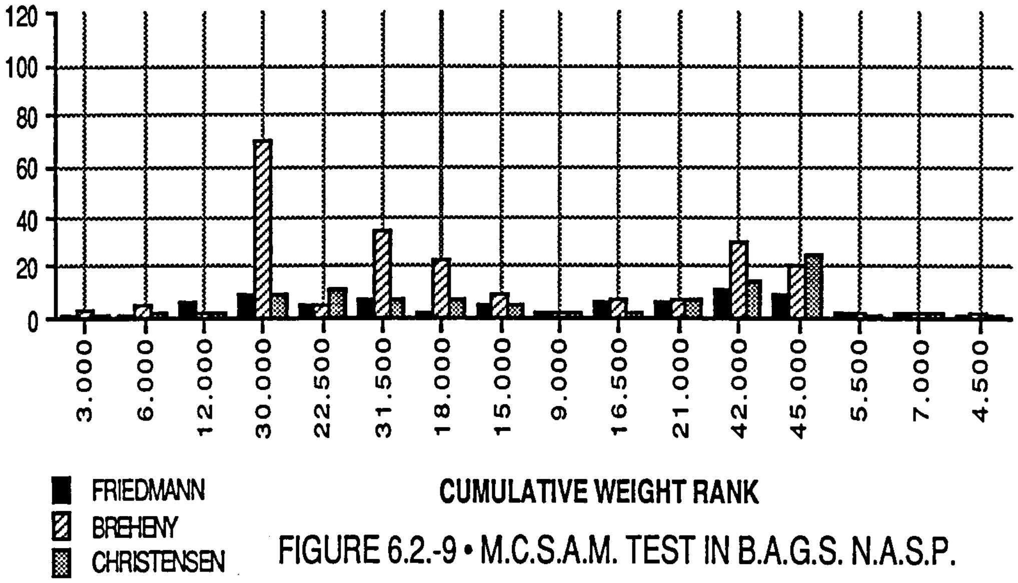


FIGURE 6.2.-9 • M.C.S.A.M. TEST IN B.A.G.S. N.A.S.P.

Data from "BRAZIL-A.S.-M.C.S.A.M.-SAMPLE"

6.1.10. FIGURE 6.2.-10 shows the low level of cumulative weight and the almost uniform contribution of all the three supporting planning theories over the common planning factors and goals• This diagram is an indication of the large susceptibility for change within the actual Brazilian N.A.S.P. planning practices, i.e., it is possible to promote planning improvement by assessing any one of the three supporting planning theories•

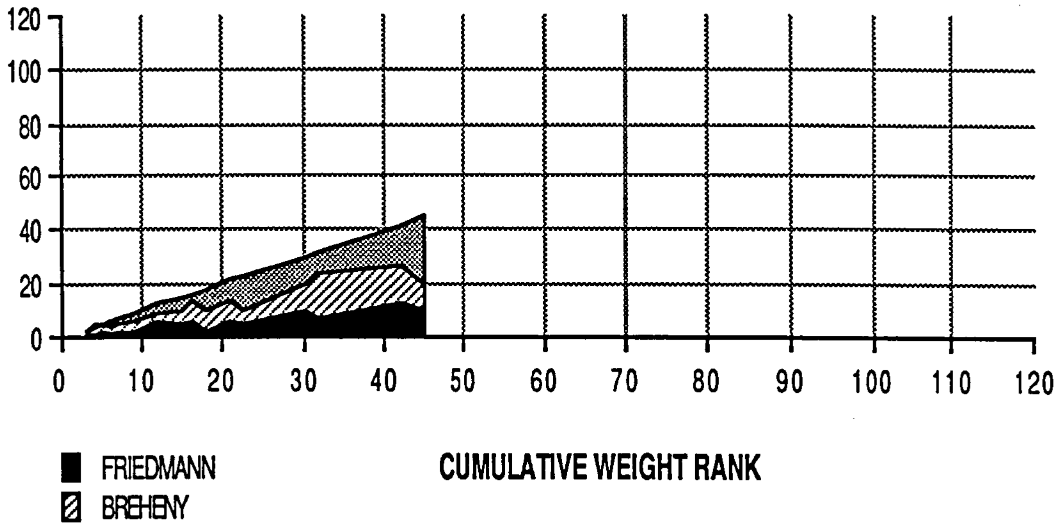


FIGURE 6.2.-10 • M.C.S.A.M. TEST IN B.A.G.S. N.A.S.P.

Data from "BRAZIL-A.S.-M.C.S.A.M.-SAMPLE"

6.1.11. These are some instruments for the interpretation of the actual Brazilian N.A.S.P. planning context and planning environment according to the selected supporting planning theories• The next stage should be a series of recommendations and proposals from the multi-disciplinary planning actors, in order to gradually promote the evolution of the Brazilian N.A.S.P. planning practices• Those recommendations should include actions within all organizational and technical levels of the planning environment•

6.1.12. FIGURE 6.2.-11 up to FIGURE 6.2.-14 show the variation of the preferred aspects of planning in relationships to the cumulative weight rank• These diagrams seem indicate how to promote higher cumulative weight within the supporting planning theories, i.e., the actual Brazilian N.A.S.P. practices could evolve by changing some planning aspects• The diagram below shows that "**CP1**" is much more present within the low levels of cumulative weight say for instance up to **20**•

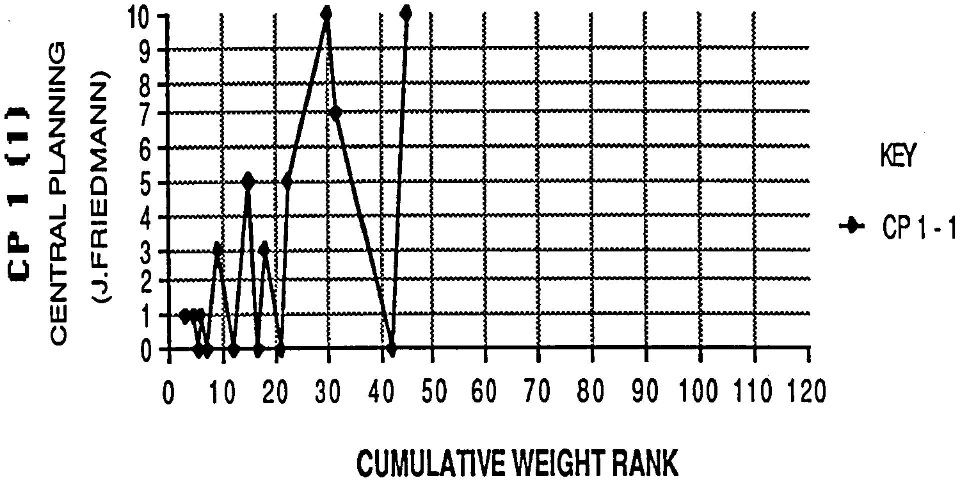


FIGURE 6.2.-11 • M.C.S.A.M. TEST IN B.A.G.S. N.A.S.P.

Data from "BRAZIL-A.S.-M.C.S.A.M.-SAMPLE"

6.1.13. FIGURE 6.2.-12 shows that also "**V**" is present in almost all the levels of cumulative weight•

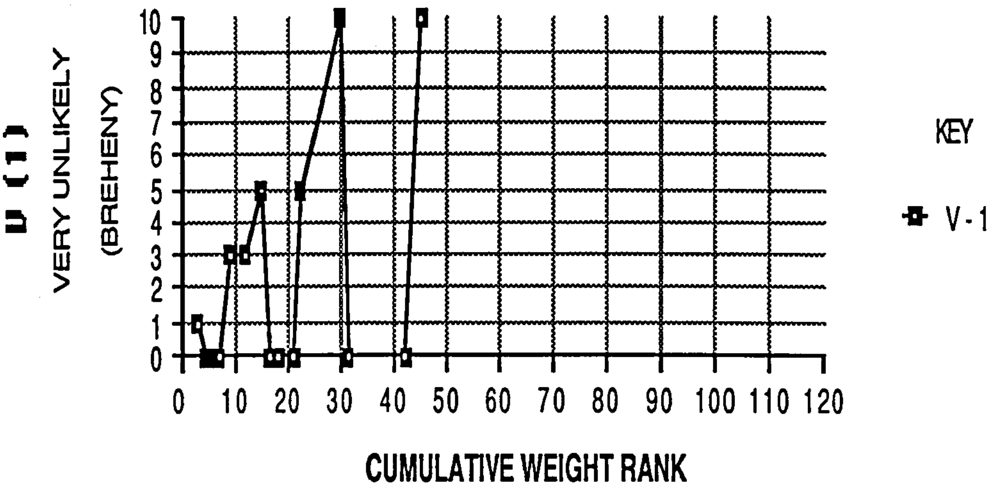


FIGURE 6.2.-12 • M.C.S.A.M. TEST IN B.A.G.S. N.A.S.P.

Data from "BRAZIL-A.S.-M.C.S.A.M.-SAMPLE"

6.1.14. FIGURE 6.2.-13 shows that "**P2**" is much more present up to the cumulative weight **20**•

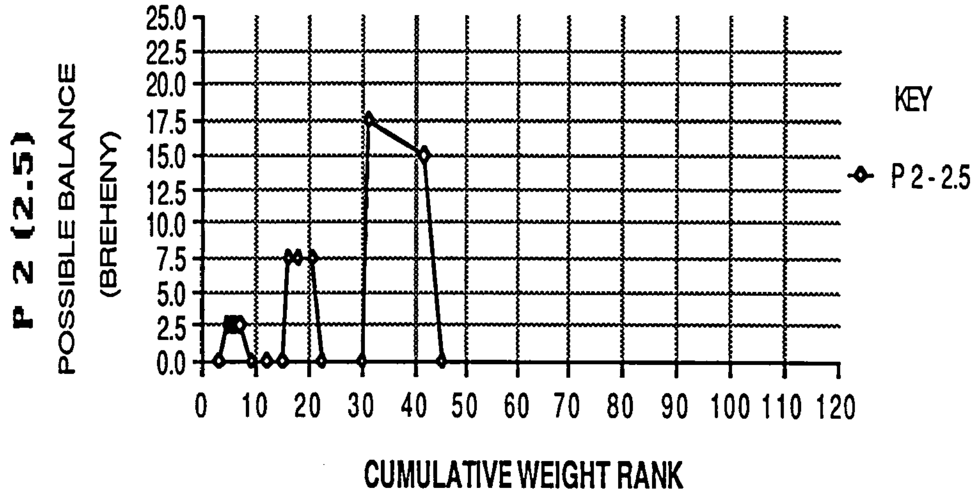


FIGURE 6.2.-13 • M.C.S.A.M. TEST IN B.A.G.S. N.A.S.P.

Data from "BRAZIL-A.S.-M.C.S.A.M.-SAMPLE"

6.1.15. FIGURE 6.2.-14 shows that "E" is very much present within the cumulative weight **20**•

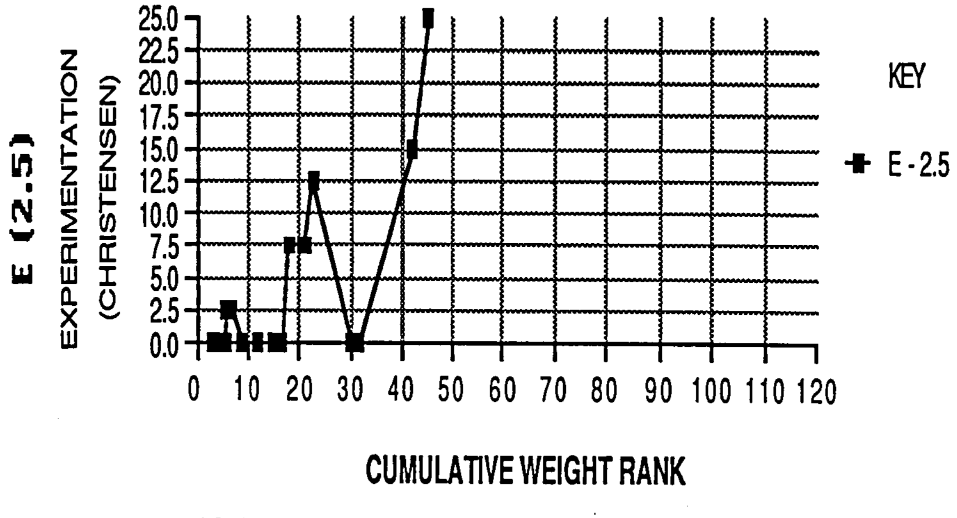


FIGURE 6.2.-14 • M.C.S.A.M. TEST IN B.A.G.S. N.A.S.P.

Data from "BRAZIL-A.S.-M.C.S.A.M.-SAMPLE"

6.1.16. FIGURE 6.2.-15 shows the different contribution of the preferred aspects of planning towards the cumulative weight rank• The aspect "V" or "very unlikely balance" has a clear major contribution to the **30** points, which means that this particular aspect of planning is much more influential over the preferred common planning factors and goals with **30** points• The actual Brazilian N.A.S.P. matrix indicates **7** common planning factors and goals with **30** points in the cumulative weight rank, which means they are very much under "very unlikely balance" concerning to their planning characteristics•

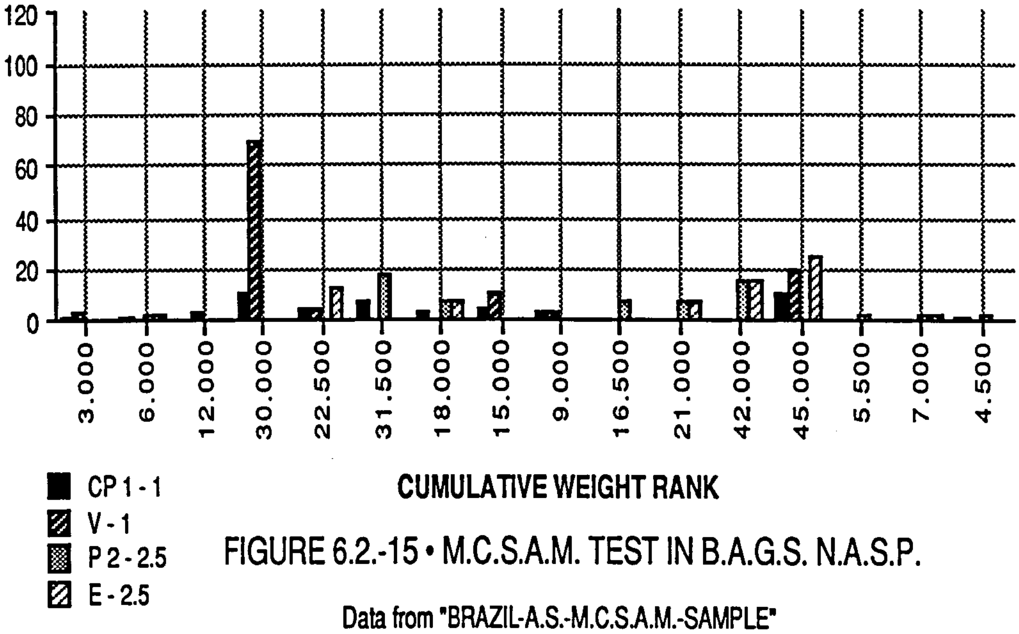


FIGURE 6.2.-15 • M.C.S.A.M. TEST IN B.A.G.S. N.A.S.P.

Data from "BRAZIL-A.S.-M.C.S.A.M.-SAMPLE"

6.1.17. FIGURE 6.2.-16 shows the different contribution of the preferred aspects of planning over the cumulative weight rank• The low level of interaction in general within the actual Brazilian N.A.S.P. practices is clear, and confirms the major contribution of "E" or "experimentation" over the cumulative weights with more than **30** points•

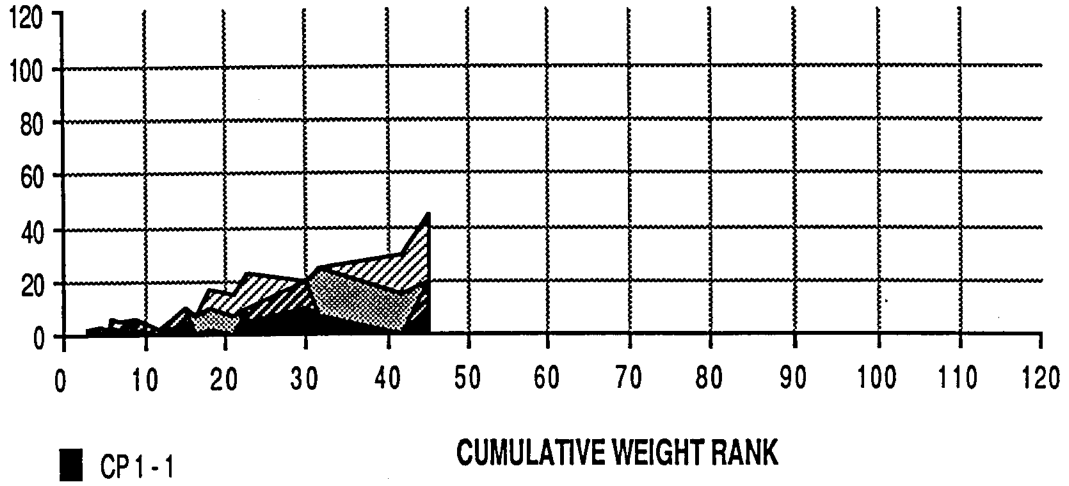


FIGURE 6.2.-16 • M.C.S.A.M. TEST IN B.A.G.S. N.A.S.P.

Data from "BRAZIL-A.S.-M.C.S.A.M.-SAMPLE"

6.1.18. FIGURE 6.2.-17 shows the relationships between the interactive classification numbers and the cumulative weight rank• This diagram can be useful in understanding the effects of the interactive system planning on the cumulative weight rank and vice-versa, and how to promote a continuous interactive planning policy without gaps and weakness as for instance between the 30 and 40•

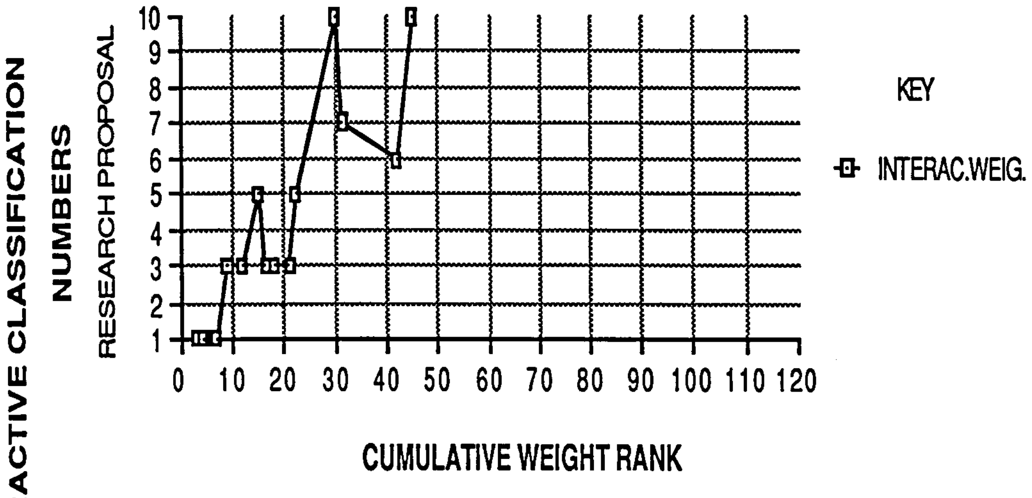


FIGURE 6.2.-17 • M.C.S.A.M. TEST IN B.A.G.S. N.A.S.P.

Data from "BRAZIL-A.S.-M.C.S.A.M.-SAMPLE"

6.3. The M.C.S.A.M. application test in the Brazil Low Growth Scenario(B.L.G.S.) N.A.S.P. and interpretation of the results:

• In this section the Brazil Low Growth Developmental Scenario has been designed according to FIGURE 6.3.-1, and the resulting matrix from the M.C.S.A.M. application test in the Brazilian Low Growth Scenario N.A.S.P. is presented through TABLE 6.3.-1• After the same calculation and check routine on the matrix its hypothetical N.A.S.P. methodology and hypothetical planning context have been identified, as follows:

1. The preferred planning factors and goals from the Brazil Low Growth Scenario(B.L.G.S.) N.A.S.P. matrix:

1.1. In this section the cumulative weight rank from the preferred common planning factors and goals of the B.L.G.S. N.A.S.P. matrix are identified and interpreted:

1.1.1. The 32 entered items resulted in 9 ranking groups and the average rank number was 5º•

1.1.2. There are two with the highest cumulative weight which are the nº25 or "National population growth" and nº26 or "National pricing policy", both of them with 45 points•

1.1.3. There are seven with 30 points which is the second highest cumulative weight and they are as follows:

nº19 or "National environmental issues",
nº18 or "National economic growth",
nº9 or "Income per capita",
nº8 or "G.N.P. growth",
nº7 or "Federal planning agencies",
nº6 or "Federal planning implementation policy", and
nº5 or "Federal planning co-ordination".

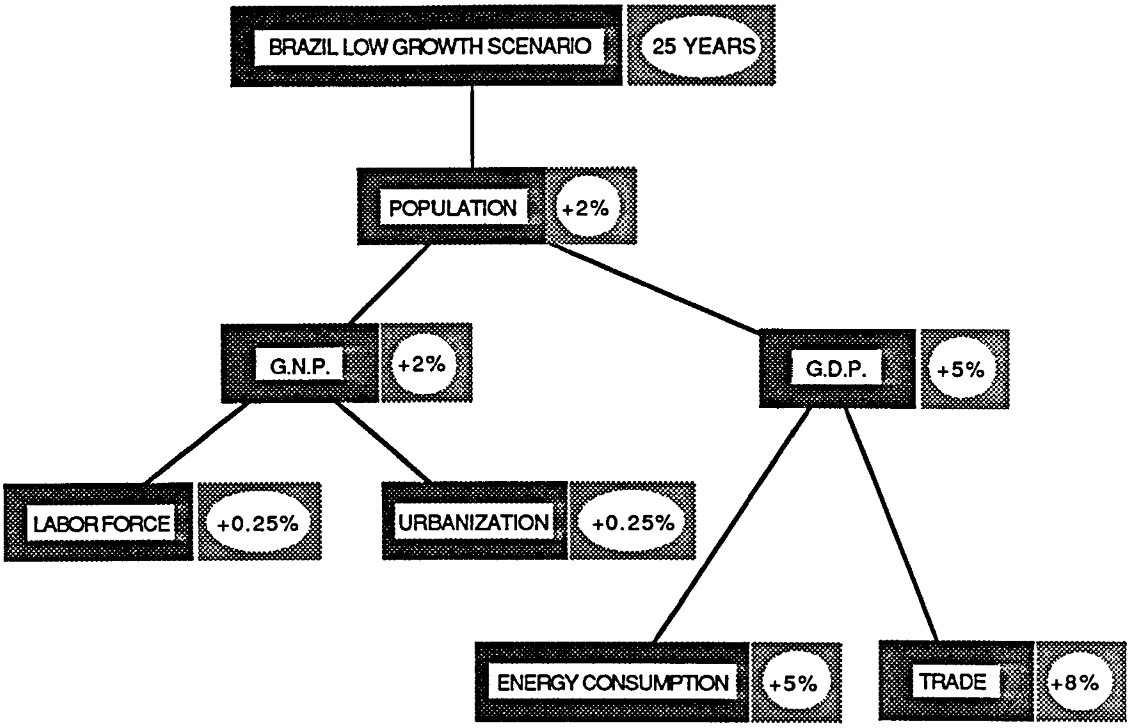


FIGURE 6.3.-1
BRAZIL LOW GROWTH DEVELOPMENTAL SCENARIO
BASED ON HIRSCHHORN (1980)

1.1.4. There are three entries with 22.5 and 21 points, respectively in third and fourth place in the weight rank, and they are as follows:

nº12 or "National airport movement in terms of total passengers throughput",
nº11 or "National airport movement in terms of total aircraft movement",
nº10 or "National airport classification",
nº27 or "National propensity to fly",
nº23 or "National air seat utilization", and
nº22 or "National air seat offer".

1.1.5. There are eight with 3 points which is simultaneously the lowest place in the cumulative weight rank and the highest number of preferred common planning factors and goals, and they are as follows:

nº32 or "Deregulation",
nº31 or "Public participation",

nº28 or "National spatial distribution",
nº24 or "National transport modal split",
nº21 or "National air transport system economic growth",
nº17 or "National demand to fly",
nº16 or "National investment in airport infrastructure", and
nº1 or "Accessibility".

2. The identification of the B.L.G.S. N.A.S.P. methodology framework:

2.1. After the analysis of the resulting preferred common planning factors and goals from the B.L.G.S. N.A.S.P. matrix, it is possible to build up the following framework:

2.1.1. From the operational point of view the B.L.G.S. N.A.S.P. methodology is heavily dependent on the following factors:

a. national airport movement in terms of total passengers throughput,
b. national airport movement in terms of total aircraft movement,
c. national airport classification, and
d. national air seat utilization.

2.1.2. From the economic point of view the B.L.G.S. N.A.S.P. methodology is very sensitive to the following indicators:

e. national population growth,
f. national economic growth,
g. income per capita,
h. G.N.P. growth, and
i. national propensity to fly.

2.1.3. From the policy point of view the B.L.G.S. N.A.S.P. methodology is very sensitive to the following issues:

j. national pricing policy, and
k. national environmental issues.

2.1.4. From the planning point of view the B.L.G.S. N.A.S.P. methodology is very sensitive to the following aspects:

l. federal planning agencies,
m. federal planning implementation policy,
n. federal planning co-ordination, and
o. national air seat offer.

2.1.5. It is important to point out the fact that there are eight entries with the lowest weight in the cumulative rank, which means that these entries are potentially the less effective planning factors and goals, within the hypothetical Brazilian Low Growth Scenario• These eight entries have been qualified according to the following criteria;

2.1.5.1. From the economic point of view the following entries have been classified in the last place of the cumulative weight rank:

p. national air transport system economic growth, and
q. national demand to fly.

2.1.5.2. From the policy point of view the following entries have been placed in last within the cumulative weight rank:

r. deregulation, and
s. public participation.

2.1.5.3. From the planning point of view these are the entries placed in last within the cumulative weight rank;

t. national spatial distribution,
u. national transport modal split,
v. national investment in airport infrastructure, and
w. accessibility.

2.1.6. From the above matrix indication and from the planning point of view it is possible to conclude that the designed Brazilian Low Growth Scenario would bring consequently a worse N.A.S.P. methodology compared to the one which was identified within the Brazilian Actual Growth Scenario•

3. The preferred supporting planning theories of the B.L.G.S. N.A.S.P. matrix:

3.1. In this section the cumulative weight rank from the preferred supporting planning theories of the B.L.G.S. N.A.S.P. are identified and interpreted:

3.1.1. Initially the analysis is made onthe first supporting planning theory entered into the B.L.G.S. N.A.S.P. matrix which is "forms of planning", and the "**CP1**" or "central planning" is the highest aspect with 118 points and the "**PP1**" or "policies planning" is the second one with 30 points• The "**CP2**" or "corporate planning" and the "**PP2**" or "participatory planning" have not been quoted by the matrix• Consequently, as expected the low growth scenario would not bring a better set of conditions to improve the actual Brazilian N.A.S.P. practices•

3.1.2. The second supporting planning theory entered into the B.L.G.S. N.A.S.P. matrix is "planning context & planning methods", and "**V**" or "very unlikely balance" is the highest aspect within the cumulative weight rank with 105 points, and the "**P2**" or "possible balance within a simple political context" is the second place of the weight rank with 68.5 points• None of the other two aspects of this supporting planning theory were quoted by the matrix, i.e., neither "**P1**" or "possible balance within a complex political context", nor "**L**" or "likely balance between the political context and the adopted planning methods"• These results give a clear idea about the hypothetical N.A.S.P. practices within the designed low growth scenario for Brazil, which may well be as bad as the identified within the actual Brazilian N.A.S.P. practices•

3.1.3. The third supporting planning theory entered into the B.L.G.S. N.A.S.P. matrix is "uncertainty in planning", and the "E" or "experimentation" is the first in the weight rank with 100 points • The "C" or "chaos" is the second aspect with 93 points• The other two aspects "bargaining" and "programming" have not been quoted by the matrix• Once again these results do not describe a better set of circumstances for the Brazilian N.A.S.P. practices compared to the one identified within the actual Brazilian N.A.S.P. practices•

4. The interactive analysis of the B.L.G.S. N.A.S.P. matrix:

4.1. In this section the interactive classification given to the B.L.G.S. N.A.S.P. planning factors and goals are analysed and interpreted within the others results obtained in the matrix:

4.1.1. Before the matrix calculation, a total of 133 points were given by the interactive system planning analysis to the 32 entered items, which represents an average of 4.15 points per item• After the matrix calculation a total of 514.5 weight points were given to the items, with an average of 16.07 weight points to each item• These results will be useful within the forthcoming comparative analysis•

5. The identification of the planning context and planning environment within which the B.L.G.S. N.A.S.P. would be practiced:

5.1. The preferred supporting planning theories obtained from the matrix were analysed to produce the following B.L.G.S. N.A.S.P. Planning Methodology Label:

THE BRAZIL LOW GROWTH SCENARIO N.A.S.P. LABEL

"The Brazilian N.A.S.P. methodology has been identified within a hypothetical low growth scenario which would result consequently in a low interactive, in contrast to a highly central planning practices society, with a very unlikely balance between the extremely complex political context and the also complex planning methods, which would be adopted under a dominant experimentation and chaotical level of uncertainty"•

MULTIDISCIPLINARY ANALYSIS OF AIR TRANSPORT PLANNING METHODOLOGIES

MULTIPLE
CROSS
SYSTEM
ANALYSIS
MATRIX
= **M.C.S.A.M.**

M.C.S.A.M. APPLICATION TEST IN THE BRAZIL N.A.S.P. WITHIN THE LOW GROWTH SCENARIO

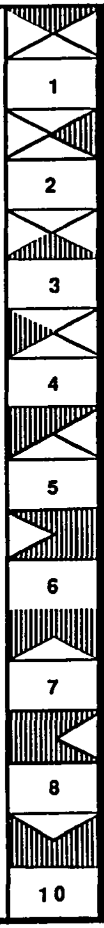
INVESTIGATION FIELD	
APPLICATION FIELD	•

FOCUSED PLANNING LEVEL	
NATIONAL	•
REGIONAL	
STATE	
AREA	
LOCAL	

SELECTED PLANNING FACTORS AND GOALS OF THE FOCUSED PLANNING FIELD

INTERACTIVE ANALYSIS

LEVELS OF PLANNING FACTORS AND GOALS INTERACTION



IDENTIFIED ELEMENTS OR SUB-SYSTEMS WITHIN THE FOCUSED PLANNING FIELD

1	AIRPORT NETWORK	AIRPORT SYSTEM	AIRPORT •
2	AIROUTE NETWORK	AIROUTE	AIRLINE-SERVICE •
3	AEROSPACE INDUSTRY	AIRCRAFT FLEET	AIRCRAFT •
4	NATIONAL •	STATE REGIONAL	LOCAL AREA

	MULTI-OBJECTIVE PLANNING FACTORS AND GOALS	DIMENSIONAL EXPRESSION	INTERACTIVE CLASSIFICATION NUMBERS	INTERACTIVE COMBINATION SYMBOLS	FORMS OF PLANNING (FRIEDMANN-1973)				PLANNING CONTEXT X PLANNING METHODS (BREHENY-1986)				UNCERTAINTY IN PLANNING (CHRISTENSEN-1985)				INTERACTIVE COMMON FACTORS		COMMENTS
					CP1	PP1	CP2	PP2	V	P2	P1	L	C	B	E	P	CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	
					1	2	3	4	1	2.5	2.5	4	1	2.5	2.5	4			
1	ACCESSIBILITY POLICY	FREQUENCY AND JOURNEY COST		1	1				1				1				3	9º	• LOWEST CUMULATIVE WEIGH
2	AEROSPACE INDUSTRY PROFITABILITY	ECONOMIC RATIO		1	1			-		2.5					2.5		6	7º	
3	AIRPORT SYSTEM PROFITABILITY	ECONOMIC RATIO		1	1					2.5					2.5		6	7º	
4	AIRLINE SYSTEM PROFITABILITY	ECONOMIC RATIO		3		6			3				3				12	5º	
5	FEDERAL PLANNING CO-ORDINATION	G-B-M-NA		10	10				10				10				30	2º	
6	FEDERAL PLANNING IMPLEMENTATION POLICY	G-B-M-NA		10	10				10				10				30	2º	
7	FEDERAL PLANNING AGENCIES	G-B-M-NA		10	10				10				10				30	2º	
8	G.N.P.-US$ AND % GROWTH	H-M-L		10	10				10				10				30	2º	
9	INCOME PER CAPITA-US$ AND % GROWTH.	H-M-L		10	10				10				10				30	2º	
10	NATIONAL AIRPORT CLASSIFICATION	G-B-M-NA		5	5				5						12.5		22.5	3º	
11	NAT.AIRPORT MOVEMENT AND AIRCRAFT MOVEMENT	H-M-L		5	5					12.5			5				22.5	3º	
12	NATIONAL AIRPORT MOVEMENT AND PAX THROUGHPUT	H-M-L		5	5					12.5			5				22.5	3º	
13	NATIONAL AIRPORT NETWORK- GENERAL NUMBER	H-M-L		1	1					2.5					2.5		6	7º	
14	NATIONAL AIRPORT NETWORK PER CATEGORY NUMBER	H-M-L		1	1					2.5					2.5		6	7º	
15	NATIONAL AIRPORT NETWORK PER CITY PAIR NUMBER	H-M-L		1	1					2.5					2.5		6	7º	
16	NAT.CAPITAL INVESTMENT IN AIRPORT INFRASTRUCT.	US$ AND % VARIATION PER YEAR		1	1				1				1				3	9º	• LOWEST CUMULATIVE WEIGH
17	NATIONAL DEMAND TO FLY	PAX MOV.-AIR.MOV./L.F.-AIR.MIX		1	1				1				1				3	9º	• LOWEST CUMULATIVE WEIGH
18	NATIONAL ECONOMIC GROWTH	ECONOMIC RATIO		10	10				10				10				30	2º	
19	NATIONAL ENVIRONMENTAL ISSUE	G-M-B-NA		10	10				10				10				30	2º	
20	NATIONAL FLEET COMPOSITION	A-B-C-D		1		2				2.5			1				5.5	8º	
21	NATIONAL AIR-TRANSPORT SYSTEM ECONOMIC GROW.	ECONOMIC RATIO		1	1				1				1				3	9º	• LOWEST CUMULATIVE WEIGH
22	NATIONAL AIR SEAT OFFER	NR.SEATS/YEAR AND % VAR.		3		6				7.5					7.5		21	4º	
23	NATIONAL AIR SEAT UTILIZATION	NR.SEATS/PAX YEAR AND % VAR.		3		6				7.5					7.5		21	4º	
24	NATIONAL TRANSPORT MODAL SPLIT	% 1-% 2-% 3-% 4		1	1				1				1				3	9º	• LOWEST CUMULATIVE WEIGH
25	NATIONAL POPULATION GROWTH	NR. INHABITANTS/YEAR AND % VAR.		10	10				10						25		45	1º	* HIGHEST CUMULATIVE WEIGH
26	NATIONAL PRICING POLICY	H-M-L-NA		10	10				10						25		45	1º	* HIGHEST CUMULATIVE WEIGH
27	NATIONAL PROPENSITY TO FLY	NR.INH./NR.SEAT UTIL. AND % VAR.		3		6				7.5					7.5		21	4º	
28	NATIONAL SPATIAL DISTRIBUTION	NR.CITY AND AVERAGE DISTANCE		1	1				1				1				3	9º	• LOWEST CUMULATIVE WEIGH
29	NATIONAL SUPPLY POLICY	H-M-L-NA		1		2				2.5			1				5.5	8º	
30	NATIONAL TRAVELLERS CHARACTERISTICS	BUSINESS-TOURISM-COMMUTER-OTHERS		1		2				2.5					2.5		7	6º	
31	PUBLIC PARTICIPATION POLICY	H-M-L-NA		1	1					1			1				3	9º	• LOWEST CUMULATIVE WEIGH
32	DEREGULATION	H-M-L-NA		1	1				1				1				3	9º	• LOWEST CUMULATIVE WEIGH
	FOCUSED PLANNING SCENARIO	SUPPORTING THEORIES RANK →	41.5 %	133	118	30	-	-	105	68.5	-	-	93	-	100	-	514.5	-	◄-TOTAL CUMULATIVE WEIGHT
			-	-	1º	2º	-	-	1º	2º	-	-	2º	-	1º	-	-	5º	◄ AVERAGE COM. FA. RANK
		AVERAGE CLASSIFICATION →	-	4.15	4.72	4.28	-	-	5.83	4.89	-	-	4.65	-	8.33	-	16.07	-	◄ AVERAGE CUMULATIVE W

FOCUSED PLANNING HORIZON

ACTUAL		MEDIUM-TERM	
SHORT-TERM		LONG-STRATEGIC	•

FOCUSED PLANNING SCENARIO

CURRENT		MEDIUM GROWTH	
HIGH GROWTH		LOW GROWTH	•

• THE BRAZILIAN N.A.S.P. METHODOLOGY HAS BEEN IDENTIFIED WITHIN A HYPOTHETICAL LOW GROWTH SCENARIO WHICH WOULD RESULT CONSEQUENTLY IN A LOW INTERACTIVE IN CONTRAST TO A HIGHLY CENTRAL PLANNING PRACTICES SOCIETY, WITH A VERY UNLIKELY BALANCE BETWEEN THE EXTREMELY COMPLEX POLITICAL CONTEXT AND THE ALSO COMPLEX PLANNING METHODS, WHICH WOULD BE ADOPTED UNDER A DOMINANT EXPERIMENTATION AND CHAOTICAL LEVEL OF UNCERTAINTY •

TABLE 6.3.-1
THE M.C.S.A.M. APPLICTION TEST IN THE BRAZIL N.A.S.P. WITHIN THE LOW GROWTH SCENARIO
(RESEARCH SOURCE)

6.4. The M.C.S.A.M. application test in the Brazil Medium Growth Scenario(B.M.G.S.) N.A.S.P. and interpretation of the results:

• The Brazil Medium Growth Developmental Scenario has been designed according to FIGURE 6.4.-1, and the resulting matrix from the M.C.S.A.M. application test in the Brazilian Medium Growth Scenario N.A.S.P. is presented through TABLE 6.4.-1• The calculation and check of the matrix has been done within the same routine, and its hypothetical N.A.S.P. methodology and hypothetical planning context have been identified, as follows:

1. The preferred planning factors and goals from the Brazil Medium Growth Scenario(B.M.G.S.) N.A.S.P. matrix:

1.1. In this section the cumulative weights from preferred common planning factors and goals of the B.M.G.S. N.A.S.P. are identified and interpreted:

1.1.1. The 32 entries items resulted in 13 ranking groups and the average rank number was 6º•

1.1.2. There is just one with 110 points which is the highest cumulative weight in the rank, and this is the nº21 or "National air transport system economic growth"•

1.1.3. There are two in second place of the cumulative weight rank with 100 points and they are; nº13 or "National airport network general number", and nº14 or "National airport network per category number"•

1.1.4. There are seven entries with 95 points which is the third place in the cumulative weight rank, and they are as follows:

nº8 or "G.N.P. growth",
nº9 or "Income per capita",
nº10 or "National airport classification",
nº15 or "National airport network per city pair number",
nº16 or "National capital investment in airport infrastructure",
nº18 or "National economic growth", and
nº25 or "National population growth".

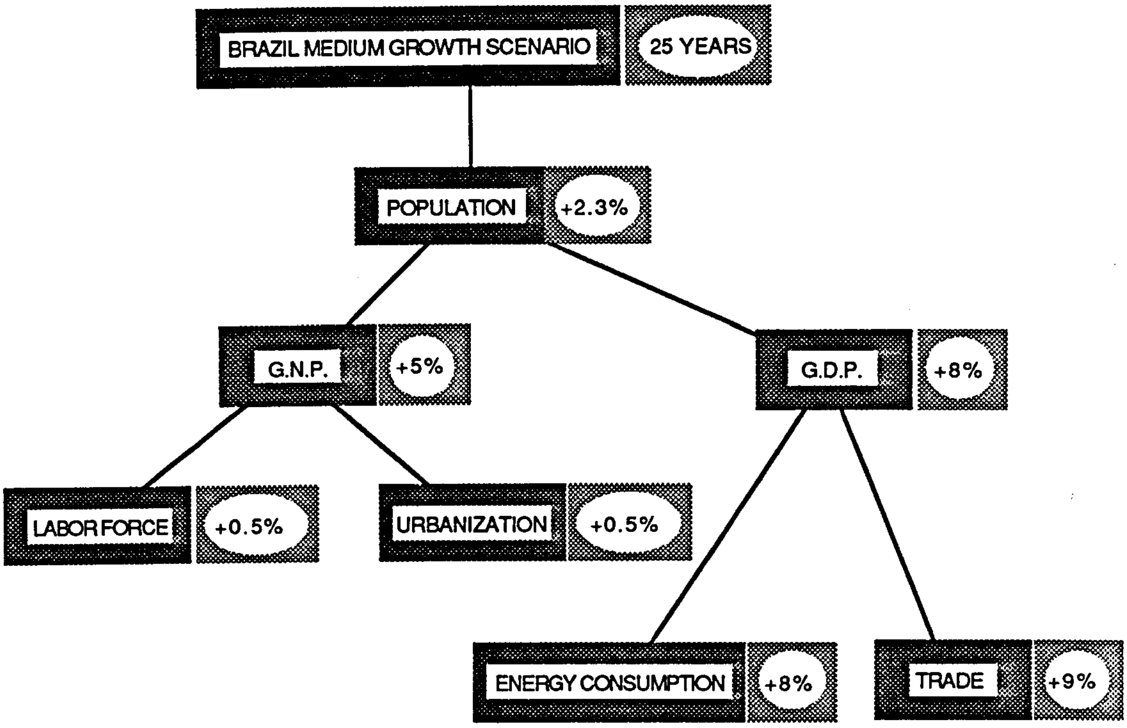


FIGURE 6.4.-1
BRAZIL MEDIUM GROWTH DEVELOPMENTAL SCENARIO
BASED ON HIRSCHHORN (1980)

1.1.5. There is just one with 85 points in fourth place of the cumulative weight rank, which is the nº24 "National transport modal split"•

1.1.6. There are eight entries with 80 points which is respectively the fifth place in the cumulative weight rank, and also the highest number of preferred common planning factors and goals in the rank, and they are as follows:

nº11 or "National airport movement in terms of total aircraft movement",
nº12 or "National airport movement in terms of total number of passengers throughput",
nº17 or "National demand to fly",
nº22 or "National air seat offer",
nº23 or "National air seat utilization",
nº27 or "National propensity to fly",
nº30 or "National travellers characteristics", and
nº32 or "Deregulation".

1.1.7. There is just one with 28.5 points which is the lowest place in the cumulative weight rank, and this is the nº4 or "Airline system profitability"•

2. The identification of the B.M.G.S. N.A.S.P. methodology framework:

2.1. After the analysis of the resulting preferred common planning factors and goals from the B.M.G.S. N.A.S.P. matrix, it is possible to build up the following framework;

2.1.1. From the operational point of view the B.M.G.S. N.A.S.P. methodology is heavily dependent on the following factors:

a. national airport network general number,
b. national airport classification,
c. national airport network per city pair number,
d. national airport movement in terms of total aircraft movements, and
e. national airport movement in terms of total number of passengers throughput.

2.1.2. From the economic point of view the B.M.G.S. N.A.S.P. methodology is very sensitive to the following indicators:

f. national air transport system economic growth,
g. G.N.P. growth,
h. income per capita,
i. national capital investment in airport infrastructure,
j. national economic growth,
k. national population growth,
l. national demand to fly,
m. national propensity to fly, and
n. national travellers characteristics.

2.1.3. According to the matrix, and from the policy point of view the B.M.G.S. N.A.S.P. methodology is not sensitive to any one of the entries or planning factors and goals• This output may indicate the low level of central policy dependency within the B.M.G.S. N.A.S.P. practices towards the corporate planning practices•

2.1.4. From the planning point of view the B.M.G.S. N.A.S.P. methodology framework is very sensitive to the following aspects:

o. national transport modal split,
p. national air seat offer, and
q. deregulation.

2.1.5. It is very important to point out that the highest number of preferred common planning factors and goals with eight entries is in the fifth place of the cumulative weight rank and not any longer in the last or near the last place of the rank as compared to the other previous Brazilian scenarios, which is an indication of improvement towards a better interactive planning practices within the hypothetical Brazilian medium growth N.A.S.P. practices•

3. The preferred supporting planning theories of the B.M.G.S. N.A.S.P. matrix:

3.1. In this section the cumulative weight rank from the preferred supporting planning theories of the B.M.G.S. N.A.S.P. are identified and interpreted:

3.1.1. Initially the analysis is made on the first supporting planning theory entered into the B.M.G.S. N.A.S.P. matrix which is "forms of planning", and the "**CP2**" or "corporate planning" is the highest aspect with 624 points in the cumulative weight rank of the supporting planning theories• The second place in the rank is the "**PP1**" or "policies planning", and the third aspect in the rank is the "**PP2**" or "participatory planning"• It is important to point out the fact that the "**CP1**" or "central planning" has not been quoted by the matrix which is a positive sign of possible improvement within the hypothetical Brazilian medium growth N.A.S.P. practices•

3.1.2. The second supporting planning theory entered into the B.M.G.S. N.A.S.P. matrix is "planning context & planning methods", and the highest aspect of planning within it is "**P1**" or "possible balance between the still complex political context and the relatively simple planning methods", which would be adopted by the multi-disciplinary planning actors within the hypothetical Brazilian low growth N.A.S.P. practices• The second classified aspect is the "**L**" or "likely balance between the relatively simple political context and the also relatively simple planning methods", which would be adopted within the Brazilian medium growth N.A.S.P. practices• Neither the "**V**" or "very unlikely balance between the political context and the planning methods", nor the "**P1**" or "possible balance between the political context and the planning methods", have been quoted by the matrix, which is a very positive indication of the possible improvements within the Brazilian medium growth N.A.S.P. practices•

3.1.3. The third supporting planning theory entered into the B.M.G.S. N.A.S.P. matrix is "uncertainty in planning", and the "**E**" or "experimentation" is the first aspect classified with 287.5 within this supporting planning theory rank• The second aspect is the "**P**" or "programming" with 260 points, and the third place is given to the "**B**" or "bargaining"• The "**C**" or "chaos" has not been quoted by the matrix• These results are once again a very good indication of the positive way to promote improvements within the Brazilian medium growth N.A.S.P. practices•

4. The interactive analysis of the B.M.G.S. N.A.S.P. matrix:

4.1. In this section the interactive classification given to the B.M.G.S. N.A.S.P. planning factors and goals are analysed and interpreted within the other results obtained in the matrix:

4.1.1. Before the matrix calculation, a total of 253 points were given by the interactive system planning analysis to the 32 entered items, which represents an average of 7.9 points per item• After the matrix calculation a total of 2234.5 weight points were given to the items, with an average of 69.82 weight points to each item• These results will be useful within the forthcoming comparative analysis•

5. The identification of the planning context and planning environment within which the B.M.G.S. N.A.S.P. has been practiced:

5.1. The preferred supporting planning theories obtained from the matrix were analysed to produce the following B.M.G.S. N.A.S.P. Planning Methodology Label;

THE BRAZIL MEDIUM GROWTH SCENARIO N.A.S.P. LABEL

"The Brazilian N.A.S.P. methodology has been identified within a hypothetical medium growth scenario which would result consequently in a highly interactive and extremely high corporate planning practices society, with an equally possible and likely balance between the relatively complex political context and the simple planning methods, which would be adopted under a dominant experimentation towards a programming level of uncertainty"•

MULTIDISCIPLINARY ANALYSIS OF AIR TRANSPORT PLANNING METHODOLOGIES

MULTIPLE
CROSS
SYSTEM
ANALYSIS
MATRIX
= **M.C.S.A.M.**

M.C.S.A.M. APPLICATION TEST IN THE BRAZILIAN N.A.S.P. WITHIN THE MEDIUM GROWTH SCENARIO

FOCUSED PLANNING LEVEL	
NATIONAL	•
REGIONAL	
STATE	
AREA	
LOCAL	

INVESTIGATION FIELD	
APPLICATION FIELD	•

SELECTED PLANNING FACTORS AND GOALS OF THE FOCUSED PLANNING FIELD

LEVELS OF PLANNING FACTORS AND GOALS INTERACTION

IDENTIFIED ELEMENTS OR SUB-SYSTEMS WITHIN THE FOCUSED PLANNING FIELD

INTERACTIVE ANALYSIS		MULTI-OBJECTIVE PLANNING FACTORS AND GOALS	DIMENSIONAL EXPRESSION	INTERACTIVE CLASSIFICATION NUMBERS	INTERACTIVE COMBINATION SYMBOLS	FORMS OF PLANNING (FRIEDMANN-1973)				PLANNING CONTEXT X PLANNING METHODS (BREHENY-1986)				UNCERTAINTY IN PLANNING (CHRISTENSEN-1985)				INTERACTIVE COMMON FACTORS		COMMENTS
						CP1	PP1	CP2	PP2	V	P2	P1	L	C	B	E	P	CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	
						1	2	3	4	1	2.5	2.5	4	1	2.5	2.5	4			
1 AIRPORT NETWORK AIRPORT SYSTEM AIRPORT	1	ACCESSIBILITY POLICY	FREQUENCY AND JOURNEY COST		5		10					12.5			12.5			35	12º	
	2	AEROSPACE INDUSTRY PROFITABILITY	ECONOMIC RATIO		4			12					16			10		38	11º	
	3	AIRPORT SYSTEM PROFITABILITY	ECONOMIC RATIO		5				20			12.5				12.5		45	9º	
	4	AIRLINE SYSTEM PROFITABILITY	ECONOMIC RATIO		3			9					12		7.5			28.5	13º	• LOWEST CUMULATIVE WEIGH
	5	FEDERAL PLANNING CO-ORDINATION	G-B-M-NA		5			15				12.5			12.5			40	10º	
	6	FEDERAL PLANNING IMPLEMENTATION POLICY	G-B-M-NA		5			15				12.5			12.5			40	10º	
	7	FEDERAL PLANNING AGENCIES	G-B-M-NA		5			15				12.5			12.5			40	10º	
	8	G.N.P.-US$ AND % GROWTH	H-M-L		10			30					40			25		95	3º	
2 AIROUTE NETWORK AIROUTE AIRLINE-SERVICE	9	INCOME PER CAPITA-US$ AND % GROWTH	H-M-L		10			30					40			25		95	3º	
	10	NATIONAL AIRPORT CLASSIFICATION	G-B-M-NA		10			30					40			25		95	3º	
	11	NAT.AIRPORT MOVEMENT AND AIRCRAFT MOVEMENT	H-M-L		10			30				25				25		80	5º	
	12	NATIONAL AIRPORT MOVEMENT AND PAX THROUGHPUT	H-M-L		10			30				25				25		80	5º	
	13	NATIONAL AIRPORT NETWORK-GENERAL NUMBER	H-M-L		10		20						40				40	100	2º	
	14	NATIONAL AIRPORT NETWORK PER CATEGORY NUMBER	H-M-L		10		20						40				40	100	2º	
	15	NATIONAL AIRPORT NETWORK PER CITY PAIR NUMBER	H-M-L		10			30					40			25		95	3º	
	16	NAT.CAPITAL INVESTMENT IN AIRPORT INFRASTRUCT.	US$ AND % VARIATION PER YEAR		10			30				25					40	95	3º	
3 AEROSPACE INDUSTRY AIRCRAFT FLEET AIRCRAFT	17	NATIONAL DEMAND TO FLY	PAX MOV.-AIR.MOV./L.F.-AIR.MIX		10			30				25				25		80	5º	
	18	NATIONAL ECONOMIC GROWTH	ECONOMIC RATIO		10			30				25					40	95	3º	
	19	NATIONAL ENVIRONMENTAL ISSUE	G-M-B-NA		5				20			12.5			12.5			45	9º	
	20	NATIONAL FLEET COMPOSITION	A-B-C-D		6			18				15				15		48	7º	
	21	NATIONAL AIR-TRANSPORT SYSTEM ECONOMIC GROW.	ECONOMIC RATIO		10			30					40				40	110	1º	* HIGHEST CUMULATIVE WEIGH
	22	NATIONAL AIR SEAT OFFER	NR.SEATS/YEAR AND % VAR.		10			30				25				25		80	5º	
	23	NATIONAL AIR SEAT UTILIZATION	NR.SEATS/PAX YEAR AND % VAR.		10			30				25				25		80	5º	
	24	NATIONAL TRANSPORT MODAL SPLIT	% 1-% 2-% 3-% 4		10		20						40		25			85	4º	
4 NATIONAL REGIONAL AREA STATE LOCAL	25	NATIONAL POPULATION GROWTH	NR. INHABITANTS/YEAR AND % VAR.		10			30				25					40	95	3º	
	26	NATIONAL PRICING POLICY	H-M-L-NA		5			15					20		12.5			47.5	8º	
	27	NATIONAL PROPENSITY TO FLY	NR.INH./NR.SEAT UTIL. AND % VAR.		10			30				25			25			80	5º	
	28	NATIONAL SPATIAL DISTRIBUTION	NR.CITY AND AVERAGE DISTANCE		5			15				12.5					20	47.5	8º	
	29	NATIONAL SUPPLY POLICY	H-M-L-NA		5			15				12.5			12.5			40	10º	
	30	NATIONAL TRAVELLERS CHARACTERISTICS	BUSINESS-TOURISM-COMMUTER-OTHERS		10			30				25				25		80	5º	
	31	PUBLIC PARTICIPATION POLICY	H-M-L-NA		5			15				12.5			12.5			40	10º	
	32	DEREGULATION	H-M-L-NA		10			30				25			25			80	5º	
			SUPPORTING THEORIES RANK →	79.0%	253	-	70	624	40	-	-	402.5	368	-	182.5	287.5	260	2234.5	-	◄ TOTAL CUMULATIVE WEIGHT
				-	-	-	2º	1º	3º	-	-	1º	2º	-	3º	1º	2º	-	6º	◄ AVERAGE COM. FA. RANK
			AVERAGE CLASSIFICATION →	-	7.90	-	17.5	24	20	-	-	19.16	33.45	-	15.20	22.11	37.14	69.82	-	◄ AVERAGE CUMULATIVE W.

FOCUSED PLANNING HORIZON				FOCUSED PLANNING SCENARIO			
ACTUAL		MEDIUM-TERM		CURRENT		MEDIUM GROWTH	•
SHORT-TERM		LONG-STRATEGIC	•	HIGH GROWTH		LOW GROWTH	

THE BRAZILIAN N.A.S.P. METHODOLOGY HAS BEEN IDENTIFIED WITHIN A HYPOTHETICAL MEDIUM GROWTH SCENARIO WHICH WOULD RESULT CONSEQUENTLY IN A HIGHLY INTERACTIVE AND EXTREMELY HIGH CORPORATE PLANNING PRACTICES SOCIETY WITH AN EQUALLY POSSIBLE AND LIKELY BALANCE BETWEEN THE RELATIVELY COMPLEX POLITICAL CONTEXT AND THE SIMPLE PLANNING METHODS, WHICH WOULD BE ADOPTED UNDER A DOMINANT EXPERIMENTATION TOWARDS A PROGRAMMING LEVEL OF UNCERTAINTY

TABLE 6.4-1
THE M.C.S.A.M. APPLICATION TEST IN THE BRAZIL N.A.S.P. WITHIN THE MEDIUM GROWTH SCENARIO
(RESEARCH SOURCE)

6.5. The M.C.S.A.M. application test in the Brazil High Growth Scenario(B.H.G.S.) N.A.S.P. and interpretation of the results:

• In this section the Brazil High Growth Developmental Scenario has been designed as shown by FIGURE 6.5.-1, and the resulting matrix from the M.C.S.A.M. application test in the Brazilian High Growth Scenario N.A.S.P. is presented in TABLE 6.5.-1• The same routine calculation and check has been done on the matrix, from where the hypothetical N.A.S.P. methodology and the hypothetical planning context of the Brazilian High Growth Scenario have been identified, as follows:

1. The preferred planning factors and goals from the Brazil High Growth Scenario(B.H.G.S.) N.A.S.P. matrix:

1.1. In this section the cumulative weight rank from the preferred common planning factors and goals of the B.H.G.S. N.A.S.P. matrix are identified and interpreted:

1.1.1. The 32 entered items resulted in 8 ranking group and the average rank number was 4º•

1.1.2. There are five with 110 points which is the highest cumulative weight and they are as follows:

nº31 or "Public participation",
nº19 or "National environmental issues",
nº4 or "Airline system profitability",
nº3 or "Airport system profitability", and
nº2 or "Aerospace industry profitability".

1.1.3. There are six with 100 points which is the second highest cumulative weight and simultaneously the highest number of preferred common planning factors and goals in the rank, and they are as follows:

nº29 or "National supply policy",
nº28 or "National spatial distribution",
nº25 or "National population growth",
nº18 or "National economic growth",

nº16 or "National capital investment in airport infrastructure", and
nº1 or "Accessibility policy"

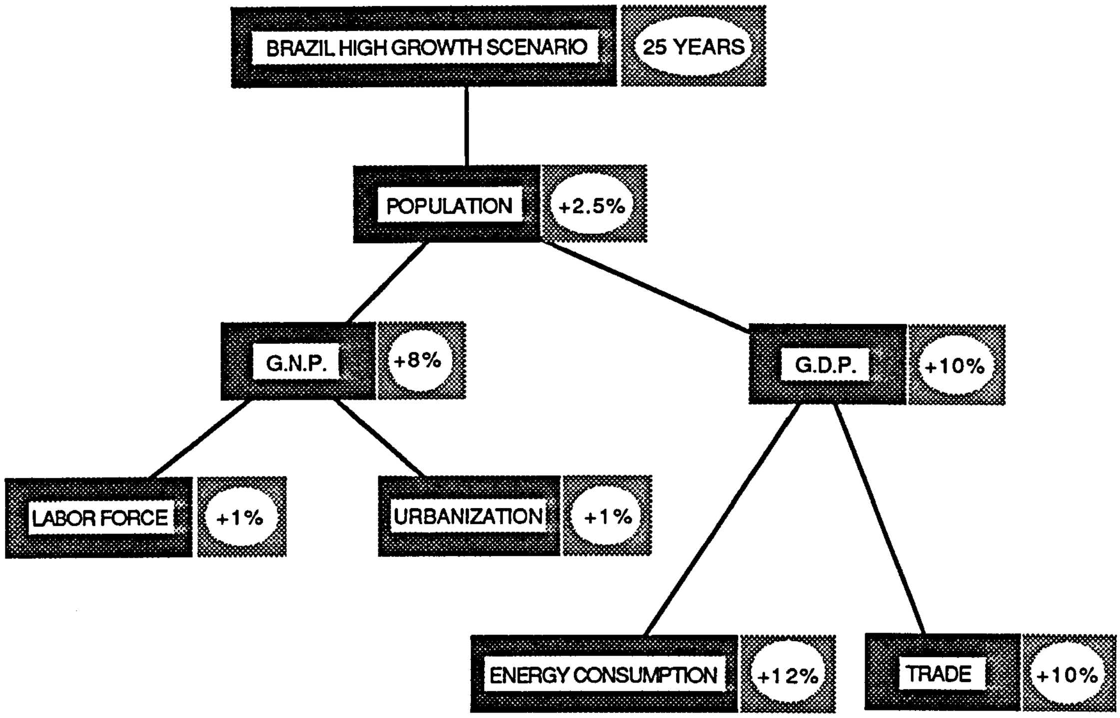


FIGURE 6.5.-1
BRAZIL HIGH GROWTH DEVELOPMENTAL SCENARIO
BASED ON HIRSCHHORN (1980)

1.1.4. There are six with 95 points which is the third highest cumulative weight in the rank and simultaneously the also highest number of preferred common factors and goals of the rank, and they are as follows:

nº32 or "Deregulation",
nº30 or "National travellers characteristics",
nº21 or "National air transport system economic growth",
nº13 or "National airport network general number",
nº12 or "National airport movement in terms of total passengers throughput", and
nº11 or "National airport movement in terms of total aircraft movements".

1.1.5. There is just one with 8 points which is the lowest cumulative weight in the rank, and this is the nº26 or "National pricing policy"•

2. The identification of the B.H.G.S. N.A.S.P. methodology

framework:

2.1. After the analysis of the preferred common planning factors and goals resulting from the B.H.G.S. N.A.S.P. matrix, it is possible to build up the following framework:

2.1.1. From the operational point of view the B.H.G.S. N.A.S.P. methodology is heavily dependent on the following factors:

a. national airport network general number,
b. national airport movement in terms of total passengers throughput, and
c. national airport movement in terms of total aircraft movements.

2.1.2. From the economic point of view the B.H.G.S. N.A.S.P. methodology is very sensitive to the following indicators:

d. airline system profitability,
e. airport system profitability,
f. aerospace industry profitability,
g. national population growth,
h. national economic growth,
i. national capital investment in airport infrastructure,
j. national travellers characteristics, and
k. national air transport system economic growth.

2.1.3. From the policy point of view the B.H.G.S. N.A.S.P. methodology is very sensitive to the following issues:

m. public participation policy,
n. national environmental issues,
o. national supply policy, and
p. deregulation.

2.1.4. From the planning point of view the B.H.G.S. N.A.S.P. is very sensitive to the following two aspects:

q. national spatial distribution, and
r. accessibility policy.

2.1.5. According to the cumulative weight rank the B.H.G.S. N.A.S.P. methodology framework is not sensitive to the nº26 or "National pricing policy", which means that the market within the hypothetical Brazilian High Growth Scenario would be able to define by itself the pricing policy in a clear demonstration of maturity and "corporate planning" towards a "participatory planning" practices•

3. The preferred supporting planning theories of the B.H.G.S. N.A.S.P. matrix:

3.1. In this section the cumulative weight from the preferred supporting planning theories of the B.H.G.S. N.A.S.P. matrix are identified and interpreted:

3.1.1. Initially the analysis is made on the first supporting planning theory entered into the B.H.G.S. N.A.S.P. matrix which is "forms of planning", and the "**CP2**" or "corporate planning" is the highest aspect with 492 points in the cumulative weight rank of the supporting planning theories• The "**PP1**" or "policies planning" is the second in the cumulative weight rank with 240 points• Neither the "**CP1**" or "central policy" nor the "**PP2**" or "participatory planning" have been quoted by the matrix•

3.1.2. The second supporting planning theory entered into the B.H.G.S. N.A.S.P. matrix is "planning context & planning methods", and the "**L**" or "likely balance between the relatively simple political context and the also simple planning methods" is the highest aspect with 652 points in the cumulative weight rank• The second aspect in the cumulative weight rank with 302.5 points is the "**P1**" or "possible balance between the complex political context and the relatively simple planning methods"• Neither the "**V**" or "very unlikely balance between the highly complex political context and the also complex planning methods", nor the "**P2**" or "possible balance between the relatively simple political context and the complex planning methods" have been quoted by the matrix•

3.1.3. The third supporting planning theory entered into the B.H.G.S. N.A.S.P. matrix is "uncertainty in planning", and the "**P**" or "programming" is the highest aspect with 532 points in the cumulative weight rank• The second aspect is the "**E**" or "experimentation" with 377.5 points in the cumulative weight rank• Neither the "**C**" or "chaos", nor the "**B**" or "bargaining" have been quoted by the matrix• These results are an indication of the fact that the Brazilian scenario of high economic growth does not provide all the facilities to promote a healthy development if the "bargaining" aspect to promote the necessary political debate towards social equity and social participation in planning is not taken into consideration•

4. The interactive analysis of the B.H.G.S. N.A.S.P. matrix:

4.1. In this section the interactive classification given to the B.H.G.S. N.A.S.P. planning factors and goals are analysed and interpreted within the other results obtained in the matrix:

4.1. Before the matrix calculation, a total of 284 points were given by the interactive system planning analysis to the 32 entered items, which represents an average of 8.87 points per item• After the matrix calculation a total of 2596 weight points were given to the items, with an average of 81.12 weight points to each item• These results will be useful within the forthcoming comparative analysis•

5. The identification of the planning context and planning environment within which the B.H.G.S. N.A.S.P. would be practiced:

5.1. The preferred supporting planning theories obtained from the matrix were analysed to produce the following B.H.G.S. N.A.S.P. Planning Methodology Label:

THE BRAZIL HIGH GROWTH SCENARIO N.A.S.P. LABEL

"The Brazilian N.A.S.P. methodology has been identified within a hypothetical high growth scenario which would result in a highly interactive and corporate planning practices society with a well likely balance between the relatively simple political context and the also simple planning methods, which would be adopted under a dominant programming level of uncertainty"•

MULTIPLE
CROSS
SYSTEM
ANALYSIS
MATRIX

= **M.C.S.A.M.**

M.C.S.A.M. APPLICATION TEST IN THE BRAZIL N.A.S.P. WITHIN THE HIGH GROWTH SCENARIO

INVESTIGATION FIELD

APPLICATION FIELD •

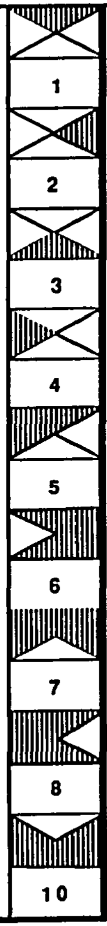
FOCUSED PLANNING LEVEL

NATIONAL	•
REGIONAL	
STATE	
AREA	
LOCAL	

SELECTED PLANNING FACTORS AND GOALS OF THE FOCUSED PLANNING FIELD

INTERACTIVE ANALYSIS

LEVELS OF PLANNING FACTORS AND GOALS INTERACTION



IDENTIFIED ELEMENTS OR SUB-SYSTEMS WITHIN THE FOCUSED PLANNING FIELD

1: AIRPORT NETWORK, AIRPORT SYSTEM, AIRPORT •

2: AIROUTE NETWORK, AIROUTE, AIRLINE-SERVICE •

3: AEROSPACE INDUSTRY, AIRCRAFT FLEET, AIRCRAFT •

4: NATIONAL, REGIONAL, AREA, STATE, LOCAL •

	MULTI-OBJECTIVE PLANNING FACTORS AND GOALS	DIMENSIONAL EXPRESSION	INTERACTIVE CLASSIFICATION NUMBERS	INTERACTIVE COMBINATION SYMBOLS	FORMS OF PLANNING (FRIEDMANN-1973)				PLANNING CONTEXT X PLANNING METHODS (BREHENY-1986)				UNCERTAINTY IN PLANNING (CHRISTENSEN-1985)				INTERACTIVE COMMON FACTORS		COMMENTS
					CP1	PP1	CP2	PP2	V	P2	P1	L	C	B	E	P	CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	
					1	2	3	4	1	2.5	2.5	4	1	2.5	2.5	4			
1	ACCESSIBILITY POLICY	FREQUENCY AND JOURNEY COST	▥	10		20						40				40	100	2º	
2	AEROSPACE INDUSTRY PROFITABILITY	ECONOMIC RATIO	▥	10			30					40				40	110	1º	* HIGHEST CUMULATIVE WEIGH
3	AIRPORT SYSTEM PROFITABILITY	ECONOMIC RATIO	▥	10			30					40				40	110	1º	* HIGHEST CUMULATIVE WEIGH
4	AIRLINE SYSTEM PROFITABILITY	ECONOMIC RATIO	▥	10			30					40				40	110	1º	* HIGHEST CUMULATIVE WEIGH
5	FEDERAL PLANNING CO-ORDINATION	G-B-M-NA	☒	1			3					4				4	11	7º	
6	FEDERAL PLANNING IMPLEMENTATION POLICY	G-B-M-NA	☒	1			3					4				4	11	7º	
7	FEDERAL PLANNING AGENCIES	G-B-M-NA	☒	1			3					4				4	11	7º	
8	G.N.P.-US$ AND % GROWTH	H-M-L	▥	10		20					25				25		70	6º	
9	INCOME PER CAPITA-US$ AND % GROWTH	H-M-L	▥	10		20					25				25		70	6º	
10	NATIONAL AIRPORT CLASSIFICATION	G-B-M-NA	▥	10			30				25				25		80	5º	
11	NAT.AIRPORT MOVEMENT AND AIRCRAFT MOVEMENT	H-M-L	▥	10			30					40			25		95	3º	
12	NATIONAL AIRPORT MOVEMENT AND PAX THROUGHPUT	H-M-L	▥	10			30					40			25		95	3º	
13	NATIONAL AIRPORT NETWORK- GENERAL NUMBER	H-M-L	▥	10			30					40			25		95	3º	
14	NATIONAL AIRPORT NETWORK PER CATEGORY NUMBER	H-M-L	▥	10		20					25				25		70	6º	
15	NATIONAL AIRPORT NETWORK PER CITY PAIR NUMBER	H-M-L	▥	10		20					25				25		70	6º	
16	NAT.CAPITAL INVESTMENT IN AIRPORT INFRASTRUCT.	US$ AND % VARIATION PER YEAR	▥	10		20						40				40	100	2º	
17	NATIONAL DEMAND TO FLY	PAX MOV.-AIR.MOV./L.F.-AIR.MIX	▥	10			30				25				25		80	5º	
18	NATIONAL ECONOMIC GROWTH	ECONOMIC RATIO	▥	10		20						40				40	100	2º	
19	NATIONAL ENVIRONMENTAL ISSUE	G-M-B-NA	▥	10			30					40				40	110	1º	* HIGHEST CUMULATIVE WEIGH
20	NATIONAL FLEET COMPOSITION	A-B-C-D	▥	10			30				25				25		80	5º	
21	NATIONAL AIR-TRANSPORT SYSTEM ECONOMIC GROW.	ECONOMIC RATIO	▥	10			30				25					40	95	3º	
22	NATIONAL AIR SEAT OFFER	NR.SEATS/YEAR AND % VAR.	▥	10		20					25					40	85	4º	
23	NATIONAL AIR SEAT UTILIZATION	NR.SEATS/PAX YEAR AND % VAR.	▥	10			30				25				25		80	5º	
24	NATIONAL TRANSPORT MODAL SPLIT	% 1-% 2-% 3-% 4	▥	10		20					25				25		70	6º	
25	NATIONAL POPULATION GROWTH	NR. INHABITANTS/YEAR AND % VAR.	▥	10		20						40				40	100	2º	
26	NATIONAL PRICING POLICY	H-M-L-NA	☒	1			3				2.5				2.5		8	8º	• LOWEST CUMULATIVE WEIGH.
27	NATIONAL PROPENSITY TO FLY	NR.INH/NR.SEAT UTIL. AND % VAR.	▥	10			30				25				25		80	5º	
28	NATIONAL SPATIAL DISTRIBUTION	NR.CITY AND AVERAGE DISTANCE	▥	10		20						40				40	100	2º	
29	NATIONAL SUPPLY POLICY	H-M-L-NA	▥	10		20						40				40	100	2º	
30	NATIONAL TRAVELLERS CHARACTERISTICS	BUSINESS-TOURISM-COMMUTER-OTHERS	▥	10			30					40			25		95	3º	
31	PUBLIC PARTICIPATION POLICY	H-M-L-NA	▥	10			30					40				40	110	1º	* HIGHEST CUMULATIVE WEIGH
32	DEREGULATION	H-M-L-NA	▥	10			30					40			25		95	3º	
		SUPPORTING THEORIES RANK	88.7 %	284	-	240	492	-	-	-	302.5	652	-	-	377.5	532	2596	-	◄TOTAL CUMULATIVE WEIGHT
		→	-	-	-	2º	1º	-	-	-	2º	1º	-	-	2º	1º	-	4º	◄ AVERAGE COM. FA. RANK
		AVERAGE CLASSIFICATION →	-	8.87	-	20	24.6	-	-	-	23.2	34.31	-	-	23.59	33.25	81.12	-	◄ AVERAGE CUMULATIVE W

FOCUSED PLANNING HORIZON

ACTUAL		MEDIUM-TERM	
SHORT-TERM		LONG-STRATEGIC	•

FOCUSED PLANNING SCENARIO

CURRENT		MEDIUM GROWTH	
HIGH GROWTH	•	LOW GROWTH	

• THE BRAZILIAN N.A.S.P. HAS BEEN IDENTIFIED WITHIN A HYPOTHETICAL HIGH GROWTH SCENARIO WHICH WOULD RESULT IN A HIGHLY INTERACTIVE AND CORPORATE PLANNING PRACTICES SOCIETY WITH A WELL LIKELY BALANCE BETWEEN THE RELATIVELY SIMPLE POLITICAL CONTEXT AND THE ALSO SIMPLE PLANNING METHODS, WHICH WOULD BE ADOPTED UNDER A DOMINANT PROGRAMMING LEVEL OF UNCERTAINTY•

TABLE 6.5.-1
THE M.C.S.A.M. APPLICATION TEST IN THE BRAZIL N.A.S.P. WITHIN THE HIGH GROWTH SCENARIO
(RESEARCH SOURCE)

6.6. The M.C.S.A.M. comparative analysis and interpretation of the application test in the M.I.E.A.C. N.A.S.P. or the application field:

• **Introduction:** In this section the results from the M.C.S.A.M. application test in the N.A.S.P. of the Middle Income and Economically Active Countries, which are here represented by the four different scenarios designed for the Brazilian N.A.S.P., are analysed through the M.C.S.A.M. comparative table as shown in TABLE 6.6.-1• The analysis and interpretation are based on the four matrixes of the application field, or more specifically based on the values and weights given to the 32 entries of all the four Brazilian scenarios of the sample defined within the application field• This analysis has been done with the help of a PC Macintosh with suitable softwares from were a series of graphs and diagrams has been produced in order to have the results enlightened•

1. The Realist N.A.S.P. methodology model from the M.I.E.A.C. or the Brazilian Planned Scenario(B.P.S.) N.A.S.P.:

1.1. The "Realist N.A.S.P. methodology model from the M.I.E.A.C.", which is supposed to be the expression of the common N.A.S.P. methodology within the Middle Income and Economically Active Countries• Since the "Realist N.A.S.P. methodology model" has been obtained from the four Brazilian Scenarios, then it is possible to name it "Brazilian Planned Scenario N.A.S.P.", which is supposed to be the ideal Brazilian planning context hypothetically designed to improve the actual Brazilian N.A.S.P. practices• The following results have been collected from the outputs of the four matrixes and plotted into the M.C.S.A.M. Comparative Table(TABLE 6.6.-1) to produce the Brazilian Planned Scenario(B.P.S.) N.A.S.P.:

1.1.1. Interactive system analysis numbers:

• Are the mean values given to the interactive classification numbers of the four matrixes of the application field•

1.1.2. Cumulative weight rank from the preferred common planning factors and goals:

• Are the mean values given to the cumulative weight rank of the four matrixes of the application field•

1.1.3. Common factors rank defined from the cumulative weight rank:

• Are the mean values given to the common factors rank of the four matrixes of the investigation field•

1.1.4. Average values defined from the individual weights and interactive numbers given to the entries of the four matrixes:

• Have been obtained from; the interactive analysis, the cumulative weight rank, and the common factors rank•

1.1.5. The simple classification order of the above outputs are plotted in the M.C.S.A.M. Comparative Table•

1.1.6. The number of preferred common planning factors and goals identified within each matrix of the sample are plotted into the M.C.S.A.M. Comparative Table and as well their respective position within the common factor rank•

1.1.7. According to the TABLE 6.6.-1, it is possible to coclude that:

a. The Brazilian High Growth Scenario has the highest interactive analysis number, whereas the Medium Growth Scenario is in second place, and the Actual Growth Scenario is the third, finally, the Low Growth Scenario is in the last place• It is possible to conclude that the Brazilian N.A.S.P. methodology within the designed High Growth Scenario would be practiced under a very interactive planning context as compared to the other scenarios• These results would provide the multi-disciplinary planning actors with the reasonable set of arguments and justifications to propose important changes within the actual low interactive N.A.S.P. practices•

b. Concerning the cumulative weight rank, the Brazilian High Growth Scenario has received the highest weight, with the Brazilian Medium Growth Scenario coming in second place, and the Actual Growth Scenario is placed in third, whereas again, the Brazilian Low Growth Scenario is coming in last place• These results may reinforce the above arguments in order to promote changes within the Brazilian Actual N.A.S.P. practices towards a more interactive planning environment•

c. As far as common factors rank is concerned, which express the preferred common planning factors and goals, it is possible to observe that; both, the Brazilian Medium Growth Scenario and the Low Growth Scenario have eight preferred common planning factors and goals, whereas the Brazilian Actual Scenario has seven common factors; the High Growth Scenario has got six common factors in two different places in the weight rank• These results may be interpreted as follows; the high number of preferred common planning factors and goals means that, on one hand, the identified planning context has a large number of planning variables to be considered by the adopted planning method, and on the other hand this same adopted planning method may well be effective as far as aggregation is concerned, i.e., a great number of planning actors would have to be potentially satisfied• This is a very important point to be considered within the Actual Brazilian N.A.S.P. practices, specially concerning to the reduced financial resources actually available•

1.1.8. FIGURE 6.6.-1 shows the possible relationships between the average cumulative weight rank, and the average interactive classification numbers• The diagram shows that perhaps the most effective planning factors should be the ones between 35 and 60 within the cumulative weight rank, and probably the most appropriate interactive level should be between 4 and 7•

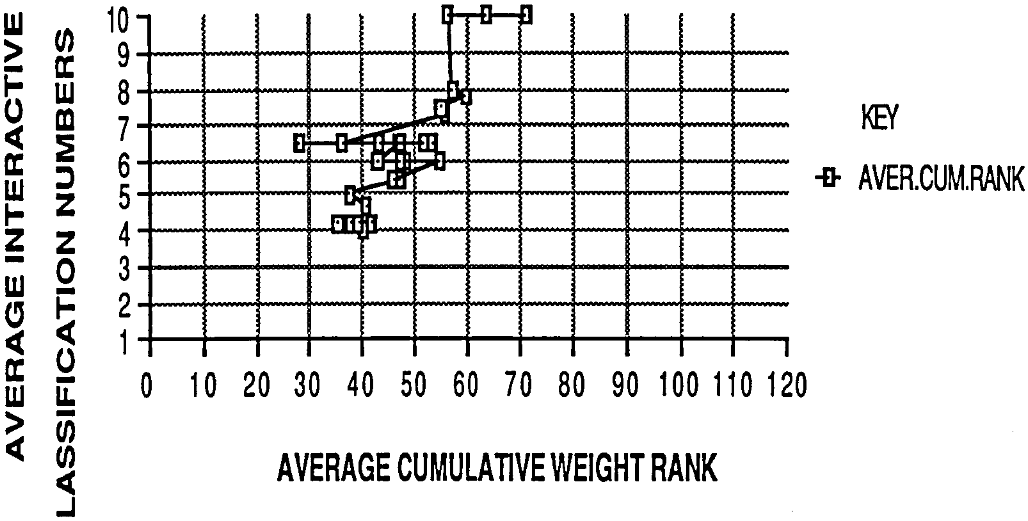


FIGURE 6.6.-1 • M.C.S.A.M. COMPARATIVE ANALYSIS 1

Data from M.C.S.A.M. COMPARATIVE TABLE

1.1.9. FIGURE 6.6.-2 shows the possible relationships between the average cumulative weight rank and the average common factors rank• The diagram shows that perhaps the most effective planning factors and goals should be the ones between the fourth and the eleventh place in the common factors rank, and probably the most effective ones should be the ones between **35** and **60** in the cumulative weight rank•

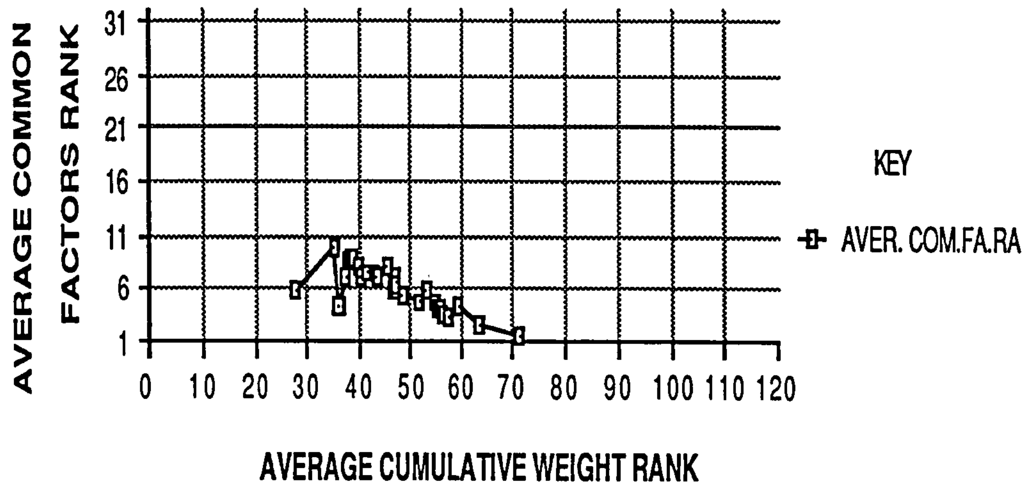


FIGURE 6.6.-2 • M.C.S.A.M. COMPARATIVE ANALYSIS 2

Data from M.C.S.A.M. COMPARATIVE TABLE

MULTIDISCIPLINARY ANALYSIS OF AIR TRANSPORT PLANNING METHODOLOGIES

M.C.S.A.M. COMPARATIVE TABLE

COMPARATIVE RESULTS FROM THE M.C.S.A.M. APPLICATION TEST IN THE M.I.E.A.C. N.A.S.P. OR APPLICATION FIELD

INVESTIGATION FIELD	
APPLICATION FIELD	●

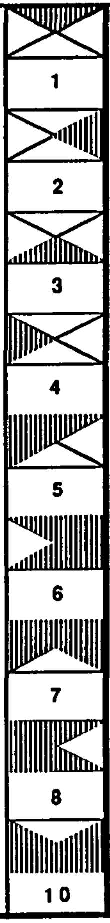
FOCUSED PLANNING LEVEL	
NATIONAL	●
REGIONAL	
STATE	
AREA	
LOCAL	

TABLE 6.6.-1
M.C.S.A.M. COMPARATIVE RESULTS FROM THE APPLICATION TEST IN THE M.I.E.A.C. N.A.S.P.
(RESEARCH SOURCE)

SELECTED PLANNING FACTORS AND GOALS OF THE FOCUSED PLANNING FIELD

INTERACTIVE ANALYSIS

LEVELS OF PLANNING FACTORS AND GOALS INTERACTION



IDENTIFIED ELEMENTS OR SUB-SYSTEMS WITHIN THE FOCUSED PLANNING FIELD

1 (factors 1–8)	AIRPORT NETWORK	AIRPORT SYSTEM	AIRPORT ●
2 (factors 9–16)	AIROUTE NETWORK	AIROUTE	AIRLINE-SERVICE ●
3 (factors 17–24)	AEROSPACE INDUSTRY	AIRCRAFT FLEET	AIRCRAFT ●
4 (factors 25–32)	NATIONAL ●	STATE REGIONAL	LOCAL AREA

	MULTI-OBJECTIVE PLANNING FACTORS AND GOALS	DIMENSIONAL EXPRESSION	BRAZILIAN HIGH GROWTH SCENARIO			BRAZILIAN MEDIUM GROW. SCENARIO			BRAZILIAN LOW GROWTH SCENARIO			BRAZILIAN ACTUAL GROW. SCENARIO			BRAZILIAN NASP WITHIN A PLANNED SCENARIO			COMMENTS
			INTERACTIVE ANALYSIS	CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	INTERACTIVE ANALYSIS	CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	INTERACTIVE ANALYSIS	CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	INTERACTIVE ANALYSIS	CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	INTERACTIVE ANALYSIS	CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	
1	ACCESSIBILITY POLICY	FREQUENCY AND JOURNEY COST	10	100	2	5	35	12	1	3	9	1	3	16	4.2	35.2	10º	
2	AEROSPACE INDUSTRY PROFITABILITY	ECONOMIC RATIO	10	110	1	4	38	11	1	6	7	1	6	13	4	40	8º	
3	AIRPORT SYSTEM PROFITABILITY	ECONOMIC RATIO	10	110	1	5	45	9	1	6	7	1	6	13	4.2	41.7	7º	
4	AIRLINE SYSTEM PROFITABILITY	ECONOMIC RATIO	10	110	1	3	28.5	13	3	12	5	3	12	10	4.7	40.6	7º	
5	FEDERAL PLANNING CO-ORDINATION	G-B-M-NA	1	11	7	5	40	10	10	30	2	10	30	4	6.5	27.7	6º	
6	FEDERAL PLANNING IMPLEMENTATION POLICY	G-B-M-NA	1	11	7	5	40	10	10	30	2	10	30	4	6.5	27.7	6º	
7	FEDERAL PLANNING AGENCIES	G-B-M-NA	1	11	7	5	40	10	10	30	2	10	30	4	6.5	27.7	6º	
8	G.N.P.-US$ AND % GROWTH	H-M-L	10	70	6	10	95	3	10	30	2	10	30	4	10	66.2	4º	
9	INCOME PER CAPITA-US$ AND % GROWTH	H-M-L	10	70	6	10	95	3	10	30	2	10	30	4	10	66.2	4º	
10	NATIONAL AIRPORT CLASSIFICATION	G-B-M-NA	10	80	5	10	95	3	5	22.5	3	5	22.5	5	7.5	55	4º	
11	NAT.AIRPORT MOVEMENT AND AIRCRAFT MOVEMENT	H-M-L	10	95	3	10	80	5	5	22.5	3	7	31.5	3	8	57.2	3º	
12	NATIONAL AIRPORT MOVEMENT AND PAX THROUGHPUT	H-M-L	10	95	3	10	80	5	5	22.5	3	7	31.5	3	8	57.2	3º	
13	NATIONAL AIRPORT NETWORK-GENERAL NUMBER	H-M-L	10	95	3	10	100	2	1	6	7	3	18	7	6	54.7	5º	
14	NATIONAL AIRPORT NETWORK PER CATEGORY NUMBER	H-M-L	10	70	6	10	100	2	1	6	7	3	18	7	6	48.5	6º	
15	NATIONAL AIRPORT NETWORK PER CITY PAIR NUMBER	H-M-L	10	70	6	10	95	3	1	6	7	3	18	7	6	47.2	6º	
16	NAT.CAPITAL INVESTMENT IN AIRPORT INFRASTRUCT.	US$ AND % VARIATION PER YEAR	10	100	2	10	95	3	1	3	9	5	15	9	6.5	53.2	6º	
17	NATIONAL DEMAND TO FLY	PAX MOV.-AIRC. MOV./L.F.-AIRC.MIX	10	80	5	10	80	5	1	3	9	3	9	11	6	43	7º	
18	NATIONAL ECONOMIC GROWTH	ECONOMIC RATIO	10	100	2	10	95	3	10	30	2	10	30	4	10	63.7	3º	
19	NATIONAL ENVIRONMENTAL ISSUE	G-B-M-NA	10	110	1	5	45	9	10	30	2	1	3	16	6.5	47	7º	
20	NATIONAL FLEET COMPOSITION	A-B-C-D	10	80	5	6	48	7	1	5.5	8	3	16.5	8	5	37.5	7º	
21	NATIONAL AIR-TRANSPORT SYSTEM ECONOMIC GROW.	ECONOMIC RATIO	10	95	3	10	110	1	1	3	9	10	30	4	7.7	59.5	4º	
22	NATIONAL AIR SEAT OFFER	NR.SEATS OF./YEAR AND % VAR.	10	85	4	10	80	5	3	21	4	3	21	6	6.5	51.7	5º	
23	NATIONAL AIR SEAT UTILIZATION	NR.SEATS UT./PAX YEAR AND % VAR.	10	80	5	10	80	5	3	21	4	6	42	2	7.2	55.7	4º	
24	NATIONAL TRANSPORT MODAL SPLIT	% 1+% 2+% 3+ % 4...	10	70	6	10	85	4	1	3	9	5	15	9	6.5	43.2	7º	
25	NATIONAL POPULATION GROWTH	NR.INHABITANTS/YEAR AND % VAR.	10	100	2	10	95	3	10	45	1	10	45	1	10	71.2	2º	
26	NATIONAL PRICING POLICY	H-M-L-NA	1	8	8	5	47.5	8	10	45	1	10	45	1	6.5	36.3	4º	
27	NATIONAL PROPENSITY TO FLY	NR.INH./NR.SEAT UTIL. AND % VAR.	10	80	5	10	80	5	3	21	4	6	42	2	7.2	55.7	4º	
28	NATIONAL SPATIAL DISTRIBUTION	NR.CITY AND AVERAGE DISTANCE	10	100	2	5	47.5	8	1	3	9	1	3	16	4.2	38.3	9º	
29	NATIONAL SUPPLY POLICY	H-M-L-NA	10	100	2	5	40	10	1	5.5	8	1	5.5	14	4.2	37.7	8º	
30	NATIONAL TRAVELLERS CHARACTERICTICS	BUSINESS-TOURISM-COMMUTER-OTHERS	10	95	3	10	80	5	1	7	6	1	7	12	5.5	47.2	6º	
31	PUBLIC PARTICIPATION POLICY	H-M-L-NA	10	110	1	5	40	10	1	3	9	1	3	16	4.2	39	9º	
32	DEREGULATION	H-M-L-NA	10	95	3	10	80	5	1	3	9	1	4.5	15	5.5	45.6	8º	
	FOCUSED PLANNING SCENARIO		8.87	81.12	3.84	7.90	69.82	6.15	4.15	16.07	5.34	5.03	20.40	7.81	6.49	46.8	6º	← AVERAGE
		SAMPLE CLASSIFICATION →	1º	1º		2º	2º		4º	4º		3º	3º					
		NUMBER OF COMMON FACTORS →	6+6CF. IN 2ºAND3º			8 CF. IN 5º			8 CF. IN 9º(LAST)			7 CF. IN 4º						

FOCUSED PLANNING HORIZON			
ACTUAL	●	MEDIUM-TERM	
SHORT-TERM		LONG-STRATEGIC	

FOCUSED PLANNING SCENARIO			
CURRENT		MEDIUM GROWTH	
HIGH GROWTH		LOW GROWTH	

2. The interpretation of the Brazilian Planned Scenario N.A.S.P. methodology model obtained from the M.C.S.A.M. Comparative Table:

2.1. The values and weights obtained from the M.C.S.A.M. Comparative Table(TABLE 6.6.-1) have been used with the identification of the Brazilian Planned Scenario N.A.S.P. methodology• A M.C.S.A.M. matrix has been filled up with the values and weights, as shown in TABLE 6.6.-2, and its outputs have been checked and analysed by a series of suitable softwares• The following interpretation has been made from the Brazilian Planned Scenario(B.P.S.) N.A.S.P. matrix:

2.1.1. The preferred common planning factors and goals from the Brazilian Planned Scenario N.A.S.P. matrix:

2.1.1.1. In this section the cumulative weight rank from the Brazilian Planned Scenario N.A.S.P. or their preferred common planning factors and goals are identified and interpreted:

2.1.1.2. The 32 entered items resulted in 26 ranking groups of entries and the average rank number was 13º•

2.1.1.3. There is just one with the highest cumulative weight, or 71.2 points, and this is the nº25 or "National population growth"•

2.1.1.4. There is just one classified in second and third place in the cumulative rank, with 63.7 and 59.5 points respectively, and they are as follows:

nº18 or "National economic growth", and
nº21 or "National air transport system economic growth".

2.1.1.5. The next places in the cumulative rank; third, fourth and fifth had respectively 57.2, 56.2, and 55.7 points, and all them had had two entries each, as follows:

nº12 or "National airport movement in terms of total passengers throughput",
nº11 or "National airport movement in terms of total aircraft

movement",
nº9 or "Income per capita",
nº8 or "G.N.P. growth",
nº27 or "National propensity to fly", and
nº23 or "National air seat utilization".

2.1.1.6. The highest number of preferred common planning factors and goals had three entries, and they are in the last place of the cumulative weight rank with 27.7 points, and they are as follows:

nº7 or "Federal planning agencies",
nº6 or "Federal planning implementation policy", and
nº5 or "Federal planning co-ordination".

3. The identification of the methodology model framework from the Brazilian Planned Scenario N.A.S.P. matrix:

3.1. After the analysis of the preferred common planning factors and goals from the Brazilian Planned Scenario N.A.S.P. matrix it is possible to build up the following framework:

3.1.1. From the operational point of view the B.P.S. N.A.S.P. methodology is heavily dependent on the following factors:

a. national airport movement in terms of total passengers throughput,
b. national airport movement in terms of total aircraft movement, and
c. national seat utilization.

3.1.2. From the economic point of view the B.P.S. N.A.S.P. methodology is very sensitive to the following indicators:

d. national population growth,
e. national economic growth,
f. national air transport system economic growth,
g. income per capita,
h. G.N.P. growth, and
i. national propensity to fly.

3.1.3. From the policy-making point of view the B.P.S. N.A.S.P. methodology is not sensitive to any one of the selected aspects entered to the matrix•

3.1.4. As far as planning is concerned the B.P.S. N.A.S.P. methodology is not sensitive at all to the entered aspects of the matrix, much on the contrary, the highest number of preferred common planning factors and goals, which are exactly in the last place of the cumulative weight rank are composed of three planning aspects, these are;

j. federal planning agencies,
k. federal planning implementation policy, and
l. federal planning co-ordination.

4. The preferred supporting planning theories from the matrix of the Brazilian Planned Scenario N.A.S.P. model:

4.1. Since the Brazilian Planned Scenario N.A.S.P. model belongs to an hypothetical planning context, which can be described as a resulting combination of different contexts within the sample of Brazilian Scenarios, and the planning context can be expressed by the combination of aspects of planning from the supporting planning theories, then it is possible to conclude that the hypothetical planning context may be expressed by different combination of aspects of planning from the same supporting planning theories• Assuming that the cumulative weight rank is the resulting addition of the weights given by the aspects of planning within the matrix, then it is possible to conclude that any combination of aspects of planning from the same supporting planning theories, which end up with the same cumulative results plotted in the matrix of the Brazilian Planned Scenario N.A.S.P. model will correspond to hypothetical planning contexts of other Brazilian Scenarios, and perhaps other Middle Income and Economically Active Countries• These aspects of planning combined in such way will define the preferred supporting planning theories of the matrix for the Brazilian Planned Scenario N.A.S.P. model, which should be useful for identifying different planning contexts and different N.A.S.P. methodologies from the sample•

5. The interactive analysis from matrix of the Brazilian Planned Scenario N.A.S.P. model:

5.1. In this section the interactive classification given to the planning factors and goals from the B.P.S. N.A.S.P. matrix are analysed and interpreted within the other results obtained in the matrix:

5.1.1. A total of 212 points have been obtained from the four interactive classification numbers of the four matrixes of the Brazilian scenarios, which represents an average of 6.62 points to each one of the 32 entered items• A total of 1499.5 points have been obtained from the four cumulative weight of the four matrixes of the Brazilian scenarios, which represents an average of 46.85 weight points to each one of the 32 entered items•

6. The identification of the hypothetical planning context and planning environment within which the Brazilian Planned Scenario N.A.S.P. model would be practiced:

6.1. The possible combination of planning aspects within the supporting planning theories, as described above, gives to the M.C.S.A.M. the necessary flexibility to identify different planning contexts and different planning environments• This flexibility can be expressed by the following Brazilian Planned Scenario N.A.S.P. Model Label:

THE N.A.S.P. LABEL OF THE BRAZILIAN PLANNED SCENARIO

"The Realist M.I.E.A.C. N.A.S.P. methodology model or the Brazilian Planned Scenario N.A.S.P. can be identified within the mean values of the interactive classification numbers through different combinations of the aspects of planning to meet the total cumulative weight of 1499.5 points, which have been obtained from the Brazilian scenarios designed to represent the M.I.E.A.C. sample"•

MULTIDISCIPLINARY ANALYSIS OF AIR TRANSPORT PLANNING METHODOLOGIES

MULTIPLE
CROSS
SYSTEM
ANALYSIS
MATRIX
= **M.C.S.A.M.**

THE M.I.E.A.C. N.A.S.P. REALIST METHODOLOGY MODEL OR THE BRAZILIAN PLANNED SCENARIO N.A.S.P.

INVESTIGATION FIELD	
APPLICATION FIELD	•

FOCUSED PLANNING LEVEL	
NATIONAL	•
REGIONAL	
STATE	
AREA	
LOCAL	

SELECTED PLANNING FACTORS AND GOALS OF THE FOCUSED PLANNING FIELD

LEVELS OF PLANNING FACTORS AND GOALS INTERACTION

IDENTIFIED ELEMENTS OR SUB-SYSTEMS WITHIN THE FOCUSED PLANNING FIELD

INTERACTIVE ANALYSIS		MULTI-OBJECTIVE PLANNING FACTORS AND GOALS		DIMENSIONAL EXPRESSION	INTERACTIVE COMBINATION SYSTEM	INTERACTIVE CLASSIFICATION NUMBERS	FORMS OF PLANNING (FRIEDMANN-1973)				PLANNING CONTEXT X PLANNING METHODS (BREHENY-1986)				UNCERTAINTY IN PLANNING (CHRISTENSEN-1985)				INTERACTIVE COMMON FACTORS		COMMENTS
							CP1	PP1	CP2	PP2	V	P2	P1	L	C	B	E	P	CUMULATIVE WEIGHT RANK	COMMON FACTORS RANK	
							1	2	3	4	1	2.5	2.5	4	1	2.5	2.5	4			
	•	1	ACCESSIBILITY POLICY	FREQUENCY AND JOURNEY COST		4	4	8	12	16	4	10	10	16	4	10	10	16	35.2	25º	
		2	AEROSPACE INDUSTRY PROFITABILITY	ECONOMIC RATIO		4	4	8	12	16	4	10	10	16	4	10	10	16	40	19º	
1	AIRPORT NETWORK AIRPORT SYSTEM AIRPORT	3	AIRPORT SYSTEM PROFITABILITY	ECONOMIC RATIO		4	4	8	12	16	4	10	10	16	4	10	10	16	41.7	17º	
		4	AIRLINE SYSTEM PROFITABILITY	ECONOMIC RATIO		5	5	10	15	20	5	12.5	12.5	20	5	12.5	12.5	20	40.6	18º	
		5	FEDERAL PLANNING CO-ORDINATION	G-B-M-NA		7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	27.7	26º	• LOWEST CUMULATIVE WEIGH
		6	FEDERAL PLANNING IMPLEMENTATION POLICY	G-B-M-NA		7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	27.7	26º	• LOWEST CUMULATIVE WEIGH
2	1	7	FEDERAL PLANNING AGENCIES	G-B-M-NA		7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	27.7	26º	• LOWEST CUMULATIVE WEIGH
		8	G.N.P.-US$ AND % GROWTH	H-M-L		10	10	20	30	40	10	25	25	40	10	25	25	40	56.2	5º	
	•	9	INCOME PER CAPITA-US$ AND % GROWTH	H-M-L		10	10	20	30	40	10	25	25	40	10	25	25	40	56.2	5º	
3		10	NATIONAL AIRPORT CLASSIFICATION	G-B-M-NA		8	8	16	24	32	8	20	20	32	8	20	20	32	55	7º	
		11	NAT.AIRPORT MOVEMENT AND AIRCRAFT MOVEMENT	H-M-L		8	8	16	24	32	8	20	20	32	8	20	20	32	57.2	4º	
	AIROUTE NETWORK AIROUTE AIRLINE-SERVICE	12	NATIONAL AIRPORT MOVEMENT AND PAX THROUGHPUT	H-M-L		8	8	16	24	32	8	20	20	32	8	20	20	32	57.2	4º	
		13	NATIONAL AIRPORT NETWORK- GENERAL NUMBER	H-M-L		6	6	12	18	24	6	15	15	24	6	15	15	24	54.7	8º	
4		14	NATIONAL AIRPORT NETWORK PER CATEGORY NUMBER	H-M-L		6	6	12	18	24	6	15	15	24	6	15	15	24	48.5	11º	
	2	15	NATIONAL AIRPORT NETWORK PER CITY PAIR NUMBER	H-M-L		6	6	12	18	24	6	15	15	24	6	15	15	24	47.2	12º	
		16	NAT.CAPITAL INVESTMENT IN AIRPORT INFRASTRUCT.	US$ AND % VARIATION PER YEAR		7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	53.2	9º	
	•	17	NATIONAL DEMAND TO FLY	PAX MOV.-AIR.MOV./L.F.-AIR.MIX		6	6	12	18	24	6	15	15	24	6	15	15	24	43	16º	
5		18	NATIONAL ECONOMIC GROWTH	ECONOMIC RATIO		10	10	20	30	40	10	25	25	40	10	25	25	40	63.7	2º	
		19	NATIONAL ENVIRONMENTAL ISSUE	G-M-B-NA		7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	47	13º	
	AEROSPACE INDUSTRY AIRCRAFT FLEET AIRCRAFT	20	NATIONAL FLEET COMPOSITION	A-B-C-D		5	5	10	15	20	5	12.5	12.5	20	5	12.5	12.5	20	37.5	23º	
6		21	NATIONAL AIR-TRANSPORT SYSTEM ECONOMIC GROW.	ECONOMIC RATIO		8	8	16	24	32	8	20	20	32	8	20	20	32	59.5	3º	
		22	NATIONAL AIR SEAT OFFER	NR.SEATS/YEAR AND % VAR.		7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	51.7	10º	
	3	23	NATIONAL AIR SEAT UTILIZATION	NR.SEATS/PAX YEAR AND % VAR.		7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	55.7	6º	
7		24	NATIONAL TRANSPORT MODAL SPLIT	% 1-% 2-% 3-% 4		7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	43.2	15º	
	•	25	NATIONAL POPULATION GROWTH	NR. INHABITANTS/YEAR AND % VAR.		10	10	20	30	40	10	25	25	40	10	25	25	40	71.2	1º	* HIGHEST CUMULATIVE WEIGH
		26	NATIONAL PRICING POLICY	H-M-L-NA		7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	36.3	24º	
	STATE LOCAL	27	NATIONAL PROPENSITY TO FLY	NR.INH./NR.SEAT UTIL. AND % VAR.		7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	55.7	6º	
8		28	NATIONAL SPATIAL DISTRIBUTION	NR.CITY AND AVERAGE DISTANCE		4	4	8	12	16	4	10	10	16	4	10	10	16	38.3	21º	
	NATIONAL REGIONAL AREA	29	NATIONAL SUPPLY POLICY	H-M-L-NA		4	4	8	12	16	4	10	10	16	4	10	10	16	37.7	22º	
		30	NATIONAL TRAVELLERS CHARACTERISTICS	BUSINESS-TOURISM-COMMUTER-OTHERS		6	6	12	18	24	6	15	15	24	6	15	15	24	47.2	12º	
10	4	31	PUBLIC PARTICIPATION POLICY	H-M-L-NA		4	4	8	12	16	4	10	10	16	4	10	10	16	39	20º	
		32	DEREGULATION	H-M-L-NA		6	6	12	18	24	6	15	15	24	6	15	15	24	45.6	14º	
FOCUSED PLANNING HORIZON		FOCUSED PLANNING SCENARIO		SUPPORTING THEORIES RANK 6.6213.2 →	66.2%	212	212	424	636	848	212	530	530	848	212	530	530	848	1499.5	-	◄— TOTAL CUMULATIVE WEIGHT
					-	-													-	13º	◄— REALISTIC AVER. COM. FA.
				AVERAGE CLASSIFICATION →	-	6.62	6.62	13.25	19.87	26.50	6.62	16.56	16.56	26.50	6.62	16.56	16.56	26.50	46.85	-	◄— AVERAGE CUMULATIVE W.

ACTUAL		MEDIUM-TERM	
SHORT-TERM		LONG-STRATEGIC	•

CURRENT	•	MEDIUM GROWTH
HIGH GROWTH		LOW GROWTH

• THE REALIST M.I.E.A.C. N.A.S.P. METHODOLOGY MODEL OR THE BRAZILIAN PLANNED SCENARIO N.A.S.P. CAN BE IDENTIFIED WITHIN THE MEAN VALUES OF THE INTERACTIVE CLASSIFICATION NUMBERS THROUGH DIFFERENT COMBINATIONS OF THE ASPECTS OF PLANNING TO MEET THE 1499.5 POINTS, WHICH HAVE BEEN OBTAINED FROM THE BRAZILIAN SCENARIOS DESIGNED TO REPRESENT THE M.I.E.A.C. SAMPLE•

TABLE 6.6.-2
THE M.I.E.A.C. N.A.S.P. METHODOLOGY MODEL OR THE BRAZILIAN PLANNED SCENARIO N.A.S.P.
(RESEARCH SOURCE)

7. The exploratory interpretation over the Brazilian Planned Scenario N.A.S.P. matrix:

7.1. A series of possible interpretation are made in this section with the objective of exploring the matrix's capacity to deal with the selected planning field at the given circumstances of the sample:

7.1.1. FIGURE 6.6.-3 shows the relationships between the "planned cumulative weight" and the "planned interactive classification numbers" from the Brazilian Planned Scenario N.A.S.P. model• The diagram shows that perhaps the most effective planning factors and goals should be the ones between **35** and **60** in the planned cumulative weight rank, and the possible most effective interactive levels should be the ones between **4** and **7**•

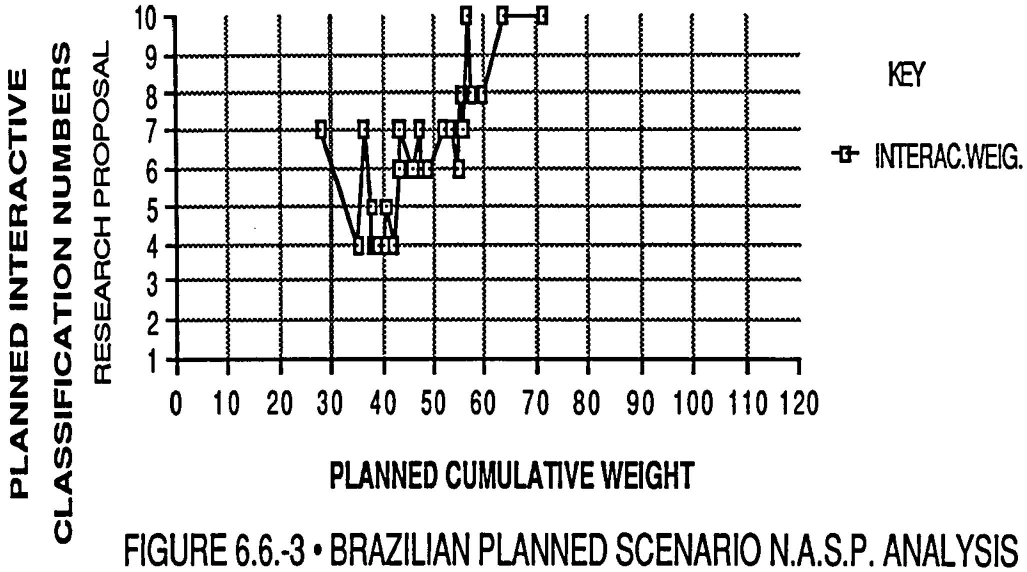


FIGURE 6.6.-3 • BRAZILIAN PLANNED SCENARIO N.A.S.P. ANALYSIS 1

Data from M.C.S.A.M. BRAZILIAN PLANNED SCENARIO N.A.S.P.

7.1.2. FIGURE 6.6.-4 up to FIGURE 6.6.-6 show the relationships between the "possible" realist cumulative weights and the "possible" realist weights of the supporting planning theories within the matrix of the Brazilian Planned Scenario N.A.S.P. Model• The first diagram below shows the different weights that may be assumed by the different aspects of planning within the first supporting planning theory, which is "Forms of Planning", according to its internal scale of desirability• As far as their forms of planning are concerned this diagram is an exercise to identify different planning contexts of the Middle Income and Economically Active Countries•

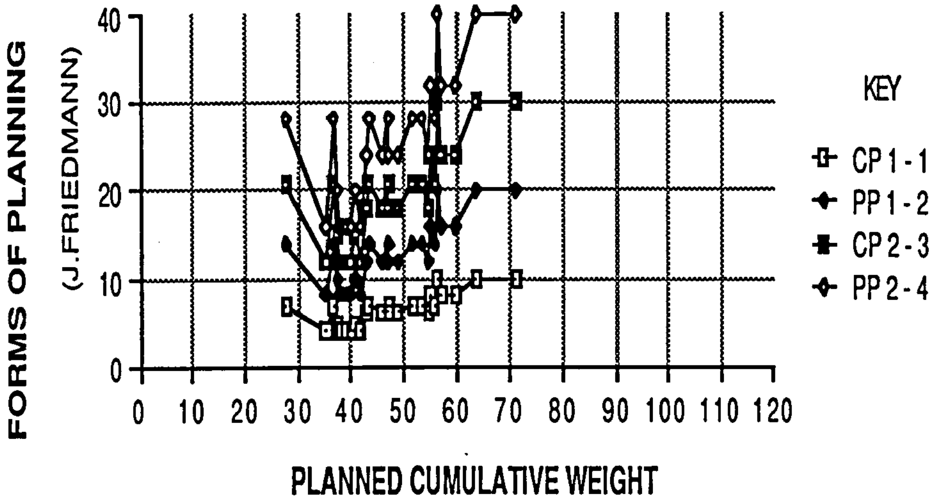


FIGURE 6.6.-4 • BRAZILIAN PLANNED SCENARIO N.A.S.P. ANALYSIS 2

Data from M.C.S.A.M. BRAZILIAN PLANNED SCENARIO N.A.S.P.

7.1.3. FIGURE 6.6.-5 shows the different weights that may be assumed by the aspects of planning within the second supporting planning theory which is "Planning Context & Planning Methods" according to its internal scale of desirability• This diagram is an exercise of planning context identification concerning the balance between the political context and the adopted planning methods•

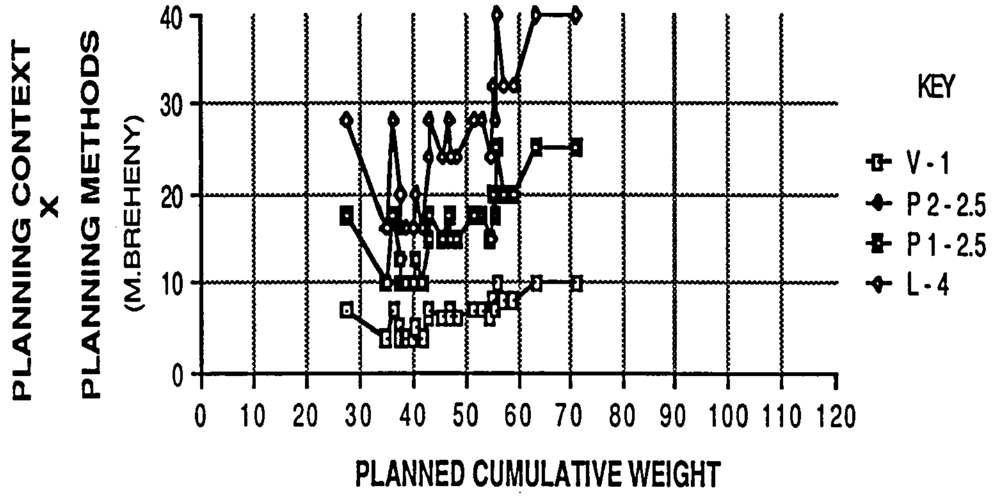


FIGURE 6.6.-5 • BRAZILIAN PLANNED SCENARIO N.A.S.P. ANALYSIS 3

Data from M.C.S.A.M. BRAZILIAN PLANNED SCENARIO N.A.S.P.

7.1.4. FIGURE 6.6.-6 shows the possible weights that may be assumed by the aspects of planning within the third supporting planning theory which is "Uncertainty in Planning" according to its internal scale of desirability• This diagram is an exercise of planning context identification concerning its level of uncertainty in planning•

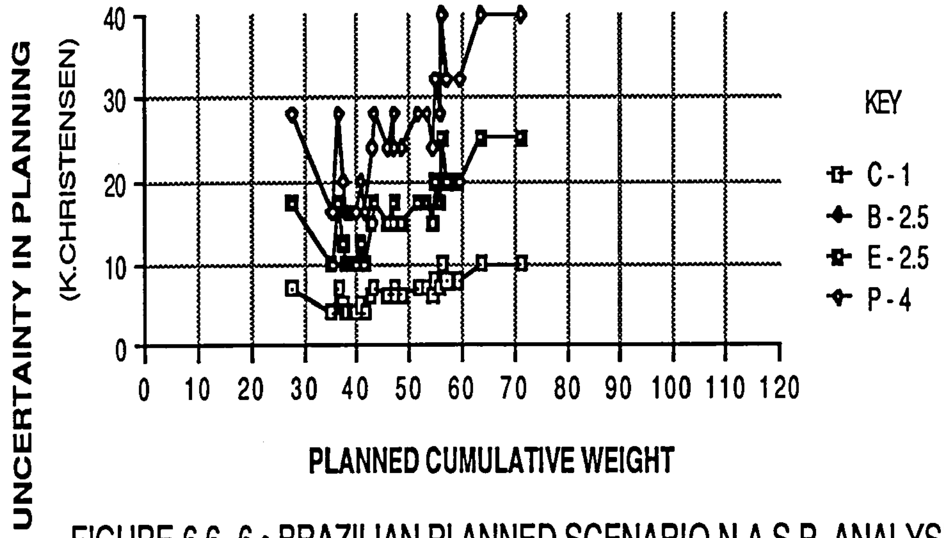


FIGURE 6.6.-6 • BRAZILIAN PLANNED SCENARIO N.A.S.P. ANALYSIS 4

Data from M.C.S.A.M. BRAZILIAN PLANNED SCENARIO N.A.S.P.

CHAPTER 7

Chapter 7:

7. Conclusions and Suggested Further Research:

7.1. The Comparative Analysis over the M.C.S.A.M. test in the N.A.S.P.:

• In this section a final analysis is made over the M.C.S.A.M. application test in the N.A.S.P. of Developed Countries and Middle Income and Economically Active Countries• After the M.C.S.A.M. application test over the two samples of countries, which are respectively the "emphatic understanding" and the "predictive understanding", a M.C.S.A.M. Summary Table is produced to illustrate this final analysis, as shown in TABLE 7.-1• This analysis has been divided in three parts; first, is the interpretation of the outputs of the M.C.S.A.M. Summary Table; second, a planning routine is suggested from both the "Realist N.A.S.P. Methodology Model of Developed Countries", and from the "Brazilian Planned Scenario N.A.S.P. Model"; third, the Realist N.A.S.P. Methodology Model of Developed Countries, and the Brazilian Planned Scenario N.A.S.P. Model are examined as examples of N.A.S.P. practices, respectively according to the concepts of "emphatic understanding" and "predictive understanding"•

1. The interpretation of the M.C.S.A.M. outputs:

1.1. A comparative list of the identified N.A.S.P. methodologies labels has been provided in order to help the multi-disciplinary planning actors to better understand their own N.A.S.P. planning contexts and planning environments• This comparative process should promote planning practices improvement and mutual learning among the multi-disciplinary planning actors•

1.2. A complete list of the preferred common planning factors and goals, according to each one of the N.A.S.P. matrixes, is provided to permit the comparative analysis•

1.3. A complete list of the preferred aspects of planning, according to the N.A.S.P. matrixes is provided to help with their planning context identification and comparison of their planning characteristics•

M.C.S.A.M.
SUMMARY TABLE

N.A.S.P. IDENTIFIED METHODOLOGIES COMPARATIVE TABLE

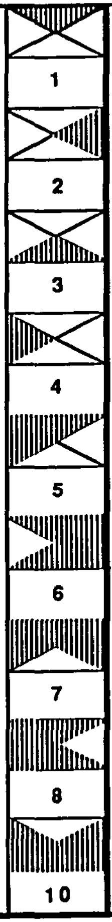
INVESTIGATION FIELD •

APPLICATION FIELD •

SELECTED PLANNING FACTORS AND GOALS OF THE FOCUSED PLANNING FIELD

INTERACTIVE ANALYSIS

LEVELS OF PLANNING FACTORS AND GOALS INTERACTION



IDENTIFIED ELEMENTS OR SUB-SYSTEMS WITHIN THE FOCUSED PLANNING FIELD

		MULTI-OBJECTIVE PLANNING FACTORS AND GOALS	DIMENSIONAL EXPRESSION	U.S.A. N.A.S.P.	U.K. N.A.S.P.	FEDERAL REPUBLIC OF GERMANY N.A.S.P.	CANADA N.A.S.P.	NORWAY N.A.S.P.	REALIST N.A.S.P. MET MODEL OF DEV. COUNT.	BRAZILIAN ACT. GROW SCENARIO N.A.S.P.	BRAZILIAN LOW GROW. SCENARIO N.A.S.P.	BRAZILIAN MED. GROW SCENARIO N.A.S.P.	BRAZILIAN HIGH GROW SCENARIO N.A.S.P.	BRAZILIAN PLANNED SCENARIO N.A.S.P.
•	1	ACCESSIBILITY POLICY	FREQUENCY AND JOURNEY COST	1	12	1	7	19	20	26	26	21	31	25
AIRPORT NETWORK AIRPORT SYSTEM AIRPORT	2	AEROSPACE INDUSTRY PROFITABILITY	ECONOMIC RATIO	12	11	31	6	7	30	25	25	13	19	18
	3	AIRPORT SYSTEM PROFITABILITY	ECONOMIC RATIO	30	20	25	25	6	21	27	19	14	4	21
	4	AIRLINE SYSTEM PROFITABILITY	ECONOMIC RATIO	21	30	18	30	31	12	23	18	8	3	12
	5	FEDERAL PLANNING CO-ORDINATION	G-B-M-NA	20	29	32	20	16	1	12	9	9	2	11
	6	FEDERAL PLANNING IMPLEMENTATION POLICY	G-B-M-NA	11	26	30	21	21	11	11	8	10	29	9
1	7	FEDERAL PLANNING AGENCIES	G-B-M-NA	18	23	21	27	20	19	21	7	15	28	8
	8	G.N.P.-US$ AND % GROWTH	H-M-L	9	17	20	17	14	9	18	6	16	25	27
•	9	INCOME PER CAPITA-US$ AND % GROWTH	H-M-L	8	24	19	9	12	24	9	5	18	18	23
AIROUTE NETWORK AIROUTE AIRLINE-SERVICE	10	NATIONAL AIRPORT CLASSIFICATION	G-B-M-NA	29	14	9	8	24	8	8	12	25	16	10
	11	NAT.AIRPORT MOVEMENT AND AIRCRAFT MOVEMENT	H-M-L	24	31	8	5	18	18	7	11	24	1	13
	12	NATIONAL AIRPORT MOVEMENT AND PAX THROUGHPUT	H-M-L	15	21	26	32	13	31	6	10	11	32	16
	13	NATIONAL AIRPORT NETWORK-GENERAL NUMBER	H-M-L	28	19	24	31	5	7	5	27	12	30	22
	14	NATIONAL AIRPORT NETWORK PER CATEGORY NUMBER	H-M-L	10	16	13	26	1	17	10	23	17	21	14
2	15	NATIONAL AIRPORT NETWORK PER CITY PAIR NUMBER	H-M-L	17	13	28	24	30	29	22	22	22	13	15
	16	NAT.CAPITAL INVESTMENT IN AIRPORT INFRASTRUCT.	US$ AND % VARIATION PER YEAR	23	27	16	19	28	6	15	4	23	12	30
•	17	NATIONAL DEMAND TO FLY	PAX MOV.-AIRC. MOV./L.F.-AIRC.MIX	27	32	14	13	15	25	14	30	27	11	19
AEROSPACE INDUSTRY AIRCRAFT FLEET AIRCRAFT	18	NATIONAL ECONOMIC GROWTH	ECONOMIC RATIO	19	28	29	23	11	26	13	15	30	22	32
	19	NATIONAL ENVIRONMENTAL ISSUE	G-B-M-NA	26	25	27	15	9	28	20	14	32	27	24
	20	NATIONAL FLEET COMPOSITION	A-B-C-D	22	18	23	12	17	15	24	13	20	23	17
	21	NATIONAL AIR-TRANSPORT SYSTEM ECONOMIC GROW.	ECONOMIC RATIO	3	9	22	11	29	23	16	3	26	20	3
	22	NATIONAL AIR SEAT OFFER	NR.SEATS OF./YEAR AND % VAR.	32	8	17	29	10	13	4	2	28	17	4
3	23	NATIONAL AIR SEAT UTILIZATION	NR.SEATS UT./PAX YEAR AND % VAR.	14	7	7	1	8	14	17	29	3	10	2
	24	NATIONAL TRANSPORT MODAL SPLIT	% 1+% 2+% 3+ % 4...	13	6	5	14	27	27	30	20	19	24	31
•	25	NATIONAL POPULATION GROWTH	NR.INHABITANTS/YEAR AND % VAR.	2	5	15	28	23	32	3	32	5	15	28
NATIONAL STATE LOCAL	26	NATIONAL PRICING POLICY	H-M-L-NA	31	1	2	22	22	16	2	31	6	14	29
	27	NATIONAL PROPENSITY TO FLY	NR.INH./NR.SEAT UTIL. AND % VAR.	25	15	12	18	25	10	29	28	7	9	20
	28	NATIONAL SPATIAL DISTRIBUTION	NR.CITY AND AVERAGE DISTANCE	16	10	11	10	26	5	32	24	29	8	26
REGIONAL AREA	29	NATIONAL SUPPLY POLICY	H-M-L-NA	4	22	10	16	32	22	31	21	31	7	1
	30	NATIONAL TRAVELLERS CHARACTERICTICS	BUSINESS-TOURISM-COMMUTER-OTHERS	6	3	3	3	2	3	28	17	2	6	7
4	31	PUBLIC PARTICIPATION POLICY	H-M-L-NA	7	2	4	2	3	2	19	16	1	5	6
	32	DEREGULATION	H-M-L-NA	5	4	6	4	4	4	1	1	4	26	5
		FOCUSED PLANNING SCENARIO	FORMS OF PLANNING	CP2	CP2	PP2	CP2	PP1	$?_1$	CP1	CP1	CP2	CP2	$?_4$
			PLAN. CONTEXT X PLAN. METHODS	L	L	P2	L	L	$?_2$	V/P2	V	P1	L	$?_5$
			UNCERTAINTY IN PLANNING	B/E	B	E	B	E	$?_3$	E	E	E	P	$?_6$
			TOTAL INTERACTIVE CLASSIFIC. NUMBER	249	280	239	269	282	264	161	133	253	284	212
			TOTAL CUMULATIVE WEIGHT	1987	2026.5	1871.5	2209	2195.5	2057.5	653	514.5	2234.5	2590	1499.5
			AVERAGE COMMON FACTOR RANK	11°	7°	8°	8°	6°	15°	8°	5°	6°	4°	13°

FOCUSED PLANNING HORIZON

ACTUAL	•	MEDIUM-TERM	
SHORT-TERM		LONG-STRATEGIC	•

FOCUSED PLANNING SCENARIO

CURRENT	•	MEDIUM GROWTH	•
HIGH GROWTH	•	LOW GROWTH	•

IDENTIFIED N.A.S.P. METHODOLOGIES LABELS

UNITED STATES OF AMERICA

"THE U.S.A N.A.S.P. METHODOLOGY HAS BEEN IDENTIFIED WITHIN A HIGHLY INTERACTIVE AND CORPORATE PLANNING PRACTICES SOCIETY, WITH A LIKELY BALANCE BETWEEN THE POLITICAL CONTEXT AND THE ADOPTED PLANNING METHODS, UNDER A PERMANENT BARGAINING AND EXPERIMENTATION LEVEL OF UNCERTAINTY"

UNITED KINGDOM

"THE U.K N.A.S.P. METHODOLOGY HAS BEEN IDENTIFIED WITHIN A HIGHLY INTERACTIVE AND PLANNING POLICY TOWARDS A CORPORATE PLANNING PRACTICES SOCIETY, WITH A LIKELY BALANCE BETWEEN THE POLITICAL CONTEXT AND THE ADOPTED PLANNING METHODS, UNDER ALMOST SHARED BARGAINING AND EXPERIMENTATION LEVEL OF UNCERTAINTY"

FEDERAL REPUBLIC OF GERMANY

"THE F.R.G. N.A.S.P. METHODOLOGY HAS BEEN IDENTIFIED WITHIN A HIGHLY INTERACTIVE AND MORE LIKELY PARTICIPATORY PLANNING PRACTICES SOCIETY, WITH A POSSIBLE BALANCE BETWEEN THE LIMITED POLITICAL CONTEXT AND THE SLIGHTLY COMPLEX PLANNING METHODS, WHICH HAVE BEEN ADOPTED UNDER A CONSTANT EXPERIMENTATION LEVEL OF UNCERTAINTY"

CANADA

"THE CANADA N.A.S.P. METHODOLOGY HAS BEEN IDENTIFIED WITHIN A HIGHLY INTERACTIVE AND CORPORATE PLANNING PRACTICES SOCIETY, WITH A LIKELY BALANCE BETWEEN THE POLITICAL CONTEXT AND THE ADOPTED PLANNING METHODS, UNDER A CONSTANT BARGAINING LEVEL OF UNCERTAINTY"

NORWAY

"THE NORWAY N.A.S.P. METHODOLOGY HAS BEEN IDENTIFIED WITHIN A HIGHLY INTERACTIVE AND PLANNING POLICY TOWARDS A PARTICIPATORY PLANNING PRACTICES SOCIETY, WITH A LIKELY AND POSSIBLE BALANCE BETWEEN THE RELATIVELY SIMPLE POLITICAL CONTEXT AND THE SLIGHTLY COMPLEX PLANNING METHODS, WHICH HAVE BEEN ADOPTED UNDER A PREDOMINANTLY EXPERIMENTATION LEVEL OF UNCERTAINTY"

REALIST MODEL

"THE REALIST N.A.S.P. METHODOLOGY MODEL CAN BE IDENTIFIED WITHIN THE MEAN VALUES OF THE INTERACTIVE CLASSIFICATION NUMBERS THROUGH DIFFERENT COMBINATIONS OF THE ASPECTS OF PLANNING TO MEET THE TOTAL CUMULATIVE WEIGHT OF 2057.9 POINTS, WHICH HAVE BEEN OBTAINED FROM THE DEVELOPED COUNTRIES SAMPLE"

BRAZILIAN ACTUAL GROWTH SCENARIO

"THE BRAZILIAN N.A.S.P. METHODOLOGY HAS BEEN IDENTIFIED WITHIN THE ACTUAL SCENARIO AS A LOW INTERACTIVE, IN CONTRAST TO A HIGHLY CENTRAL PLANNING PRACTICES SOCIETY, WITH A SHARED VERY UNLIKELY AND POSSIBLE BALANCE BETWEEN THE POLITICAL CONTEXT AND THE COMPLEX PLANNING METHODS, WHICH HAVE BEEN ADOPTED UNDER A MAJOR EXPERIMENTATION TOWARDS A CHAOTICAL LEVEL OF UNCERTAINTY"

BRAZILIAN LOW GROWTH SCENARIO

"THE BRAZILIAN N.A.S.P. METHODOLOGY HAS BEEN IDENTIFIED WITHIN A HYPOTHETICAL LOW GROWTH SCENARIO WHICH WOULD RESULT CONSEQUENTLY IN A LOW INTERACTIVE, IN CONTRAST TO A HIGHLY CENTRAL PLANNING PRACTICES SOCIETY WITH A VERY UNLIKELY BALANCE BETWEEN THE EXTREMELY COMPLEX POLITICAL CONTEXT AND THE ALSO COMPLEX PLANNING METHODS, WHICH WOULD BE ADOPTED UNDER A DOMINANT EXPERIMENTATION AND CHAOTICAL LEVEL OF UNCERTAINTY"

BRAZILIAN MEDIUM GROWTH SCENARIO

"THE BRAZILIAN N.A.S.P. METHODOLOGY HAS BEEN IDENTIFIED WITHIN A HYPOTHETICAL MEDIUM GROWTH SCENARIO WHICH WOULD RESULT CONSEQUENTLY, IN A HIGHLY INTERACTIVE AND EXTREMELY HIGH CORPORATE PLANNING PRACTICES SOCIETY, WITH AN EQUALLY POSSIBLE AND LIKELY BALANCE BETWEEN THE RELATIVELY COMPLEX POLITICAL CONTEXT AND THE SIMPLE PLANNING METHODS, WHICH WOULD BE ADOPTED UNDER A DOMINANT EXPERIMENTATION TOWARDS A PROGRAMMING LEVEL OF UNCERTAINTY"

BRAZILIAN HIGH GROWTH SCENARIO

"THE BRAZILIAN N.A.S.P. METHODOLOGY HAS BEEN IDENTIFIED WITHIN A HYPOTHETICAL HIGH GROWTH SCENARIO, WHICH WOULD RESULT IN A HIGHLY INTERACTIVE AND CORPORATE PLANNING PRACTICES SOCIETY WITH A WELL LIKELY BALANCE BETWEEN THE RELATIVELY SIMPLE POLITICAL CONTEXT AND THE ALSO SIMPLE PLANNING METHODS, WHICH WOULD BE ADOPTED UNDER A DOMINANT PROGRAMING LEVEL OF UNCERTAINTY"

BRAZILIAN PLANNED SCENARIO

"THE REALIST M.I.E.A.C. N.A.S.P. METHODOLOGY MODEL OR THE BRAZILIAN PLANNED SCENARIO N.A.S.P. CAN BE IDENTIFIED WITHIN THE MEAN VALUES OF THE INTERACTIVE CLASSIFICATION NUMBERS, THROUGH DIFFERENT COMBINATIONS OF THE ASPECTS OF PLANNING TO MEET THE TOTAL CUMULATIVE WEIGHT OF 1499.5 POINTS, WHICH HAVE BEEN OBTAINED FROM THE BRAZILIAN SCENARIOS DESIGNED TO REPRESENT THE M.I.E.A.C SAMPLE"

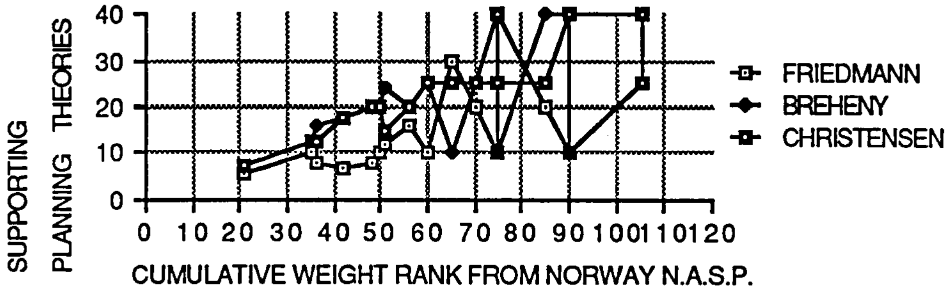
TABLE 7.1
N.A.S.P. IDENTIFIED METHODOLOGIES COMPARATIVE TABLE
(RESEARCH SOURCE)

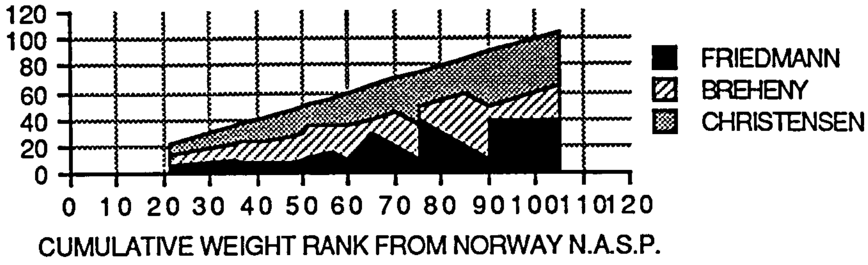
1.4. A comparative list of the totals of the cumulative weights is given to better understand the reasons and effects of the interactive system planning analysis within the N.A.S.P. practices•

1.5. A series of Comparative Diagrams from the Developed Countries N.A.S.P., and from the Brazilian Scenarios N.A.S.P. are provided in TABLE 7.-2 and TABLE 7.-3 to visualize some possible compositions of the cumulative weight rank in relationship to the supporting planning theories, from which is possible to identify and understand the specific characteristics of each one of the components of the two samples•

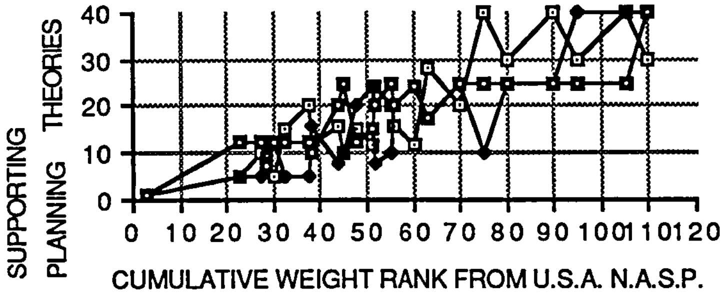
1.6. TABLE 7.-2 bellow is a set of comparative diagrams of the five Developed Countries sample showing the relationships between their cumulative weight rank which goes up to **120** in total, and their supporting planning theories which goes up to **40** individually• These comparison will provide through the interpretation of the diagrams the necessary evidences about different characteristics of planning contexts and planning environments, as follows:

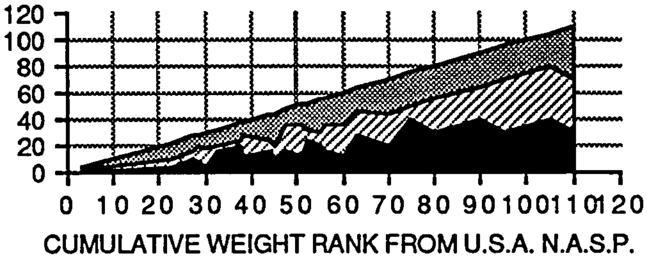
• **Norwegian N.A.S.P.:** The cumulative weight rank in Norway has been identified within a range of **20** and **105**, which means there is no interaction below **20** nor above **105** within the cumulative weight rank, suggesting perhaps the existence of large space to promote planning interactions within the planning context of the Norwegian N.A.S.P., if that becomes necessary• The second diagram shows the existence of discontinuity within the influence of "Breheny" or "Planning context & Planning methods" over the cumulative weight rank, specifically around the **75**, which means the planning factors and goals within this weight have no influence from "Breheny"•



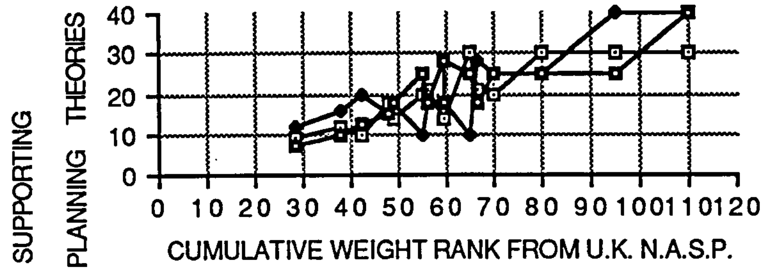


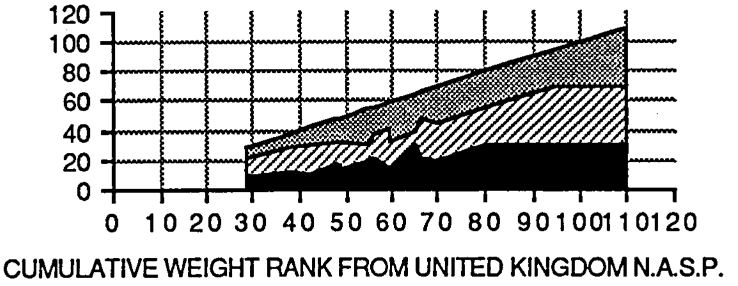
• **U.S.A. N.A.S.P.:** In U.S.A. the cumulative weight rank has been detected between the values near **1** and **110**, which means there is no space to promote further interactive planning within the U.S.A. planning context, suggesting perhaps improvements within the existent levels of interaction•



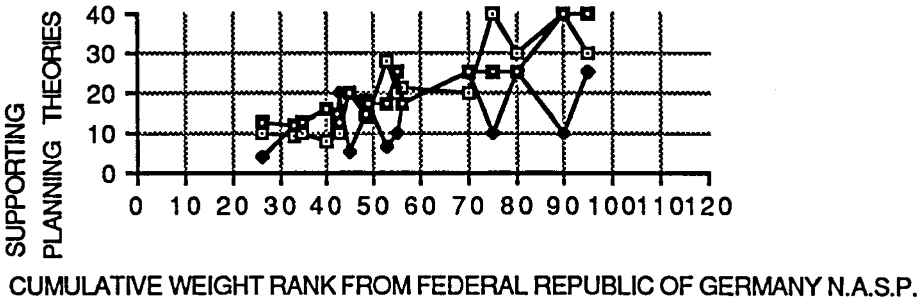


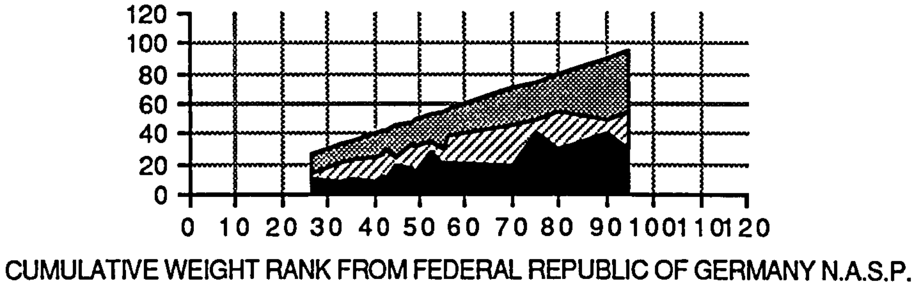
• **United Kingdom N.A.S.P.:** The U.K. cumulative weight rank has been detected between the values near **30** and **110**, suggesting the existence of a considerable space for interactive planning improvements within the planning context of the U.K. N.A.S.P.•



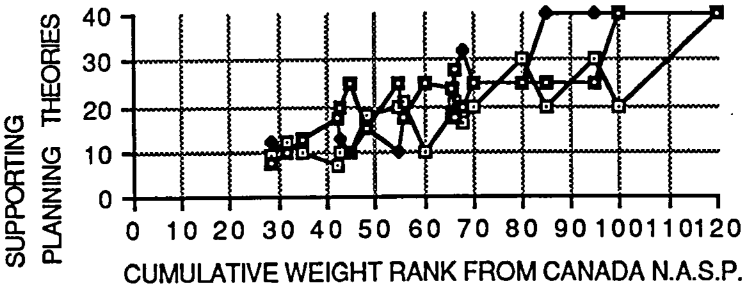


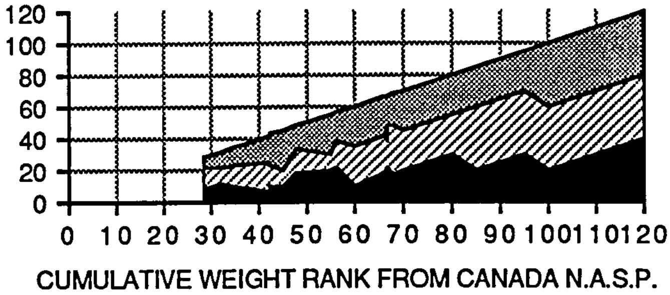
• **Federal Republic of Germany N.A.S.P.:** The cumulative weight rank within Federal Rep. of Germany has been identified between **25** and **95,** suggesting two points; first, the existence of a large space for interactive planning improvements and second the existent interaction is very concentrated, perhaps due to their internal political organization in terms of "independent states" or "länders"•





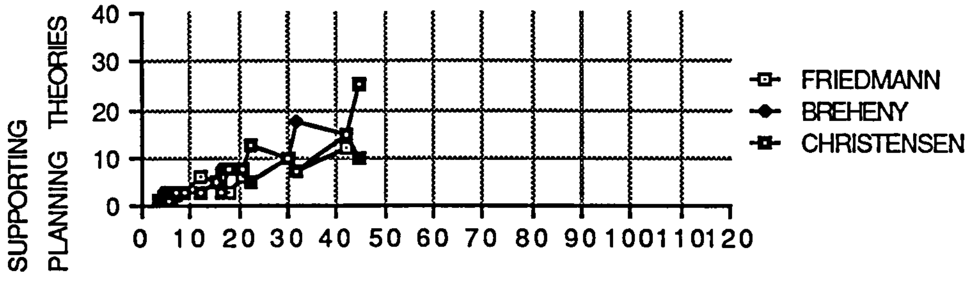
• **Canadian N.A.S.P.:** The cumulative weight rank in Canada has been identified within **30** and **120,** which means the Canadian N.A.S.P. has been practiced within high levels of interaction but on the other hand there is still a large space for planning interaction improvement below **30**•



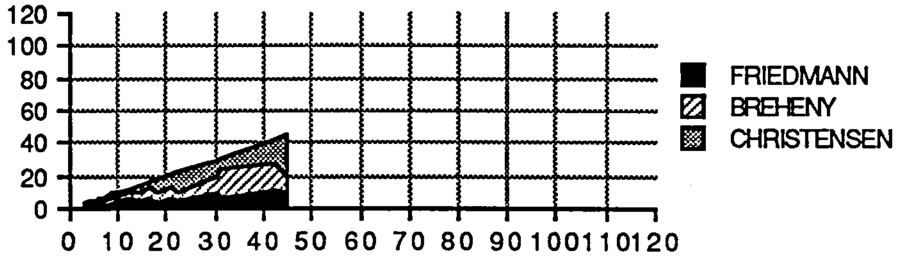


1.7. TABLE 7.-3 bellow is a set of comparative diagrams of the four Brazilian Scenarios sample showing the relationships between their cumulative weight rank which goes up to **120** in total, and their supporting planning theories which individually goes up to **40**• The different characteristics between the Brazilian N.A.S.P. within the Actual Brazilian Scenario, and the hypothetical planning contexts and planning environments from the Brazilian designed scenarios will provide the necessary evidences for necessary improvements•

• **Brazil Actual Growth Scenario N.A.S.P.:** The cumulative weight rank has been identified from the Actual Brazilian Scenario,and it starts around **1** and goes just up to **45**• That means the Actual Brazilian Scenario does not provide the necessary conditions for further interactive planning in their N.A.S.P. practices• There is a large space for improvements within the planning context of the Actual Brazilian Scenario and the main challenge is to choose the most effective way to do it• Using the next diagrams, it will be possible to suggest some forms of promoting these improvements•

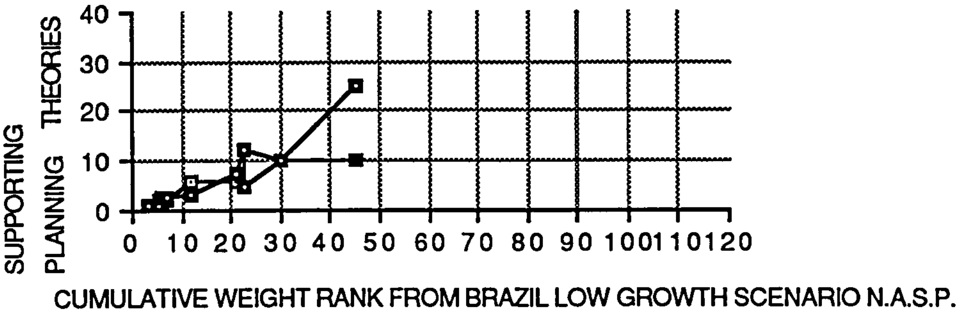


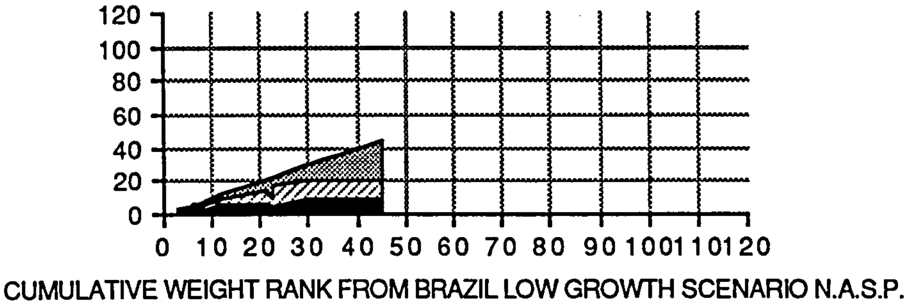
CUMULATIVE WEIGHT RANK FROM BRAZIL ACTUAL GROWTH SCENARIO N.A.S.P.



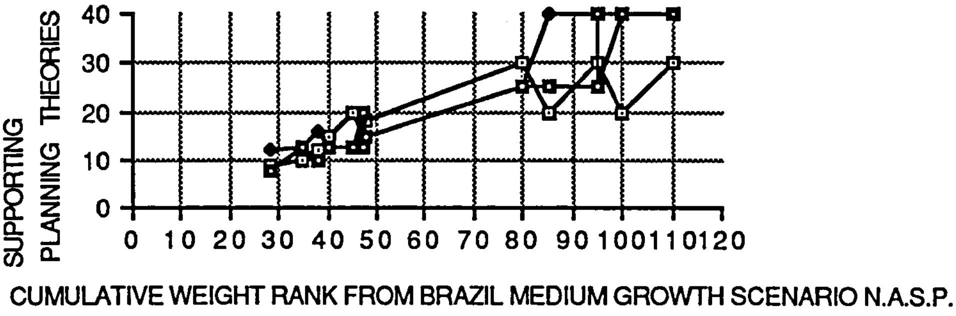
CUMULATIVE WEIGHT RANK FROM BRAZIL ACTUAL GROWTH SCENARIO N.A.S.P.

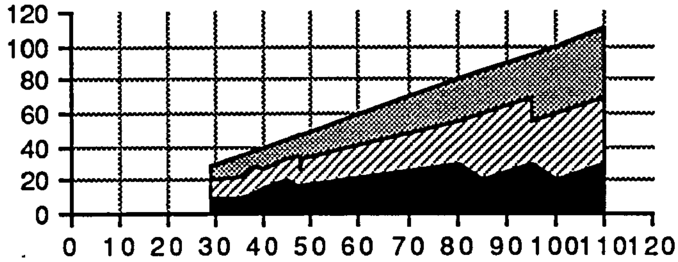
• **Brazil Low Growth Scenario N.A.S.P.:** The cumulative weight rank from the Brazilian Low Growth Scenario has been identified within the levels around **1** and **45**, which is very limited suggesting perhaps that the designed scenario of low growth rates is not the ideal one for the Brazilian planning context in the future•





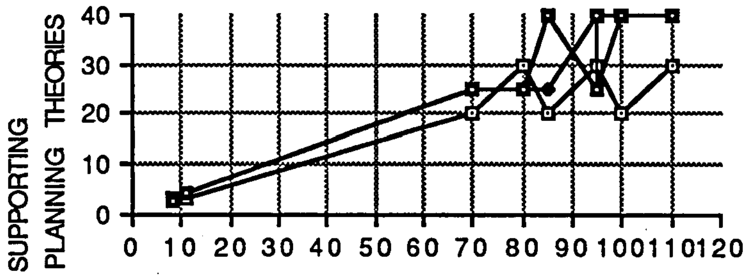
• **Brazil Medium Growth Scenario N.A.S.P.:** The cumulative weight rank from the Brazilian Medium Growth Scenario has been identified within the levels around **25** and **110**, which seem to give better results as compared to the other previous scenarios• There is still space for further improvements specially within the low levels of interaction, which means these is not yet the ideal planning context• Nevertheless, it is possible to state that the values and weights assumed within the matrix for the Brazilian Medium Scenario are quite compatible with the main objective, which is to promote N.A.S.P. practices improvements by providing the necessary changes within the planning context and planning environment•



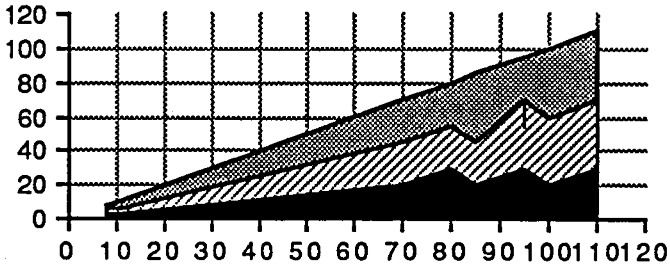


CUMULATIVE WEIGHT RANK FROM BRAZIL MEDIUM GROWTH SCENARIO N.A.S.P.

- **Brazil High Growth Scenario N.A.S.P.:** The cumulative weight rank from the Brazilian High Growth Scenario has been identified within the levels **6** and **110**, which is considerably better than the other previous scenarios• Although this seem to be the ideal planning context designed for the Brazilian N.A.S.P. practices in the future, there is still room for improvements within the identified scale of interaction, for example between **10** and **70**, where the interactions are too regular and continuous which is not always real and true in terms of real life• Nonetheless, comparing the results from the three scenarios designed for the Brazilian N.A.S.P. practices in the future it is possible to state that; despite the fact that High Growth Scenario looks promising, the adoption of the Medium Growth Scenario is suggested as a starting stage of development to improve the Actual Brazilian N.A.S.P. practices•



CUMULATIVE WEIGHT RANK FROM BRAZIL HIGH GROWTH SCENARIO N.A.S.P.



CUMULATIVE WEIGHT RANK FROM BRAZIL HIGH GROWTH SCENARIO N.A.S.P.

2. A suggested N.A.S.P. planning routine:

2.1. This suggested planning routine is also called in this research the "Tailoring process in planning" where all the M.C.S.A.M. outputs are analysed and manipulated by the multi-disciplinary planning actors team according to the following processes:

2.1.1. In the M.C.S.A.M. Summary Table, each country of the two samples has its own different sequence of preferred common planning factors and goals which is given by their individual matrixes• As expected, these sequences are rather different from the original entry order given by the original M.C.S.A.M. matrix, as they now express the individual N.A.S.P. needs within the particular circumstances of their own planning contexts and planning environments• These identified preferred common planning factors and goals should be examined with the other results plotted in the Summary Table, and then applied to the most suitable multi-objective planning methods among the suggested ones in this dissertation• The evaluation of their effectiveness should be expressed by the minimal satisfaction of each one of the members of the multi-disciplinary planning actors, as indicated by this research within the concept of minimal requirement approach stated by Hill(1980)• The identified preferred planning factors and goals are expected to improve N.A.S.P. performances specially in terms of; operational, engineering, management, and cost-benefit issues•

2.1.2. The Summary Table also provides the identified preferred planning aspects from each one of the examined countries, which should be analysed in order to; firstly, promote the minimal understanding of their own planning contexts; secondly, to promote the possible institutional changes within their organizations, and thirdly, to promote the necessary improvement within the N.A.S.P. practices•

2.1.3. The M.C.S.A.M. is an operational instrument for the proposed General System Planning Methodology(G.S.P.M.) and its feedback process is available for the next round of experimentation whenever necessary by providing new data sets for both, the planning factors and goals, and for the supporting planning theories• This combined and iterative process of planning provided by the G.S.P.M. through the M.C.S.A.M., should be carried out; firstly, until all the multi-disciplinary planning actors have been minimally satisfied, and secondly, until all the necessary changes within the planning context have been promoted, and the quality of the planning environment has proved satisfactory•

3. The Realist N.A.S.P. Methodology Model of Developed Countries, and the Brazilian Planned Scenario N.A.S.P. Methodology Model:

3.1. Before going through the applicability of the models it is important to provide further analysis on the M.C.S.A.M. Summary Table; firstly, within the concept of "emphatic understanding" of the investigation field, from where we expect to learn from their N.A.S.P. practices, and some examples have been selected to better illustrate this analysis, as follows:

3.1.1. All the countries of the developed countries sample have their N.A.S.P. methodology identified as shown in their labels, and particularly the U.S.A. and the Federal Republic of Germany both have "Accessibility policy" as the first preferred planning factor and goal, whereas the U.K. has the "National airport movement in terms of total passengers throughput" as its first preferred planning factor and goal, which is the second in the U.S.A. rank• Canada has the "Federal planning agencies" as its first preferred planning factor and goal, whereas Norway has the "National environmental issues" as its first preferred planning factor and goal• Three countries; U.K., Canada, and Norway have the "Airline system profitability" as their last preferred planning factor and goal, whereas the "Federal planning co-ordination" is the last within the U.S.A. rank, and the "Federal planning implementation policy" is the last within the Federal Republic of Germany rank•

3.1.2. Three countries; U.S.A., U.K., and Canada have the "**CP2**" or "corporate planning" as their first preferred aspect of planning to identify their planning contexts and planning environments, whereas, the Federal Republic of Germany has the "**PP2**" or "participatory planning" as one of its preferred planning aspects to identify its planning context and planning environment• Norway, has the "**PP1**" or "policies planning" as one of its preferred planning aspects to identify its planning context and planning environment• Four countries, such as; U.S.A., U.K., Canada and Norway have the "**L**" or "likely balance between the political context and the adopted planning methods", as their second preferred aspect of planning to identify their planning contexts and planning environments• Federal Republic of Germany has the "**P2**" or "possible balance between the relatively simple political context and the complex planning methods which have been adopted so far", as its second preferred aspect of planning to identify its planning context and planning environment• Two countries, such as; U.K., and Canada have the "**B**" or "bargaining" as their third preferred planning aspect to identify their planning contexts and planning environments• Two other countries; Federal Republic of Germany, and Norway have the "E" or "experimentation" as their third preferred planning aspect to identify their planning contexts and planning environments• U.S.A. has both the "**B**" or "bargaining", and the "E" or "experimentation" as its third preferred planning aspects to identify its planning context and planning environment• According to the evidences within the available literature it is possible to confirm that, apart from some small differences the above characteristics of the N.A.S.P. planning contexts and planning environments provided by the M.C.S.A.M. matrix, are perfectly suitable to identify the planning contexts and planning environment of the Developed Countries sample• Consequently, it is possible to state that the M.C.S.A.M. matrix is a suitable instrument to provide the necessary "emphatical understanding" from the sample•

3.1.3. The Realist N.A.S.P. Methodology Model of the Developed Countries is supposed to be the expression of the N.A.S.P. methodology of any Developed World Countries, and despite the fact that it is not the intention of this research to suggest any change within the developed countries N.A.S.P. sample, the forthcoming example is more likely another exercise within this learning process of planning• In the Summary Table, three interrogation symbols have been plotted within the column of the Realist N.A.S.P. Methodology Model of Developed Countries• They correspond to three questions that should be answered by the multi-disciplinary planning actors within the Developed Countries N.A.S.P. practices• More precisely, the three questions are:

1 "*Under which form of planning are* "we" *practicing* "our" *N.A.S.P.* ?"

2 "*What sort of balance does exist between* "our"*political context and the planning methods that* "we"*have been adopting within* "our" *N.A.S.P.* ?"

3 "*Under what level of uncertainty are* "we" *practicing* "our" *N.A.S.P.* ? i.e., "*Do* "we" *agree about* "our" *goals* ? *Do* "we" *agree about the solutions that should be adopted to solve* "our" *N.A.S.P. problems* ?"

3.1.4. The above questions should be answered by the multi-disciplinary planning actors of any Developed Country, assuming that the preferred planning factors and goals of the focused Developed Country N.A.S.P. are the same ones as compared to the ones shown in the Realist Model of the Summary Table, i.e., the focused Developed Country should have initially the same planning characteristics and the same preferred planning factors and goals, as compared to the Realist Model• The other characteristics of the Realist Model, i.e.; the total interactive classification number, the total cumulative weight, and the average common factor rank should be the same as from the focused developed country• Alternatively, if that is not so the exercise should be inverted i.e., the questions should be asked about the entered planning factors and goals of the matrix in order to determine the cumulative weight rank and all the other outputs of the matrix• Consequently, when these steps have been followed, the new identified preferred common planning factors and goals can be then applied to the suggested multi-objective planning methods• The new identified preferred aspects of planning should be used to promote the necessary improvements within the planning context and planning environment of the focused country N.A.S.P.•

3.2. Before going through the second example it is also important to provide further analysis of the M.C.S.A.M. Summary Table, specially within the concept of "predictive understanding" of the application field, where it is intended to apply, and some examples have been also selected to better illustrate this second part of the analysis•

3.2.1. All the four Brazilian Scenarios which represents the Middle Income and Economically Active Countries sample have their N.A.S.P. methodology identified as shown in their labels, and two of the Brazilian scenarios; the Actual Growth and the Low Growth have the "National pricing policy" as the first preferred planning factor and goal, whereas the Medium Growth Scenario has the "National air transport system economic growth" as the first preferred planning factors and goal• The High Growth Scenario has the "Public participation policy" as the first preferred planning factor and goal• Two of the Brazilian Scenarios; the Actual Growth and the Low Growth have the "Accessibility policy" as the last preferred planning factor and goal, whereas the "Airline system profitability" is the last preferred planning factor and goal in the Medium Growth rank• The High Growth Scenario has the "National pricing policy" as the last preferred planning factor and goal•

3.2.2. Two Brazilian Scenarios; the Actual Growth and the Low Growth have the "**CP1**" or "central planning" as their first preferred aspect of planning to identify respectively their real and hypothetical planning contexts and planning environments, whereas the other two Brazilian Scenarios; the Medium Growth and the High Growth have the "**CP2**" or "corporate planning" as their first preferred aspect of planning to identify their hypothetical planning contexts and planning environments• The "**V**" or "very unlikely balance between the political context and the adopted planning methods" is the second preferred planning aspect to identify the hypothetical planning context and planning environment of the Low Growth Scenario, and the "**V**" is also one of the two seconds preferred planning aspects to identify the real planning context and planning environment of the Actual Growth Scenario• The other second preferred planning aspect to identify the real planning context and planning environment of the Actual Growth Scenario is the "**P2**" or "possible balance between the actual political context and the adopted planning methods"• The "**P1**" or "possible balance between the relatively complex political context and the simple planning methods that would be adopted within the hypothetical Medium Growth Scenario", is the second preferred planning aspect to identify the planning context and the planning environment of the Medium Growth Scenario• The "L" or "likely balance between the relatively simple political context and the also relatively simple planning methods that would be adopted within the hypothetical High Growth Scenario", is the second preferred planning aspect to identify the planning context and the planning environment of the High Growth Scenario• Three Brazilian Scenarios; the Actual Growth, the Low Growth, and the Medium Growth have the "E" or "experimentation" as their third planning aspect to identify respectively its real planning context and planning environment from the Actual Growth Scenario, and their hypothetical planning contexts and planning environments from the Low and Medium Growth Scenarios• The "P" or "programming" is the third preferred planning aspect to identify the hypothetical planning context and planning environment of the High Growth Scenario• According to the evidences within the available literature it is possible to confirm that, apart from some very small differences the above characteristics of the N.A.S.P. planning context and planning environment of the Brazilian Actual Growth Scenario, provided by the M.C.S.A.M. matrix, are absolutely compatible• Consequently, it is possible to state that the M.C.S.A.M. matrix is capable of identifying the hypothetical planning contexts and planning environments of the other three designed Brazilian Scenarios of growth, as a suitable instrument of system planning analysis by providing the necessary "predictable understanding" of the M.I.E.A.C. sample•

3.2.3. The "M.I.E.A.C. N.A.S.P. Realist Methodology Model", is supposed to be the expression of the common N.A.S.P. methodology within the Middle Income and Economically Active Countries• Nevertheless, the "M.I.E.A.C. N.A.S.P. Realist Methodology Model" is also called the "Brazilian Planned Scenario N.A.S.P. Model", which is supposed to be the ideal planning context hypothetically designed to improve the actual Brazilian N.A.S.P. practices• After learning from the M.C.S.A.M. application test within the investigation field or the Developed Countries N.A.S.P., and the relatively successful application test within the application field defined by the Brazilian Actual Scenario N.A.S.P., the forthcoming example is another learning exercise of planning• In the Summary Table, three interrogation symbols have been plotted within the column of the Brazilian Planned Scenario N.A.S.P. • They correspond to three questions that should be answered by the multi-disciplinary planning actors within the Actual Brazilian N.A.S.P. practices• More precisely, the three questions are:

4 "*Under which sort of form of planning are* "we"*actually practicing* "our" *N.A.S.P. in Brazil ?*"

5 "*What sort of balance does exist between* "our"*actual political context in Brazil and the adequacy of planning methods that* "we" *have been adopting within* "our" *actual N.A.S.P. ?*"

6 "*Under what level of uncertainty are* "we"*actually practicing* "our" *N.A.S.P. in Brazil ?*" i.e., "*Do* "we" *agree about* "our" *N.A.S.P. goals ? Do* "we" *agree about the level of appropriate echnology that should be adopted to solve* "our" *actual N.A.S.P. problems ?*"

3.2.4. Before carrying out this planning exercise it must be assumed that; the preferred planning factors and goals and the other outputs obtained from the matrix of the Brazilian Planned Scenario N.A.S.P. Model are hypothetically the ideal ones in terms of planning effectiveness• The questions above should now be answered by the multi-disciplinary planning actors from the Brazilian Actual Growth Scenario or from any other focused Middle Income and Economically Active Country, assuming also that the preferred planning factors and goals of the Brazilian Actual Growth Scenario or focused M.I.E.A.C. are the same ones as those shown in the Brazilian Planned Scenario N.A.S.P. Model of the Summary Table, i.e., the focused country should have initially the same planning characteristics, and the same preferred planning factors and goals, as the Brazilian Planned Scenario Model• The other characteristics of the Brazilian Planned Scenario Model; the total interactive classification number, the total cumulative weight, and the average common factor rank should be the same as from the focused country• Alternatively, if that is not so the exercise should be inverted, i.e., the questions should be asked about the original entries in order to determine the new interactive classification numbers and consequently, the new cumulative weight rank, and finally, the new preferred common planning factors and goals• The comparison between the answers to the questions with the preferred planning aspects identified within each one of matrixes of the designed Brazilian scenarios N.A.S.P., will indicate the necessary changes within the institutional planning context of the actual Brazilian N.A.S.P., and the organizational improvements within the planning environment of the actual Brazilian N.A.S.P. practices•

7.2. Final evaluation of the proposed General System Planning Methodology(G.S.P.M.):

• In this section the final conclusions from this dissertation and possible contributions to the improvement of the multi-disciplinary planning actors' practices within multi-objective planning contexts are compiled•

1. The M.C.S.A.M. has been quite satisfactory with the cross examination and comparative analysis between the two samples, providing consequently, the epistemological qualification to this dissertation through the proposed "emphatical understanding" of the G.S.P.M. investigation field or the selected Developed Countries, and the "predictive understanding" of the G.S.P.M. application field or the M.I.E.A. Countries represented by the Brazilian Scenarios•

2. It is believed that the three specific objectives of planning; Planning Adequacy, Planning Flexibility, and Planning Continuity, which have been selected to express the G.S.P.M. effectiveness were quite satisfactory• Consequently, the main objective of this dissertation has been also achieved which is; To promote planning practices improvement within multi-objectives planning contexts through an instrument of interactive system planning analysis for the multi-disciplinary planning actors•

3. Answers to the series of questions asked throughout the work will now be attempted:

3.1."*Is it possible to adopt a multi-disciplinary planning instrument, at least to permit the analysis and identification of common planning factors* ?"(Part 1.1., Chapter 1)• Despite the fact that the proposed G.S.P.M. and the M.C.S.A.M., have been specially designed for the multi-disciplinary planning actors it was impossible to have such group working with this research, consequently, this researcher had to simulate their planning behaviour in dealing with the proposed planning instrument• Nevertheless, it has been shown that both instruments have been quite effective with the identification of the preferred common planning factors and goals•

3.2. A series of eight exploratory questions have been addressed in part 1.4.(Chapter 1) of this research, as follows:

3.2.1."*How to chose the adequate planning method for a given set of planning field characteristics and within a given set of circumstances of the Planning Context*'?"• It is believed that this task will be more reliable when the planning context becomes properly known by the multi-disciplinary planning actors in terms of its characteristics and needs• In that case perhaps the G.S.P.M. and the M.C.S.A.M. may help to provide that identification•

3.2.2. "*How to identify the common planning factors and goals at a given set of Planning Field characteristics and within a given set of circumstances of the Planning Context* ?"• There is now substitution for participation or democratic representation in terms of decision-making and decision-taking in planning processes• The G.S.P.M. and the M.C.S.A.M. have been designed to promote that congregation for identification of common planning factors and goals•

3.2.3. "*How to achieve flexibility in Planning Practices without losing the multi-objective purpose, and preserving the Planning Field characteristics within the circumstances of the Planning Context* ?"• The G.S.P.M. and the M.C.S.A.M. are instruments of planning analyses designed for the multi-disciplinary planning actors teams, and they may work as follows; firstly, they have to sustain the multi-objective purpose because each one of the members will be responsible for a set of selected planning objectives; secondly, after the identification of the planning context and planning environment through the preferred planning aspects within the supporting planning theories, the multi-disciplinary planning actors may decide to preserve the planning field characteristics, if nothing better can be done•

3.2.4. "*How to identify the real boundaries of a comprehensive and multi-disciplinary approach in Planning* ?"• The proposed Planning Analysis Tool 1 or the interactive system planning analysis, which is a permanent instrument for the M.C.S.A.M. has been designed to identify all the possible elements and sub-systems of the major system, consequently, the identification of real boundaries within the planning process will depend upon the individual planning skill of each one of the members of the multi-disciplinary planning actors team•

3.2.5. "*How to deal with uncertainty in Planning* ?"• This dissertation has selected "Uncertainty in Planning" from Christensen(1985), which identifies the problem of uncertainty within the concept of consensus concerning to goals and levels of technology within the planning process•

3.2.6. "*How to produce transparency in Planning* ?"• The G.S.P.M. and the M.C.S.A.M. are multi-disciplinary instruments of planning where each member is entitled to present as many planning factors and goals as they can support• Consequently, the multi-disciplinary planning actors team will become co-responsible for the results and outputs of the process as a whole, within which the accountability of the process is the most important one•

3.2.7. "*How to promote a joint task force in Planning and how to work within it* ?"• The working process within the multi-disciplinary teams is a very difficult task in any planning context and planning environment, and two reasons have been identified for that• First, there is a total lack of common planning terminology among the multi-disciplinary planning actors without any effort so far towards a minimum communication and exchange of information within the existing multi-disciplinary planning processes; second, there is a permanent problem of hierarchy concerning co-ordination and responsibility within any planning environment• As a matter of nomenclature the General System Planning Methodology and the M.C.S.A.M. have been designed regardless of the planning context and planning field where they happen to be applied• Furthermore, it is understood that the democratic participation or legitimate representation of any segment of society followed by the consensus in terms of decision, is an attempt to overcome these two problems within planning practices•

3.2.8. "*How to tailor in Planning in order to match the real needs with the real possibilities* ?"• That is a problem of "fitness", i.e., to "fit" the "form" to the "context", and that has been achieved through the identification of the planning context characteristics and the preferred common planning factors and goals• The iterative process defined by the three flows designed to connect the G.S.P.M. to the M.C.S.A.M. may assure the aimed "fitness"•

4. The evaluation of the G.S.P.M. applicability has been also done by using some of the concepts and theoretical support adopted by this dissertation• These are:

4.1. The realm of methodology defined by Khisty(1985) says that;"*The methods of selecting methods, is a progression from theoretical enquiries toward practical solutions* "• The proposed G.S.P.M. is at least an attempt at this, specially when selecting and relying on theoretical support to improve planning practices•

4.2. Webber(1964) has argued that; "*...if social scientists are to "understand" the behaviour of individuals and groups, they must learn to "put themselves into the place of the subject of inquiry"-"They must gain an understanding of the other's view of reality* "• This researcher has taken the place of the multi-disciplinary planning actors team to simulate their planning behaviour towards the M.C.S.A.M. application test in N.A.S.P.•

4.3. Quoting Christensen(1985); "*By tailoring planning to real world conditions, the planner is acting contingently, in doing so the planner copes rationally with uncertainty* "• The proposed G.S.P.M. and the M.C.S.A.M. with the three interdependent flows called respectively; operational flow, methodological flow, and the feedback flows, have provided the necessary tailoring tools to fit the "form" to the "context"•

4.4. Quoting Breheny(1986); "*Whether looking to tailor methods to contexts or trying to change the context, it is clear that some understanding of the broader environment in which methods are to be used is essential to any serious attempt to develop methods for policy analysis* "• It has been demonstrated that the identified preferred planning aspects within each one of the matrix of the M.C.S.A.M. are able to provide the necessary understanding of the planning environment•

4.5. Quoting Friedmann(1973); "*Two analytical distinctions have been made between the behaviour of planners and planning agencies: The first relates to the "forms of planning" considering the ways in which scientific and technical knowledge are related to organized actions that help to; a)Maintain a given system in a state of equilibrium or balance, or; b)Induce major changes in its performance• The second refers to "styles of planning" which explores the ways in which planning is influenced by the instruments and methods of control available to planners as well as by the social and institutional environment to which it must adapt itself to be effective* "• The proposed G.S.P.M. and the M.C.S.A.M. outputs have provided through both the preferred aspects of planning, and the preferred common planning factors and goals, the necessary elements to act towards these two distinctions•

4.6. Quoting Friedmann(1973) again; "*Allocative planning is an attempt to make decisions functionally rational which is not always the easiest way without the innovative planning approach, as an institutional development to promote small but significant change in the structural relations of an existing system of societal guidance* "• The combination of preferred planning aspects, and preferred common planning factors and goals from the M.C.S.A.M. may provide the combination of rational allocative planning practices and innovative planning changes within the planning context and planning environment•

4.7. Quoting Hill(1981) through his three questions when the Minimal Requirement Approach(M.R.A.) was proposed;

1st."*How to develop a method which will enable the decision-taker to resolve the conflicting interests of the various parties involved concerning the multiple issues* ?"• The M.C.S.A.M. is a democratic instrument of analysis and planning where the consensus and the "will" of the majority are the final decision•

2nd."*How to enable the participation in the process of the various interested parties involved* ?"• The M.C.S.A.M. is an open instrument of analysis and assessment for the multi-disciplinary planning actors whenever they want either to participate or be represented in the planning process•

3rd."*How to take the uncertain future into account in the process* ?"• The M.C.S.A.M. has taken some of the various forms of uncertainty defined by Christensen(1985), where the future is still unpredictable but the planning context and planning environment may become known•

4.8. Quoting Webber(1973); "*There are no set solutions• There is no way to find out what is right• Indeed, there is no one right to be found, and therefore, since there are no technically valid answers to system designs that affect social systems, no science can define human welfare...there can be only politically derived answers• The task of the system designer is therefore to contribute better information, better forecasts, better analyses...such that more enlightened...bargaining can be engaged among the several competing publics* "• The proposed G.S.P.M. and the M.C.S.A.M. have been designed to promote at least planning analyses and planning context identification•

4.9. Quoting Khisty(1985); "*Methods are the outcome of complex social demands, it is obvious that one can predict what will happen to methods if one can predict what will happen to society* "• The G.S.P.M. and the M.C.S.A.M. are instruments of "emphatical understanding" and "predictive understanding" through analogy and comparative analysis of the planning context and the planning environment toward innovative planning approach•

4.10. Quoting Popper;" *All scientific discussions start with a problem, to which we offer some sort of tentative solution, a tentative theory; this theory is criticized, in an attempt at error elimination, and as in the case of dialectic, this process renews itself: the theory and its critical revision give the rise to new problems...*"• The G.S.P.M. and the M.C.S.A.M. have been designed to promote the continual planning process driven by two of the most important planning aspects; adequate planning methods and appropriate technology within a multi-disciplinary planning context•

7.3. G.S.P.M.- Strengths & Weaknesses and Potential for further Research:

• This dissertation as a whole and specially this final section has been guided by the principles of democratic participation in planning as a legal right, and consequently, the unbiassed capacity of judgement as a moral duty• In this section the two sides of the proposed General System Planning Methodology are examined; firstly, the strengths of the proposed G.S.P.M. and M.C.S.A.M. are analysed in terms of what they represent as instruments of planning; secondly, their natural weaknesses are identified in terms of what should be done as suggested further research to improve their effectiveness•

• After the interpretation of the results and final conclusions the G.S.P.M. and M.C.S.A.M. strengths can be analysed from different angles; primarily, within the roots of procedural theories of planning it is possible to state that these instruments represent a synthetic approach of planning because they are an attempt at the "theory building" and "use maker" process of planning, i.e., it is an attempt to synthesize the best from planning theory and planning practices; secondly, the G.S.P.M. and the M.C.S.A.M. represent the idea of integration in planning through the dual exercise of "theory & practice" and "concepts & evidence", i.e., working the real world with the support of theories and concepts; thirdly, the G.S.P.M. and the M.C.S.A.M. are interactive oriented instruments of planning, i.e., they are intentionally oriented towards multi-disciplinary planning actors working within multi-objective planning contexts•

• Many points and aspects have been identified within the research process which should be done differently and perhaps better done• Consequently, the proposed G.S.P.M. and M.C.S.A.M. have presented the following weaknesses so far:

1. The G.S.P.M. and the M.C.S.A.M. should and must be tested by a multi-disciplinary planning actors team within the real world•

2. The G.S.P.M. and the M.C.S.A.M. must be tested within different planning fields and different planning contexts•

3. The number of entries or planning factors and goals of the matrix should be increased in order to have a better definition of the identifiable planning methodology framework•

4. The number of supporting planning theories of the matrix should be increased or at least their internal aspects of planning should be greater than the selected ones in order to better describe the planning context and planning environment•

5. Finally, there is a great potential for the proposed G.S.P.M & M.C.S.A.M. within Information Technology specifically through the design of special computer programmes with the help of available softwares• The objective is to allow the practical increase of components of the matrix in terms of planning factors and goals, and supporting planning theories, which will bring consirable benefits for planning practices improvements•

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APPENDIX

NORWAY-M.C.S.A.M.-SAMPLE

Mon, May 29, 1989 1:49 pm

	ENTER.ORDER.	INTER.WEIGHT	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	FRIEDMANN	BREHENY	CHRISTENSEN
1	1	10	10	0	0	0	0	25	0	0	0	0	0	40	75.000	10.000	25.000	40.000
2	2	4	0	8	0	0	0	0	0	16	0	0	12.5	0	36.500	8.000	16.000	12.500
3	3	5	0	10	0	0	0	12.5	0	0	0	0	12.5	0	35.000	10.000	12.500	12.500
4	4	3	0	6	0	0	0	7.5	0	0	0	0	7.5	0	21.000	6.000	7.500	7.500
5	5	10	10	0	0	0	0	25	0	0	0	0	0	40	75.000	10.000	25.000	40.000
6	6	10	0	0	0	40	0	25	0	0	0	0	0	40	105.000	40.000	25.000	40.000
7	7	10	0	0	0	40	0	25	0	0	0	0	0	40	105.000	40.000	25.000	40.000
8	8	10	10	0	0	0	0	25	0	0	0	0	25	0	60.000	10.000	25.000	25.000
9	9	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000	20.000	25.000	25.000
10	10	10	10	0	0	0	0	25	0	0	0	0	25	0	60.000	10.000	25.000	25.000
11	11	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000	20.000	25.000	25.000
12	12	10	0	20	0	0	0	0	0	40	0	0	25	0	85.000	20.000	40.000	25.000
13	13	10	10	0	0	0	0	0	0	40	0	0	25	0	75.000	10.000	40.000	25.000
14	14	10	0	20	0	0	0	0	0	40	0	0	25	0	85.000	20.000	40.000	25.000
15	15	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000	20.000	25.000	25.000
16	16	10	10	0	0	0	0	0	0	40	0	0	0	40	90.000	10.000	40.000	40.000
17	17	10	0	0	30	0	10	0	0	0	0	0	25	0	65.000	30.000	10.000	25.000
18	18	10	10	0	0	0	0	0	0	40	0	0	25	0	75.000	10.000	40.000	25.000
19	19	10	0	0	0	40	0	0	0	40	0	0	25	0	105.000	40.000	40.000	25.000
20	20	10	0	20	0	0	0	0	0	40	0	0	25	0	85.000	20.000	40.000	25.000
21	21	10	0	20	0	0	0	0	0	40	0	0	25	0	85.000	20.000	40.000	25.000
22	22	6	0	12	0	0	0	0	0	24	0	0	15	0	51.000	12.000	24.000	15.000
23	23	6	0	12	0	0	0	0	0	24	0	0	15	0	51.000	12.000	24.000	15.000
24	24	10	0	0	0	40	10	0	0	0	0	0	25	0	75.000	40.000	10.000	25.000
25	25	5	0	10	0	0	0	0	0	20	0	0	0	20	50.000	10.000	20.000	20.000
26	26	8	8	0	0	0	0	20	0	0	0	0	20	0	48.000	8.000	20.000	20.000
27	27	8	0	16	0	0	0	20	0	0	0	0	20	0	56.000	16.000	20.000	20.000
28	28	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000	20.000	25.000	25.000
29	29	10	10	0	0	0	0	25	0	0	0	0	25	0	60.000	10.000	25.000	25.000
30	30	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000	20.000	25.000	25.000
31	31	10	0	0	0	40	10	0	0	0	0	0	0	40	90.000	40.000	10.000	40.000
32	32	7	7	0	0	0	0	17.5	0	0	0	0	17.5	0	42.000	7.000	17.500	17.500

-NORWAY-M.C.S.A.M.-ANALYSIS 1

Mon, May 29, 1989 1:54 pm

	ENTER.ORDER.	INTER.WEIGHT	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	COMMENTS
1	1	10	10	0	0	0	0	25	0	0	0	0	0	40	75.000	
2	2	4	0	8	0	0	0	0	0	16	0	0	12.5	0	36.500	
3	3	5	0	10	0	0	0	12.5	0	0	0	0	12.5	0	35.000	
4	4	3	0	6	0	0	0	7.5	0	0	0	0	7.5	0	21.000	LOWEST
5	5	10	10	0	0	0	0	25	0	0	0	0	0	40	75.000	
6	6	10	0	0	0	40	0	25	0	0	0	0	0	40	105.000	HIGHEST
7	7	10	0	0	0	40	0	25	0	0	0	0	0	40	105.000	HIGHEST
8	8	10	10	0	0	0	0	25	0	0	0	0	25	0	60.000	
9	9	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000	
10	10	10	10	0	0	0	0	25	0	0	0	0	25	0	60.000	
11	11	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000	
12	12	10	0	20	0	0	0	0	0	40	0	0	25	0	85.000	
13	13	10	10	0	0	0	0	0	0	40	0	0	25	0	75.000	
14	14	10	0	20	0	0	0	0	0	40	0	0	25	0	85.000	
15	15	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000	
16	16	10	10	0	0	0	0	0	0	40	0	0	0	40	90.000	
17	17	10	0	0	30	0	10	0	0	0	0	0	25	0	65.000	
18	18	10	10	0	0	0	0	0	0	40	0	0	25	0	75.000	
19	19	10	0	0	0	40	0	0	0	40	0	0	25	0	105.000	HIGHEST
20	20	10	0	20	0	0	0	0	0	40	0	0	25	0	85.000	
21	21	10	0	20	0	0	0	0	0	40	0	0	25	0	85.000	
22	22	6	0	12	0	0	0	0	0	24	0	0	15	0	51.000	
23	23	6	0	12	0	0	0	0	0	24	0	0	15	0	51.000	
24	24	10	0	0	0	40	10	0	0	0	0	0	25	0	75.000	
25	25	5	0	10	0	0	0	0	0	20	0	0	0	20	50.000	
26	26	8	8	0	0	0	0	20	0	0	0	0	20	0	48.000	
27	27	8	0	16	0	0	0	20	0	0	0	0	20	0	56.000	
28	28	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000	
29	29	10	10	0	0	0	0	25	0	0	0	0	25	0	60.000	
30	30	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000	
31	31	10	0	0	0	40	10	0	0	0	0	0	0	40	90.000	
32	32	7	7	0	0	0	0	17.5	0	0	0	0	17.5	0	42.000	
33	CUMULATIVE	282.000	95.000	254.000	30.000	200.000	30.000	377.500	0.000	404.000	0.000	0.000	545.000	260.000	2195.500	TOTAL CUM.
34	AVERAGE	8.812													68.609	AVERAGE

-NORWAY-M.C.S.A.M.-ANALYSIS 2

Mon, May 29, 1989 1:56 pm

	ENTER.ORDER	INTER.WEIGHT	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	DESCENDING	COMMON FA.	Column 18
1	19	10	0	0	0	40	0	0	0	40	0	0	25	0	105.000	105.000	3	
2	7	10	0	0	0	40	0	25	0	0	0	0	0	40	105.000	90.000	2	
3	6	10	0	0	0	40	0	25	0	0	0	0	0	40	105.000	85.000	4	
4	31	10	0	0	0	40	10	0	0	0	0	0	0	40	90.000	75.000	5	
5	16	10	10	0	0	0	0	0	0	40	0	0	0	40	90.000	70.000	5	
6	21	10	0	20	0	0	0	0	0	40	0	0	25	0	85.000	65.000	1	
7	20	10	0	20	0	0	0	0	0	40	0	0	25	0	85.000	60.000	3	
8	14	10	0	20	0	0	0	0	0	40	0	0	25	0	85.000	56.000	1	
9	12	10	0	20	0	0	0	0	0	40	0	0	25	0	85.000	51.000	2	
10	24	10	0	0	0	40	10	0	0	0	0	0	25	0	75.000	50.000	1	
11	18	10	10	0	0	0	0	0	0	40	0	0	25	0	75.000	48.000	1	
12	13	10	10	0	0	0	0	0	0	40	0	0	25	0	75.000	42.000	1	
13	5	10	10	0	0	0	0	25	0	0	0	0	0	40	75.000	36.500	1	
14	1	10	10	0	0	0	0	25	0	0	0	0	0	40	75.000	35.000	1	
15	30	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000	21.000	1	
16	28	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000			
17	15	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000			
18	11	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000			
19	9	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000			
20	17	10	0	0	30	0	10	0	0	0	0	0	25	0	65.000			
21	29	10	10	0	0	0	0	25	0	0	0	0	25	0	60.000			
22	10	10	10	0	0	0	0	25	0	0	0	0	25	0	60.000			
23	8	10	10	0	0	0	0	25	0	0	0	0	25	0	60.000			
24	27	8	0	16	0	0	0	20	0	0	0	0	20	0	56.000			
25	23	6	0	12	0	0	0	0	0	24	0	0	15	0	51.000			
26	22	6	0	12	0	0	0	0	0	24	0	0	15	0	51.000			
27	25	5	0	10	0	0	0	0	0	20	0	0	0	20	50.000			
28	26	8	8	0	0	0	0	20	0	0	0	0	20	0	48.000			
29	32	7	7	0	0	0	0	17.5	0	0	0	0	17.5	0	42.000			
30	2	4	0	8	0	0	0	0	0	16	0	0	12.5	0	36.500			
31	3	5	0	10	0	0	0	12.5	0	0	0	0	12.5	0	35.000			
32	4	3	0	6	0	0	0	7.5	0	0	0	0	7.5	0	21.000			

-NORWAY-M.C.S.A.M.-ANALYSIS 3

Mon, May 29, 1989 1:58 pm

	ENTER.ORDER	INTER.WEIGHT	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	COM.FA.RAN.
1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	0	0	1	2	3	4	1	2.5	2.5	4	1	2.5	2.5	4	0	0
3	1	10	10	0	0	0	0	25	0	0	0	0	0	40	75	4*
4	2	4	0	8	0	0	0	0	0	16	0	0	12.5	0	36.5	13*
5	3	5	0	10	0	0	0	12.5	0	0	0	0	12.5	0	35	14*
6	4	3	0	6	0	0	0	7.5	0	0	0	0	7.5	0	21	15*
7	5	10	10	0	0	0	0	25	0	0	0	0	0	40	75	4*
8	6	10	0	0	0	40	0	25	0	0	0	0	0	40	105	1*
9	7	10	0	0	0	40	0	25	0	0	0	0	0	40	105	1*
10	8	10	10	0	0	0	0	25	0	0	0	0	25	0	60	7*
11	9	10	0	20	0	0	0	25	0	0	0	0	25	0	70	5*
12	10	10	10	0	0	0	0	25	0	0	0	0	25	0	60	7*
13	11	10	0	20	0	0	0	25	0	0	0	0	25	0	70	5*
14	12	10	0	20	0	0	0	0	0	40	0	0	25	0	85	3*
15	13	10	10	0	0	0	0	0	0	40	0	0	25	0	75	4*
16	14	10	0	20	0	0	0	0	0	40	0	0	25	0	85	3*
17	15	10	0	20	0	0	0	25	0	0	0	0	25	0	70	5*
18	16	10	10	0	0	0	0	0	0	40	0	0	0	40	90	2*
19	17	10	0	0	30	0	10	0	0	0	0	0	25	0	65	6*
20	18	10	10	0	0	0	0	0	0	40	0	0	25	0	75	4*
21	19	10	0	0	0	40	0	0	0	40	0	0	25	0	105	1*
22	20	10	0	20	0	0	0	0	0	40	0	0	25	0	85	3*
23	21	10	0	20	0	0	0	0	0	40	0	0	25	0	85	3*
24	22	6	0	12	0	0	0	0	0	24	0	0	15	0	51	9*
25	23	6	0	12	0	0	0	0	0	24	0	0	15	0	51	9*
26	24	10	0	0	0	40	10	0	0	0	0	0	25	0	75	4*
27	25	5	0	10	0	0	0	0	0	20	0	0	0	20	50	10*
28	26	8	8	0	0	0	0	20	0	0	0	0	20	0	48	11*
29	27	8	0	16	0	0	0	20	0	0	0	0	20	0	56	8*
30	28	10	0	20	0	0	0	25	0	0	0	0	25	0	70	5*
31	29	10	10	0	0	0	0	25	0	0	0	0	25	0	60	7*
32	30	10	0	20	0	0	0	25	0	0	0	0	25	0	70	5*
33	31	10	0	0	0	40	10	0	0	0	0	0	0	40	90	2*
34	32	7	7	0	0	0	0	17.5	0	0	0	0	17.5	0	42	12*
35	88.1%	282	95	254	30	200	30	377.5	0	404	0	0	545	260	2195.5	0
36	SUP.TH.RANK	0	3*	1*	4*	2*	3*	2*	0	1*	0	0	1*	2*	0	6*
37	AVER.WEIGHT	8.81	9.5	15.87	30	50	10	22.2	0	33.6	0	0	21.8	37.14	[illegible]	

USA -M.C.S.A.M.-SAMPLE

Mon, May 29, 1989 2:01 pm

	ENTERORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RANK	FRIEDMANN	BREHENY	CHRISTENSEN
1	1	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	30.000	40.000	40.000
2	2	4	0	0	12	0	0	0	0	16	0	10	0	0	38.000	12.000	16.000	10.000
3	3	5	0	0	15	0	0	0	0	20	0	12.5	0	0	47.500	15.000	20.000	12.500
4	4	3	0	0	9	0	0	0	0	12	0	7.5	0	0	28.500	9.000	12.000	7.500
5	5	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	1.000	1.000	1.000
6	6	5	0	10	0	0	5	0	0	0	0	12.5	0	0	27.500	10.000	5.000	12.500
7	7	5	5	0	0	0	5	0	0	0	0	12.5	0	0	22.500	5.000	5.000	12.500
8	8	10	0	0	0	40	0	0	25	0	0	25	0	0	90.000	40.000	25.000	25.000
9	9	10	0	0	0	40	0	0	25	0	0	25	0	0	90.000	40.000	25.000	25.000
10	10	10	0	20	0	0	0	0	25	0	0	25	0	0	70.000	20.000	25.000	25.000
11	11	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	30.000	40.000	25.000
12	12	10	0	0	0	40	0	0	0	40	0	0	25	0	105.000	40.000	40.000	25.000
13	13	8	0	16	0	0	8	0	0	0	0	20	0	0	44.000	16.000	8.000	20.000
14	14	8	0	16	0	0	8	0	0	0	0	20	0	0	44.000	16.000	8.000	20.000
15	15	10	0	0	30	0	0	25	0	0	0	25	0	0	80.000	30.000	25.000	25.000
16	16	5	5	0	0	0	0	0	12.5	0	0	12.5	0	0	30.000	5.000	12.500	12.500
17	17	7	0	0	0	28	0	17.5	0	0	0	0	17.5	0	63.000	28.000	17.500	17.500
18	18	10	0	0	0	40	0	25	0	0	0	0	25	0	90.000	40.000	25.000	25.000
19	19	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000	20.000	10.000	25.000
20	20	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	30.000	40.000	25.000
21	21	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	30.000	40.000	25.000
22	22	6	0	12	0	0	0	0	0	24	0	0	15	0	51.000	12.000	24.000	15.000
23	23	6	0	12	0	0	0	0	0	24	0	0	0	24	60.000	12.000	24.000	24.000
24	24	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000	30.000	25.000	25.000
25	25	5	0	0	15	0	5	0	0	0	0	0	12.5	0	32.500	15.000	5.000	12.500
26	26	8	0	0	24	0	8	0	0	0	0	20	0	0	52.000	24.000	8.000	20.000
27	27	8	0	16	0	0	0	0	20	0	0	0	20	0	56.000	16.000	20.000	20.000
28	28	10	0	0	0	40	10	0	0	0	0	0	25	0	75.000	40.000	10.000	25.000
29	29	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000	30.000	25.000	25.000
30	30	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	30.000	40.000	25.000
31	31	5	0	0	0	20	5	0	0	0	0	12.5	0	0	37.500	20.000	5.000	12.500
32	32	10	10	0	0	0	10	0	0	0	0	25	0	0	45.000	10.000	10.000	25.000

•USA-M.C.S.A.M.-ANALYSIS 1

Mon, May 29, 1989 2:04 pm

	ENTER ORDER	INTER. WEIGHT	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	COMMENTS	Column 17
1	1	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	HIGHEST	
2	2	4	0	0	12	0	0	0	0	16	0	10	0	0	38.000		
3	3	5	0	0	15	0	0	0	0	20	0	12.5	0	0	47.500		
4	4	3	0	0	9	0	0	0	0	12	0	7.5	0	0	28.500		
5	5	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	LOWEST	
6	6	5	0	10	0	0	5	0	0	0	0	12.5	0	0	27.500		
7	7	5	5	0	0	0	5	0	0	0	0	12.5	0	0	22.500		
8	8	10	0	0	0	40	0	0	25	0	0	25	0	0	90.000		
9	9	10	0	0	0	40	0	0	25	0	0	25	0	0	90.000		
10	10	10	0	20	0	0	0	0	25	0	0	25	0	0	70.000		
11	11	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000		
12	12	10	0	0	0	40	0	0	0	40	0	0	25	0	105.000		
13	13	8	0	16	0	0	8	0	0	0	0	20	0	0	44.000		
14	14	8	0	16	0	0	8	0	0	0	0	20	0	0	44.000		
15	15	10	0	0	30	0	0	25	0	0	0	25	0	0	80.000		
16	16	5	5	0	0	0	0	0	12.5	0	0	12.5	0	0	30.000		
17	17	7	0	0	0	28	0	17.5	0	0	0	0	17.5	0	63.000		
18	18	10	0	0	0	40	0	25	0	0	0	0	25	0	90.000		
19	19	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000		
20	20	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000		
21	21	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000		
22	22	6	0	12	0	0	0	0	0	24	0	0	15	0	51.000		
23	23	6	0	12	0	0	0	0	0	24	0	0	0	24	60.000		
24	24	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000		
25	25	5	0	0	15	0	5	0	0	0	0	0	12.5	0	32.500		
26	26	8	0	0	24	0	8	0	0	0	0	20	0	0	52.000		
27	27	8	0	16	0	0	0	0	20	0	0	0	20	0	56.000		
28	28	10	0	0	0	40	10	0	0	0	0	0	25	0	75.000		
29	29	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000		
30	30	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000		
31	31	5	0	0	0	20	5	0	0	0	0	12.5	0	0	37.500		
32	32	10	10	0	0	0	10	0	0	0	0	25	0	0	45.000		
33	CUMULATIVE	249.000	21.000	122.000	315.000	248.000	75.000	117.500	107.500	336.000	1.000	290.000	290.000	64.000	1987.000	TOTAL CUM.	
34	AVERAGE	7.781	-	-	-	-	-	-	-	-	-	-	-	-	62.094	AVERAGE	
35	SUPPORTING	-	4°	3°	1°	2°	4°	2°	3°	1°	3°	1°	1°	2°			

Mon, May 29, 1989 2:08 pm

•USA-M.C.S.A.M.-ANALYSIS 2

	FACTORS ENTER	INTER. WEIGHT	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	DESCENDING	COMMON FA.
1	1	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	110.000	1
2	12	10	0	0	0	40	0	0	0	40	0	0	25	0	105.000	105.000	1
3	30	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	95.000	4
4	21	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	90.000	3
5	20	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	80.000	3
6	11	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	75.000	1
7	18	10	0	0	0	40	0	25	0	0	0	0	25	0	90.000	70.000	1
8	9	10	0	0	0	40	0	0	25	0	0	25	0	0	90.000	63.000	1
9	8	10	0	0	0	40	0	0	25	0	0	25	0	0	90.000	60.000	1
10	29	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000	56.000	1
11	24	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000	55.000	1
12	15	10	0	0	30	0	0	25	0	0	0	25	0	0	80.000	52.000	1
13	28	10	0	0	0	40	10	0	0	0	0	0	25	0	75.000	51.000	1
14	10	10	0	20	0	0	0	0	25	0	0	25	0	0	70.000	47.500	1
15	17	7	0	0	0	28	0	17.5	0	0	0	0	17.5	0	63.000	45.000	1
16	23	6	0	12	0	0	0	0	0	24	0	0	0	24	60.000	44.000	2
17	27	8	0	16	0	0	0	0	20	0	0	0	20	0	56.000	38.000	1
18	19	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000	37.500	1
19	26	8	0	0	24	0	8	0	0	0	0	20	0	0	52.000	32.500	1
20	22	6	0	12	0	0	0	0	0	24	0	0	15	0	51.000	30.000	1
21	3	5	0	0	15	0	0	0	0	20	0	12.5	0	0	47.500	28.500	1
22	32	10	10	0	0	0	10	0	0	0	0	25	0	0	45.000	27.500	1
23	14	8	0	16	0	0	8	0	0	0	0	20	0	0	44.000	22.500	1
24	13	8	0	16	0	0	8	0	0	0	0	20	0	0	44.000	3.000	1
25	2	4	0	0	12	0	0	0	0	16	0	10	0	0	38.000		
26	31	5	0	0	0	20	5	0	0	0	0	12.5	0	0	37.500		
27	25	5	0	0	15	0	5	0	0	0	0	0	12.5	0	32.500		
28	16	5	5	0	0	0	0	0	12.5	0	0	12.5	0	0	30.000		
29	4	3	0	0	9	0	0	0	0	12	0	7.5	0	0	28.500		
30	6	5	0	10	0	0	5	0	0	0	0	12.5	0	0	27.500		
31	7	5	5	0	0	0	5	0	0	0	0	12.5	0	0	22.500		
32	5	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000		

Mon, May 29, 1989 2:10 pm

•USA-M.C.S.A.M.-ANALYSIS 3

	ENTER ORDER.	INTER. WEIGHT	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	COM.FA.RAN.
1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	0	0	1	2	3	4	1	2.5	2.5	4	1	2.5	2.5	4	0	0
3	1	10	0	0	30	0	0	0	0	40	0	0	0	40	110	1•
4	2	4	0	0	12	0	0	0	0	16	0	10	0	0	38	17•
5	3	5	0	0	15	0	0	0	0	20	0	12.5	0	0	47.5	14•
6	4	3	0	0	9	0	0	0	0	12	0	7.5	0	0	28.5	21•
7	5	1	1	0	0	0	1	0	0	0	1	0	0	0	3	24•
8	6	5	0	10	0	0	5	0	0	0	0	12.5	0	0	27.5	22•
9	7	5	5	0	0	0	5	0	0	0	0	12.5	0	0	22.5	23•
10	8	10	0	0	0	40	0	0	25	0	0	25	0	0	90	4•
11	9	10	0	0	0	40	0	0	25	0	0	25	0	0	90	4•
12	10	10	0	20	0	0	0	0	25	0	0	25	0	0	70	7•
13	11	10	0	0	30	0	0	0	0	40	0	0	25	0	95	3•
14	12	10	0	0	0	40	0	0	0	40	0	0	25	0	105	2•
15	13	8	0	16	0	0	8	0	0	0	0	20	0	0	44	16•
16	14	8	0	16	0	0	8	0	0	0	0	20	0	0	44	16•
17	15	10	0	0	30	0	0	25	0	0	0	25	0	0	80	5•
18	16	5	5	0	0	0	0	0	12.5	0	0	12.5	0	0	30	20•
19	17	7	0	0	0	28	0	17.5	0	0	0	0	17.5	0	63	8•
20	18	10	0	0	0	40	0	25	0	0	0	0	25	0	90	4•
21	19	10	0	20	0	0	10	0	0	0	0	25	0	0	55	11•
22	20	10	0	0	30	0	0	0	0	40	0	0	25	0	95	3•
23	21	10	0	0	30	0	0	0	0	40	0	0	25	0	95	3•
24	22	6	0	12	0	0	0	0	0	24	0	0	15	0	51	13•
25	23	6	0	12	0	0	0	0	0	24	0	0	0	24	60	9•
26	24	10	0	0	30	0	0	25	0	0	0	0	25	0	80	5•
27	25	5	0	0	15	0	5	0	0	0	0	0	12.5	0	32.5	19•
28	26	8	0	0	24	0	8	0	0	0	0	20	0	0	52	12•
29	27	8	0	16	0	0	0	0	20	0	0	0	20	0	56	10•
30	28	10	0	0	0	40	10	0	0	0	0	0	25	0	75	6•
31	29	10	0	0	30	0	0	25	0	0	0	0	25	0	80	5•
32	30	10	0	0	30	0	0	0	0	40	0	0	25	0	95	3•
33	31	5	0	0	0	20	5	0	0	0	0	12.5	0	0	37.5	18•
34	32	10	10	0	0	0	10	0	0	0	0	25	0	0	45	15•
35	77.8%	249	21	122	315	248	75	117.5	107.5	336	1	290	290	64	1987	0
36	SUP.TH.RANK	0	4•	3•	1•	2•	4•	2•	3•	1•	3•	1•	1•	2•	0	10•

Mon, May 29, 1989 2:13 pm

UK-M.C.S.A.M.-SAMPLE

	ENTER.ORDER	INTER.WEIGHT	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	FRIEDMANN	BREHENY	CHRISTENSEN
1	1	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000	20.000	10.000	25.000
2	2	4	0	0	12	0	0	0	0	16	0	0	10	0	38.000	12.000	16.000	10.000
3	3	5	0	10	0	0	0	0	0	20	0	0	12.5	0	42.500	10.000	20.000	12.500
4	4	3	0	0	9	0	0	0	0	12	0	0	7.5	0	28.500	9.000	12.000	7.500
5	5	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000	20.000	10.000	25.000
6	6	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000	20.000	10.000	25.000
7	7	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000	20.000	10.000	25.000
8	8	10	0	20	0	0	10	0	0	0	0	0	25	0	55.000	20.000	10.000	25.000
9	9	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000	20.000	10.000	25.000
10	10	7	0	14	0	0	0	0	17.5	0	0	0	17.5	0	49.000	14.000	17.500	17.500
11	11	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	30.000	40.000	40.000
12	12	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	30.000	40.000	40.000
13	13	7	0	14	0	0	0	0	0	28	0	0	17.5	0	59.500	14.000	28.000	17.500
14	14	7	0	0	21	0	0	0	0	28	0	0	17.5	0	66.500	21.000	28.000	17.500
15	15	7	0	14	0	0	0	17.5	0	0	0	0	17.5	0	49.000	14.000	17.500	17.500
16	16	7	0	14	0	0	0	17.5	0	0	0	0	0	28	59.500	14.000	17.500	28.000
17	17	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000	30.000	25.000	25.000
18	18	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000	20.000	10.000	25.000
19	19	10	0	0	30	0	10	0	0	0	0	25	0	0	65.000	30.000	10.000	25.000
20	20	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	30.000	40.000	25.000
21	21	10	0	0	30	0	10	0	0	0	0	0	25	0	65.000	30.000	10.000	25.000
22	22	6	0	0	18	0	0	15	0	0	0	0	15	0	48.000	18.000	15.000	15.000
23	23	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000	30.000	25.000	25.000
24	24	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000	20.000	25.000	25.000
25	25	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000	20.000	10.000	25.000
26	26	10	0	0	30	0	0	25	0	0	0	25	0	0	80.000	30.000	25.000	25.000
27	27	7	0	0	21	0	0	17.5	0	0	0	17.5	0	0	56.000	21.000	17.500	17.500
28	28	10	0	20	0	0	10	0	0	0	0	0	25	0	55.000	20.000	10.000	25.000
29	29	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000	30.000	25.000	25.000
30	30	10	0	0	30	0	0	25	0	0	0	25	0	0	80.000	30.000	25.000	25.000
31	31	10	0	0	30	0	10	0	0	0	0	25	0	0	65.000	30.000	10.000	25.000
32	32	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000	20.000	10.000	25.000

Mon, May 29, 1989 2:17 pm

UK-M.C.S.A.M.-ANALYSIS 1

	ENTER.ORDER	INTER.WEIGHT	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	COMMENTS	Column 17	Column 18
1	1	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000			
2	2	4	0	0	12	0	0	0	0	16	0	0	10	0	38.000			
3	3	5	0	10	0	0	0	0	0	20	0	0	12.5	0	42.500			
4	4	3	0	0	9	0	0	0	0	12	0	0	7.5	0	28.500	LOWEST CUM.W.		
5	5	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000			
6	6	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000			
7	7	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000			
8	8	10	0	20	0	0	10	0	0	0	0	0	25	0	55.000			
9	9	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000			
10	10	7	0	14	0	0	0	0	17.5	0	0	0	17.5	0	49.000			
11	11	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	HIGHEST		
12	12	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	HIGHEST		
13	13	7	0	14	0	0	0	0	0	28	0	0	17.5	0	59.500			
14	14	7	0	0	21	0	0	0	0	28	0	0	17.5	0	66.500			
15	15	7	0	14	0	0	0	17.5	0	0	0	0	17.5	0	49.000			
16	16	7	0	14	0	0	0	17.5	0	0	0	0	0	28	59.500			
17	17	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000			
18	18	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000			
19	19	10	0	0	30	0	10	0	0	0	0	25	0	0	65.000			
20	20	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000			
21	21	10	0	0	30	0	10	0	0	0	0	0	25	0	65.000			
22	22	6	0	0	18	0	0	15	0	0	0	0	15	0	48.000			
23	23	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000			
24	24	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000			
25	25	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000			
26	26	10	0	0	30	0	0	25	0	0	0	25	0	0	80.000			
27	27	7	0	0	21	0	0	17.5	0	0	0	17.5	0	0	56.000			
28	28	10	0	20	0	0	10	0	0	0	0	0	25	0	55.000			
29	29	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000			
30	30	10	0	0	30	0	0	25	0	0	0	25	0	0	80.000			
31	31	10	0	0	30	0	10	0	0	0	0	25	0	0	65.000			
32	32	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000			
33	CUMULATIVE	280.000	0.000	286.000	411.000	0.000	130.000	217.500	17.500	224.000	0.000	317.500	315.000	108.000	2026.500	TOTAL CUM.		
34	AVERAGE	8.750	-	-	-	-	-	-	-	-	-	-	-	-	63.328	AVERAGE		
35	[illegible]			[illegible]	[illegible]		3*	2*	4*	1*	-	1*	2*	3*	-			

•UK-M.C.S.A.M.-ANALYSIS 2

Mon, May 29, 1989 2:21 pm

	ENTER.ORDER.	INTER.WEIGHT	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	DESCENDING	COMMON FA.	Column 18
1	12	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	110.000	2	
2	11	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	95.000	1	
3	20	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	80.000	5	
4	30	10	0	0	30	0	0	25	0	0	0	25	0	0	80.000	70.000	1	
5	29	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000	66.500	1	
6	26	10	0	0	30	0	0	25	0	0	0	25	0	0	80.000	65.000	3	
7	23	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000	59.500	2	
8	17	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000	56.000	1	
9	24	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000	55.000	10	
10	14	7	0	0	21	0	0	0	0	28	0	0	17.5	0	66.500	49.000	2	
11	31	10	0	0	30	0	10	0	0	0	0	25	0	0	65.000	48.000	1	
12	21	10	0	0	30	0	10	0	0	0	0	0	25	0	65.000	42.500	1	
13	19	10	0	0	30	0	10	0	0	0	0	25	0	0	65.000	38.000	1	
14	16	7	0	14	0	0	0	17.5	0	0	0	0	0	28	59.500	28.500	1	
15	13	7	0	14	0	0	0	0	0	28	0	0	17.5	0	59.500			
16	27	7	0	0	21	0	0	17.5	0	0	0	17.5	0	0	56.000			
17	32	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000			
18	28	10	0	20	0	0	10	0	0	0	0	0	25	0	55.000			
19	25	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000			
20	18	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000			
21	9	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000			
22	8	10	0	20	0	0	10	0	0	0	0	0	25	0	55.000			
23	7	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000			
24	6	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000			
25	5	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000			
26	1	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000			
27	15	7	0	14	0	0	0	17.5	0	0	0	0	17.5	0	49.000			
28	10	7	0	14	0	0	0	0	17.5	0	0	0	17.5	0	49.000			
29	22	6	0	0	18	0	0	15	0	0	0	0	15	0	48.000			
30	3	5	0	10	0	0	0	0	0	20	0	0	12.5	0	42.500			
31	2	4	0	0	12	0	0	0	0	16	0	0	10	0	38.000			
32	4	3	0	0	9	0	0	0	0	12	0	0	7.5	0	28.500			

•UK- M.C.S.A.M.-ANALYSIS 3

Mon, May 29, 1989 2:23 pm

	ENTER.ORDER.	INTER.WEIGHT	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	COM.FA.RAN.	Column 17	Column 18
1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
2	0	0	1	2	3	4	1	2.5	2.5	4	1	2.5	2.5	4	0	0		
3	1	10	0	20	0	0	10	0	0	0	0	25	0	0	55	9*		
4	2	4	0	0	12	0	0	0	0	16	0	0	10	0	38	13*		
5	3	5	0	10	0	0	0	0	0	20	0	0	12.5	0	42.5	12*		
6	4	3	0	0	9	0	0	0	0	12	0	0	7.5	0	28.5	14*		
7	5	10	0	20	0	0	10	0	0	0	0	25	0	0	55	9*		
8	6	10	0	20	0	0	10	0	0	0	0	25	0	0	55	9*		
9	7	10	0	20	0	0	10	0	0	0	0	25	0	0	55	9*		
10	8	10	0	20	0	0	10	0	0	0	0	0	25	0	55	9*		
11	9	10	0	20	0	0	10	0	0	0	0	25	0	0	55	9*		
12	10	7	0	14	0	0	0	0	17.5	0	0	0	17.5	0	49	10*		
13	11	10	0	0	30	0	0	0	0	40	0	0	0	40	110	1*		
14	12	10	0	0	30	0	0	0	0	40	0	0	0	40	110	1*		
15	13	7	0	14	0	0	0	0	0	28	0	0	17.5	0	59.5	7*		
16	14	7	0	0	21	0	0	0	0	28	0	0	17.5	0	66.5	5*		
17	15	7	0	14	0	0	0	17.5	0	0	0	0	17.5	0	49	10*		
18	16	7	0	14	0	0	0	17.5	0	0	0	0	0	28	59.5	7*		
19	17	10	0	0	30	0	0	25	0	0	0	0	25	0	80	3*		
20	18	10	0	20	0	0	10	0	0	0	0	25	0	0	55	9*		
21	19	10	0	0	30	0	10	0	0	0	0	25	0	0	65	6*		
22	20	10	0	0	30	0	0	0	0	40	0	0	25	0	95	2*		
23	21	10	0	0	30	0	10	0	0	0	0	0	25	0	65	6*		
24	22	6	0	0	18	0	0	15	0	0	0	0	15	0	48	11*		
25	23	10	0	0	30	0	0	25	0	0	0	0	25	0	80	3*		
26	24	10	0	20	0	0	0	25	0	0	0	0	25	0	70	4*		
27	25	10	0	20	0	0	10	0	0	0	0	25	0	0	55	9*		
28	26	10	0	0	30	0	0	25	0	0	0	25	0	0	80	3*		
29	27	7	0	0	21	0	0	17.5	0	0	0	17.5	0	0	56	8*		
30	28	10	0	20	0	0	10	0	0	0	0	0	25	0	55	9*		
31	29	10	0	0	30	0	0	25	0	0	0	0	25	0	80	3*		
32	30	10	0	0	30	0	0	25	0	0	0	25	0	0	80	3*		
33	31	10	0	0	30	0	10	0	0	0	0	25	0	0	65	6*		
34	32	10	0	20	0	0	10	0	0	0	0	25	0	0	55	9*		
35	87.5 %	280	0	286	441	0	130	217.5	17.5	224	0	317.5	315	108	2026.5	0		
36	SUP.TH.RANK	0	0	2*	1*	0	3*	2*	4*	1*	0	1*	2*	3*	0	7*		
37	AVER.WEIGHT	8.75	0	17.87	25.68	0	10	21.75	17.5	28	0	24.42	19.68	36	63.[illegible]	0		

F.R.GERMANY-M.C.S.A.M.SAMPLE

Mon, May 29, 1989 2:28 pm

	ENTER.ORDER	INTER.WEIGHT	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	FRIEDMANN	BREHENY	CHRISTENSEN
1	1	10	0	0	30	0	0	25	0	0	0	0	0	40	95.000	30.000	25.000	40.000
2	2	4	0	8	0	0	0	0	0	16	0	0	0	16	40.000	8.000	16.000	16.000
3	3	5	0	10	0	0	0	12.5	0	0	0	12.5	0	0	35.000	10.000	12.500	12.500
4	4	3	0	0	9	0	0	0	0	12	0	0	0	12	33.000	9.000	12.000	12.000
5	5	5	0	10	0	0	0	0	0	20	0	12.5	0	0	42.500	10.000	20.000	12.500
6	6	5	0	10	0	0	0	0	0	4	0	12.5	0	0	26.500	10.000	4.000	12.500
7	7	5	0	0	0	20	5	0	0	0	0	0	0	20	45.000	20.000	5.000	20.000
8	8	10	0	0	0	40	10	0	0	0	0	25	0	0	75.000	40.000	10.000	25.000
9	9	10	0	0	0	40	10	0	0	0	0	25	0	0	75.000	40.000	10.000	25.000
10	10	5	0	10	0	0	0	12.5	0	0	0	0	12.5	0	35.000	10.000	12.500	12.500
11	11	5	0	10	0	0	0	12.5	0	0	0	0	12.5	0	35.000	10.000	12.500	12.500
12	12	5	0	10	0	0	0	12.5	0	0	0	12.5	0	0	35.000	10.000	12.500	12.500
13	13	7	0	0	21	0	0	17.5	0	0	0	0	17.5	0	56.000	21.000	17.500	17.500
14	14	7	0	14	0	0	0	17.5	0	0	0	17.5	0	0	49.000	14.000	17.500	17.500
15	15	6	0	12	0	0	0	15	0	0	0	0	15	0	42.000	12.000	15.000	15.000
16	16	7	0	0	0	28	7	0	0	0	0	17.5	0	0	52.500	28.000	7.000	17.500
17	17	6	0	0	18	0	0	15	0	0	0	0	15	0	48.000	18.000	15.000	15.000
18	18	10	0	0	0	40	10	0	0	0	0	0	0	40	90.000	40.000	10.000	40.000
19	19	10	0	0	0	40	10	0	0	0	0	25	0	0	75.000	40.000	10.000	25.000
20	20	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000	30.000	25.000	25.000
21	21	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000	30.000	25.000	25.000
22	22	6	0	0	18	0	0	15	0	0	0	0	15	0	48.000	18.000	15.000	15.000
23	23	6	0	0	18	0	0	15	0	0	0	0	15	0	48.000	18.000	15.000	15.000
24	24	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000	20.000	25.000	25.000
25	25	10	0	0	0	40	10	0	0	0	0	0	0	40	90.000	40.000	10.000	40.000
26	26	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000	20.000	25.000	25.000
27	27	6	0	0	18	0	0	15	0	0	0	0	15	0	48.000	18.000	15.000	15.000
28	28	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000	20.000	10.000	25.000
29	29	6	0	0	18	0	0	15	0	0	0	0	15	0	48.000	18.000	15.000	15.000
30	30	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000	30.000	25.000	25.000
31	31	10	0	0	0	40	10	0	0	0	0	0	0	40	90.000	40.000	10.000	40.000
32	32	10	0	0	30	0	0	25	0	0	0	25	0	0	80.000	30.000	25.000	25.000

•FRG-M.C.S.A.M.-ANALYSIS 1

Mon, May 29, 1989 2:32 pm

	ENTER.ORDER	INTER.WEIGHT	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RANK	COMMENTS
1	1	10	0	0	30	0	0	25	0	0	0	0	0	40	95.000	HIGHEST
2	2	4	0	8	0	0	0	0	0	16	0	0	0	16	40.000	
3	3	5	0	10	0	0	0	12.5	0	0	0	12.5	0	0	35.000	
4	4	3	0	0	9	0	0	0	0	12	0	0	0	12	33.000	
5	5	5	0	10	0	0	0	0	0	20	0	12.5	0	0	42.500	
6	6	5	0	10	0	0	0	0	0	4	0	12.5	0	0	26.500	LOWEST
7	7	5	0	0	0	20	5	0	0	0	0	0	0	20	45.000	
8	8	10	0	0	0	40	10	0	0	0	0	25	0	0	75.000	
9	9	10	0	0	0	40	10	0	0	0	0	25	0	0	75.000	
10	10	5	0	10	0	0	0	12.5	0	0	0	0	12.5	0	35.000	
11	11	5	0	10	0	0	0	12.5	0	0	0	0	12.5	0	35.000	
12	12	5	0	10	0	0	0	12.5	0	0	0	12.5	0	0	35.000	
13	13	7	0	0	21	0	0	17.5	0	0	0	0	17.5	0	56.000	
14	14	7	0	14	0	0	0	17.5	0	0	0	17.5	0	0	49.000	
15	15	6	0	12	0	0	0	15	0	0	0	0	15	0	42.000	
16	16	7	0	0	0	28	7	0	0	0	0	17.5	0	0	52.500	
17	17	6	0	0	18	0	0	15	0	0	0	0	15	0	48.000	
18	18	10	0	0	0	40	10	0	0	0	0	0	0	40	90.000	
19	19	10	0	0	0	40	10	0	0	0	0	25	0	0	75.000	
20	20	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000	
21	21	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000	
22	22	6	0	0	18	0	0	15	0	0	0	0	15	0	48.000	
23	23	6	0	0	18	0	0	15	0	0	0	0	15	0	48.000	
24	24	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000	
25	25	10	0	0	0	40	10	0	0	0	0	0	0	40	90.000	
26	26	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000	
27	27	6	0	0	18	0	0	15	0	0	0	0	15	0	48.000	
28	28	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000	
29	29	6	0	0	18	0	0	15	0	0	0	0	15	0	48.000	
30	30	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000	
31	31	10	0	0	0	40	10	0	0	0	0	0	0	40	90.000	
32	32	10	0	0	30	0	0	25	0	0	0	25	0	0	80.000	
33	CUMULATIVE	239.000	0.000	154.000	270.000	288.000	82.000	350.000	0.000	52.000	0.000	210.000	257.500	208.000	1871.500	TOTAL CUM.
34	AVERAGE	7.468	-	-	-	-	-	-	-	-	-	-	-	-	58.484	AVERAGE
35	SUPPORTING	-	-	3*	2*	1*	2*	1*	.	3*	.	2*	1*	2*		

•FRG-M.C.S.A.M.-ANALYSIS 2

Mon, May 29, 1989 2:35 pm

	ENTER.ORDER	INTER.WEIGHT	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	DESCENDING	COMMON FA.	Column 18	Categories
1	1	10	0	0	30	0	0	25	0	0	0	0	0	40	95.000	95.000	1		
2	31	10	0	0	0	40	10	0	0	0	0	0	0	40	90.000	90.000	3		
3	25	10	0	0	0	40	10	0	0	0	0	0	0	40	90.000	80.000	4		
4	18	10	0	0	0	40	10	0	0	0	0	0	0	40	90.000	75.000	3		
5	32	10	0	0	30	0	0	25	0	0	0	25	0	0	80.000	70.000	2		
6	30	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000	56.000	1		
7	21	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000	55.000	1		
8	20	10	0	0	30	0	0	25	0	0	0	0	25	0	80.000	52.500	1		
9	19	10	0	0	0	40	10	0	0	0	0	25	0	0	75.000	49.000	1		
10	9	10	0	0	0	40	10	0	0	0	0	25	0	0	75.000	48.000	5		
11	8	10	0	0	0	40	10	0	0	0	0	25	0	0	75.000	45.000	1		
12	26	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000	42.500	1		
13	24	10	0	20	0	0	0	25	0	0	0	0	25	0	70.000	42.000	1		
14	13	7	0	0	21	0	0	17.5	0	0	0	0	17.5	0	56.000	40.000	1		
15	28	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000	35.000	4		
16	16	7	0	0	0	28	7	0	0	0	0	17.5	0	0	52.500	33.000	1		
17	14	7	0	14	0	0	0	17.5	0	0	0	17.5	0	0	49.000	26.500	1		
18	29	6	0	0	18	0	0	15	0	0	0	0	15	0	48.000				
19	27	6	0	0	18	0	0	15	0	0	0	0	15	0	48.000				
20	23	6	0	0	18	0	0	15	0	0	0	0	15	0	48.000				
21	22	6	0	0	18	0	0	15	0	0	0	0	15	0	48.000				
22	17	6	0	0	18	0	0	15	0	0	0	0	15	0	48.000				
23	7	5	0	0	0	20	5	0	0	0	0	0	0	20	45.000				
24	5	5	0	10	0	0	0	0	0	20	0	12.5	0	0	42.500				
25	15	6	0	12	0	0	0	15	0	0	0	0	15	0	42.000				
26	2	4	0	8	0	0	0	0	0	16	0	0	0	16	40.000				
27	12	5	0	10	0	0	0	12.5	0	0	0	12.5	0	0	35.000				
28	11	5	0	10	0	0	0	12.5	0	0	0	0	12.5	0	35.000				
29	10	5	0	10	0	0	0	12.5	0	0	0	0	12.5	0	35.000				
30	3	5	0	10	0	0	0	12.5	0	0	0	12.5	0	0	35.000				
31	4	3	0	0	9	0	0	0	0	12	0	0	0	12	33.000				
32	6	5	0	10	0	0	0	0	0	4	0	12.5	0	0	26.500				

•FRG-M.C.S.A.M.-ANALYSIS 3

Mon, May 29, 1989 2:39 pm

	ENTER.ORDER	INTER.WEIGHT	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	COM.FA.RAN.	Column 17	Column 18
1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
2	0	0	1	2	3	4	1	2.5	2.5	4	1	2.5	2.5	4	0	0		
3	1	10	0	0	30	0	0	25	0	0	0	0	0	40	95	1•		
4	2	4	0	8	0	0	0	0	0	16	0	0	0	16	40	14•		
5	3	5	0	10	0	0	0	12.5	0	0	0	12.5	0	0	35	15•		
6	4	3	0	0	9	0	0	0	0	12	0	0	0	12	33	16•		
7	5	5	0	10	0	0	0	0	0	20	0	12.5	0	0	42.5	12•		
8	6	5	0	10	0	0	0	0	0	4	0	12.5	0	0	26.5	17•		
9	7	5	0	0	0	20	5	0	0	0	0	0	0	20	45	11•		
10	8	10	0	0	0	40	10	0	0	0	0	25	0	0	75	4•		
11	9	10	0	0	0	40	10	0	0	0	0	25	0	0	75	4•		
12	10	5	0	10	0	0	0	12.5	0	0	0	0	12.5	0	35	15•		
13	11	5	0	10	0	0	0	12.5	0	0	0	0	12.5	0	35	15•		
14	12	5	0	10	0	0	0	12.5	0	0	0	12.5	0	0	35	15•		
15	13	7	0	0	21	0	0	17.5	0	0	0	0	17.5	0	56	6•		
16	14	7	0	14	0	0	0	17.5	0	0	0	17.5	0	0	49	9•		
17	15	6	0	12	0	0	0	15	0	0	0	0	15	0	42	13•		
18	16	7	0	0	0	28	7	0	0	0	0	17.5	0	0	50.5	8•		
19	17	6	0	0	18	0	0	15	0	0	0	0	15	0	48	10•		
20	18	10	0	0	0	40	10	0	0	0	0	0	0	40	90	2•		
21	19	10	0	0	0	40	10	0	0	0	0	25	0	0	75	4•		
22	20	10	0	0	30	0	0	25	0	0	0	0	25	0	80	3•		
23	21	10	0	0	30	0	0	25	0	0	0	0	25	0	80	3•		
24	22	6	0	0	18	0	0	15	0	0	0	0	15	0	48	10•		
25	23	6	0	0	18	0	0	15	0	0	0	0	15	0	48	10•		
26	24	10	0	20	0	0	0	25	0	0	0	0	25	0	70	5•		
27	25	10	0	0	0	40	10	0	0	0	0	0	0	40	90	2•		
28	26	10	0	20	0	0	0	25	0	0	0	0	25	0	70	5•		
29	27	6	0	0	18	0	0	15	0	0	0	0	15	0	48	10•		
30	28	10	0	20	0	0	10	0	0	0	0	25	0	0	55	7•		
31	29	6	0	0	18	0	0	15	0	0	0	0	15	0	48	10•		
32	30	10	0	0	30	0	0	25	0	0	0	0	25	0	80	3•		
33	31	10	0	0	0	40	10	0	0	0	0	0	0	40	90	2•		
34	32	10	0	0	30	0	0	25	0	0	0	25	0	0	80	3•		
35	74.6%	239	0	154	270	288	82	350	0	52	0	210	257.5	208	1871.5	0		
36	SUP.TH.RANK	0	0	3•	2•	1•	2•	1•	0	3•	0	2•	1•	3•	0	8•		
37	AVER.WEIGHT	7.46	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]			

CANADA-M.C.S.A.M.SAMPLE

Mon, May 29, 1989 3:36 pm

	ENTERORDER	INTERWEIGHT	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	FRIEDMANN	BREHENY	CHRISTENSEN
1	1	10	10	0	0	0	0	0	25	0	0	0	25	0	60.000	10.000	25.000	25.000
2	2	4	0	0	12	0	0	10	0	0	0	0	10	0	32.000	12.000	10.000	10.000
3	3	5	0	10	0	0	0	12.5	0	0	0	0	12.5	0	35.000	10.000	12.500	12.500
4	4	3	0	0	9	0	0	0	0	12	0	0	7.5	0	28.500	9.000	12.000	7.500
5	5	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	30.000	25.000	25.000
6	6	10	0	0	0	40	0	0	0	40	0	0	0	40	120.000	40.000	40.000	40.000
7	7	10	0	0	0	40	0	0	0	40	0	0	0	40	120.000	40.000	40.000	40.000
8	8	10	0	0	30	0	0	0	25	0	0	25	0	0	80.000	30.000	25.000	25.000
9	9	10	0	0	30	0	0	0	25	0	0	25	0	0	80.000	30.000	25.000	25.000
10	10	5	0	10	0	0	0	0	12.5	0	0	0	0	20	42.500	10.000	12.500	20.000
11	11	7	0	0	21	0	0	0	0	28	0	0	17.5	0	66.500	21.000	28.000	17.500
12	12	7	0	0	21	0	0	0	0	28	0	0	17.5	0	66.500	21.000	28.000	17.500
13	13	8	0	16	0	0	0	0	0	32	0	0	20	0	68.000	16.000	32.000	20.000
14	14	7	0	0	21	0	0	0	17.5	0	0	0	17.5	0	56.000	21.000	17.500	17.500
15	15	7	0	0	21	0	0	0	17.5	0	0	0	0	28	66.500	21.000	17.500	28.000
16	16	7	7	0	0	0	0	17.5	0	0	0	0	17.5	0	42.000	7.000	17.500	17.500
17	17	10	0	0	30	0	0	25	0	0	0	25	0	0	80.000	30.000	25.000	25.000
18	18	10	10	0	0	0	10	0	0	0	0	25	0	0	45.000	10.000	10.000	25.000
19	19	10	0	20	0	0	0	0	25	0	0	25	0	0	70.000	20.000	25.000	25.000
20	20	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	30.000	40.000	25.000
21	21	10	0	20	0	0	0	0	0	40	0	0	25	0	85.000	20.000	40.000	25.000
22	22	6	0	0	18	0	0	15	0	0	0	0	15	0	48.000	18.000	15.000	15.000
23	23	7	0	0	21	0	0	0	0	28	0	17.5	0	0	66.500	21.000	28.000	17.500
24	24	10	0	20	0	0	0	0	25	0	0	25	0	0	70.000	20.000	25.000	25.000
25	25	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	20.000	40.000	40.000
26	26	10	0	20	0	0	0	25	0	0	0	25	0	0	70.000	20.000	25.000	25.000
27	27	10	0	0	30	0	0	25	0	0	0	25	0	0	80.000	30.000	25.000	25.000
28	28	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000	20.000	10.000	25.000
29	29	6	0	0	18	0	0	0	0	24	0	0	0	24	66.000	18.000	24.000	24.000
30	30	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	30.000	40.000	25.000
31	31	10	0	20	0	0	0	0	25	0	0	25	0	0	70.000	20.000	25.000	25.000
32	32	10	0	20	0	0	0	25	0	0	0	25	0	0	70.000	20.000	25.000	25.000

-CAN-M.C.S.A.M.-ANALYSIS 1

Mon, May 29, 1989 3:39 pm

	ENTERORDER	INTERWEIGHT	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	COMMENTS	Column 17
1	1	10	10	0	0	0	0	0	25	0	0	0	25	0	60.000		
2	2	4	0	0	12	0	0	10	0	0	0	0	10	0	32.000		
3	3	5	0	10	0	0	0	12.5	0	0	0	0	12.5	0	35.000		
4	4	3	0	0	9	0	0	0	0	12	0	0	7.5	0	28.500	LOWEST CUM.	
5	5	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000		
6	6	10	0	0	0	40	0	0	0	40	0	0	0	40	120.000	HIGHEST CUM.	
7	7	10	0	0	0	40	0	0	0	40	0	0	0	40	120.000	HIGHEST CUM.	
8	8	10	0	0	30	0	0	0	25	0	0	25	0	0	80.000		
9	9	10	0	0	30	0	0	0	25	0	0	25	0	0	80.000		
10	10	5	0	10	0	0	0	0	12.5	0	0	0	0	20	42.500		
11	11	7	0	0	21	0	0	0	0	28	0	0	17.5	0	66.500		
12	12	7	0	0	21	0	0	0	0	28	0	0	17.5	0	66.500		
13	13	8	0	16	0	0	0	0	0	32	0	0	20	0	68.000		
14	14	7	0	0	21	0	0	0	17.5	0	0	0	17.5	0	56.000		
15	15	7	0	0	21	0	0	0	17.5	0	0	0	0	28	66.500		
16	16	7	7	0	0	0	0	17.5	0	0	0	0	17.5	0	42.000		
17	17	10	0	0	30	0	0	25	0	0	0	25	0	0	80.000		
18	18	10	10	0	0	0	10	0	0	0	0	25	0	0	45.000		
19	19	10	0	20	0	0	0	0	25	0	0	25	0	0	70.000		
20	20	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000		
21	21	10	0	20	0	0	0	0	0	40	0	0	25	0	85.000		
22	22	6	0	0	18	0	0	15	0	0	0	0	15	0	48.000		
23	23	7	0	0	21	0	0	0	0	28	0	17.5	0	0	66.500		
24	24	10	0	20	0	0	0	0	25	0	0	25	0	0	70.000		
25	25	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000		
26	26	10	0	20	0	0	0	25	0	0	0	25	0	0	70.000		
27	27	10	0	0	30	0	0	25	0	0	0	25	0	0	80.000		
28	28	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000		
29	29	6	0	0	18	0	0	0	0	24	0	0	0	24	66.000		
30	30	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000		
31	31	10	0	20	0	0	0	0	25	0	0	25	0	0	70.000		
32	32	10	0	20	0	0	0	25	0	0	0	25	0	0	70.000		
33	CUMULATIVE	269.000	27.000	196.000	372.000	80.000	20.000	155.000	222.500	392.000	0.000	292.500	260.000	192.000	2209.000	TOTAL CUM.	
34	AVERAGE	8.406	-	-	-	-	-	-	-	-	-	-	-	-	69.031	AVERAGE	
35	SUPPORTING	-	4*	2*	1*	3*	4*	3*	2*	1*	-	1*	2*	3*			

-CAN-M.C.S.A.M.-ANALYSIS 2

Mon, May 29, 1989 3:41 pm

	ENTER.ORDER.	INTER.WEIGHT	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	DESCENDING	COMMON FA.
1	7	10	0	0	0	40	0	0	0	40	0	0	0	40	120.000	120.000	2
2	6	10	0	0	0	40	0	0	0	40	0	0	0	40	120.000	100.000	1
3	25	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	95.000	2
4	30	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	85.000	1
5	20	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	80.000	5
6	21	10	0	20	0	0	0	0	0	40	0	0	25	0	85.000	70.000	5
7	27	10	0	0	30	0	0	25	0	0	0	25	0	0	80.000	68.000	1
8	17	10	0	0	30	0	0	25	0	0	0	25	0	0	80.000	66.500	4
9	9	10	0	0	30	0	0	0	25	0	0	25	0	0	80.000	66.000	1
10	8	10	0	0	30	0	0	0	25	0	0	25	0	0	80.000	60.000	1
11	5	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	56.000	1
12	32	10	0	20	0	0	0	25	0	0	0	25	0	0	70.000	55.000	1
13	31	10	0	20	0	0	0	0	25	0	0	25	0	0	70.000	48.000	1
14	26	10	0	20	0	0	0	25	0	0	0	25	0	0	70.000	45.000	1
15	24	10	0	20	0	0	0	0	25	0	0	25	0	0	70.000	42.500	1
16	19	10	0	20	0	0	0	0	25	0	0	25	0	0	70.000	42.000	1
17	13	8	0	16	0	0	0	0	0	32	0	0	20	0	68.000	35.000	1
18	23	7	0	0	21	0	0	0	0	28	0	17.5	0	0	66.500	32.000	1
19	15	7	0	0	21	0	0	0	17.5	0	0	0	0	28	66.500	28.500	1
20	12	7	0	0	21	0	0	0	0	28	0	0	17.5	0	66.500		
21	11	7	0	0	21	0	0	0	0	28	0	0	17.5	0	66.500		
22	29	6	0	0	18	0	0	0	0	24	0	0	0	24	66.000		
23	1	10	10	0	0	0	0	0	25	0	0	0	25	0	60.000		
24	14	7	0	0	21	0	0	0	17.5	0	0	0	17.5	0	56.000		
25	28	10	0	20	0	0	10	0	0	0	0	25	0	0	55.000		
26	22	6	0	0	18	0	0	15	0	0	0	0	15	0	48.000		
27	18	10	10	0	0	0	10	0	0	0	0	25	0	0	45.000		
28	10	5	0	10	0	0	0	0	12.5	0	0	0	0	20	42.500		
29	16	7	7	0	0	0	0	17.5	0	0	0	0	17.5	0	42.000		
30	3	5	0	10	0	0	0	12.5	0	0	0	0	12.5	0	35.000		
31	2	4	0	0	12	0	0	10	0	0	0	0	10	0	32.000		
32	4	3	0	0	9	0	0	0	0	12	0	0	7.5	0	28.500		

-CAN-M.C.S.A.M.-ANALYSIS 3

Mon, May 29, 1989 3:44 pm

	ENTER.ORDER.	INTER.WEIGHT	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	COM.FA.RAN.	Column 17	Column 18
1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
2	0	0	1	2	3	4	1	2.5	2.5	4	1	2.5	2.5	4	0	0		
3	1	10	10	0	0	0	0	0	25	0	0	0	25	0	60	10°		
4	2	4	0	0	12	0	0	10	0	0	0	0	10	0	32	18°		
5	3	5	0	10	0	0	0	12.5	0	0	0	0	12.5	0	35	17°		
6	4	3	0	0	9	0	0	0	0	12	0	0	7.5	0	28.5	19°		
7	5	10	0	0	30	0	0	0	25	0	0	0	25	0	80	5°		
8	6	10	0	0	0	40	0	0	0	40	0	0	0	40	120	1°		
9	7	10	0	0	0	40	0	0	0	40	0	0	0	40	120	1°		
10	8	10	0	0	30	0	0	0	25	0	0	25	0	0	80	5°		
11	9	10	0	0	30	0	0	0	25	0	0	25	0	0	80	5°		
12	10	5	0	10	0	0	0	0	12.5	0	0	0	0	20	42.5	15°		
13	11	7	0	0	21	0	0	0	0	28	0	0	17.5	0	66.5	8°		
14	12	7	0	0	21	0	0	0	0	28	0	0	17.5	0	66.5	8°		
15	13	8	0	16	0	0	0	0	0	32	0	0	20	0	68	7°		
16	14	7	0	0	21	0	0	0	17.5	0	0	0	17.5	0	56	11°		
17	15	7	0	0	21	0	0	0	17.5	0	0	0	0	28	66.5	8°		
18	16	7	7	0	0	0	0	17.5	0	0	0	0	17.5	0	42	16°		
19	17	10	0	0	30	0	0	25	0	0	0	25	0	0	80	5°		
20	18	10	10	0	0	0	10	0	0	0	0	25	0	0	45	14°		
21	19	10	0	20	0	0	0	0	25	0	0	25	0	0	70	6°		
22	20	10	0	0	30	0	0	0	0	40	0	0	25	0	95	3°		
23	21	10	0	20	0	0	0	0	0	40	0	0	25	0	85	4°		
24	22	6	0	0	18	0	0	15	0	0	0	0	15	0	48	13°		
25	23	7	0	0	21	0	0	0	0	28	0	17.5	0	0	66.5	8°		
26	24	10	0	20	0	0	0	0	25	0	0	25	0	0	70	6°		
27	25	10	0	20	0	0	0	0	0	40	0	0	0	40	100	2°		
28	26	10	0	20	0	0	0	25	0	0	0	25	0	0	70	6°		
29	27	10	0	0	30	0	0	25	0	0	0	25	0	0	80	5°		
30	28	10	0	20	0	0	10	0	0	0	0	25	0	0	55	12°		
31	29	6	0	0	18	0	0	0	0	24	0	0	0	24	66	9°		
32	30	10	0	0	30	0	0	0	0	40	0	0	25	0	95	3°		
33	31	10	0	20	0	0	0	0	25	0	0	25	0	0	70	6°		
34	32	10	0	20	0	0	0	25	0	0	0	25	0	0	70	6°		
35	84%	269	20	196	372	80	20	155	222.5	392	0	292.5	260	192	2209	0		
36	SUP.TH.RANK	0	4°	2°	1°	3°	4°	3°	2°	1°	0	1°	2°	3°	0	8°		
37	AVER.WEIGHT	8.40	9	17.81	23.25	40	10	19.37	22.25	32.66	0	24.37	18.57	32	69.03	0		

M.C.S.A.M.-REALIST MODEL

	ENTERORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P2 - 2.5	P1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	MIN.CUM.WEIG.	MAX.CUM.WEIG.	COMMENTS
1	1	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	
2	2	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	
3	3	5	5	10	15	20	5	12.5	12.5	20	5	12.5	12.5	20	15.000	60.000	
4	4	3	3	6	9	12	3	7.5	7.5	12	3	7.5	7.5	12	9.000	36.000	
5	5	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
6	6	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
7	7	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
8	8	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	
9	9	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	
10	10	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
11	11	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
12	12	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
13	13	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
14	14	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
15	15	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
16	16	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
17	17	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
18	18	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	
19	19	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	
20	20	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	
21	21	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	
22	22	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	
23	23	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
24	24	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	
25	25	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
26	26	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	
27	27	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
28	28	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	
29	29	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
30	30	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	
31	31	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	
32	32	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	
33	MAX.REAL.WEIG	264.000	264.000	528.000	792.000	1056.000	264.000	660.000	660.000	1056.000	264.000	660.000	660.000	1056.000	792.000	3168.000	MIN./MAX.-TOT
34	AVER.REAL.WEI	8.250	8.250	16.500	24.750	33.000	8.250	20.625	20.625	33.000	8.250	20.625	20.625	33.000	24.750	99.000	MIN./MAX.-AV.

•M.C.S.A.M.-REAL.MOD.-ANAL.-1

Mon, May 29, 1989 2:54 pm

	ENTER ORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P2 - 2.5	P1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	MIN.CUM.WEIG.	MAX.CUM.WEIG.	DESCENDING	Column 18
1	32	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	30.000	13
2	31	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	24.000	11
3	30	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	21.000	4
4	28	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	18.000	1
5	26	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	15.000	1
6	24	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	12.000	1
7	21	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	9.000	1
8	20	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000		
9	19	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000		
10	18	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000		
11	9	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000		
12	8	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000		
13	1	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000		
14	29	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000		
15	27	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000		
16	25	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000		
17	17	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000		
18	15	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000		
19	14	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000		
20	13	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000		
21	12	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000		
22	11	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000		
23	7	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000		
24	6	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000		
25	23	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000		
26	16	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000		
27	10	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000		
28	5	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000		
29	22	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000		
30	3	5	5	10	15	20	5	12.5	12.5	20	5	12.5	12.5	20	15.000	60.000		
31	2	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000		
32	4	3	3	6	9	12	3	7.5	7.5	12	3	7.5	7.5	12	9.000	36.000		

•M.C.S.A.M.-REAL.MOD.-ANAL.2

Mon, May 29, 1989 2:57 pm

	ENTER ORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P2 - 2.5	P1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	MIN.CUM.WEIG.	MAX.CUM.WEIG.	REAL	DESCENDING	COMMON FA.
1	20	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	90	90	1
2	30	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	84	84	1
3	21	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	82	82	1
4	12	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	80.3	80.3	1
5	1	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	79	79	1
6	11	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	75.3	75.3	1
7	19	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	74	74	2
8	9	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	74	73	1
9	24	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	73	72	1
10	8	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	72	71	1
11	18	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	71	70.5	1
12	31	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	70.5	69.5	1
13	7	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	69.5	67.2	1
14	17	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	67.2	66.8	2
15	29	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	66.8	65.5	1
16	6	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	66.8	64	1
17	25	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	65.5	62	1
18	26	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	64	61.5	1
19	28	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	62	61.1	1
20	15	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	61.5	60.5	1
21	23	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	61.1	60.1	1
22	13	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	60.5	59.2	1
23	14	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	60.1	58.4	1
24	27	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	59.2	54.8	1
25	32	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	58.4	51.3	1
26	16	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	54.8	51.1	1
27	10	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	51.3	49.2	1
28	5	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	51.1	39	1
29	22	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	49.2	36.9	1
30	3	5	5	10	15	20	5	12.5	12.5	20	5	12.5	12.5	20	15.000	60.000	39	27.9	1
31	2	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	36.9		

-M.C.S.A.M.-REAL.MOD.-ANAL.-3

Mon, May 29, 1989 3:01 pm

	ENTERORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P2 - 2.5	P1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	MIN.CUM.WEIG.	MAX.CUM.WEIG.	COMMENTS
1	1	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	HIGHEST
2	2	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	
3	3	5	5	10	15	20	5	12.5	12.5	20	5	12.5	12.5	20	15.000	60.000	
4	4	3	3	6	9	12	3	7.5	7.5	12	3	7.5	7.5	12	9.000	36.000	LOWEST
5	5	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
6	6	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
7	7	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
8	8	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	HIGHEST
9	9	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	HIGHEST
10	10	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
11	11	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
12	12	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
13	13	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
14	14	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
15	15	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
16	16	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
17	17	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
18	18	10	10	20	30	40	.10	25	25	40	10	25	25	40	30.000	120.000	HIGHEST
19	19	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	HIGHEST
20	20	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	HIGHEST
21	21	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	HIGHEST
22	22	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	
23	23	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
24	24	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	HIGHEST
25	25	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
26	26	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	HIGHEST
27	27	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
28	28	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	HIGHEST
29	29	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
30	30	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	HIGHEST
31	31	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	HIGHEST
32	32	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	HIGHEST
33	TOT.MAX.WEIG.	264.000	264.000	528.000	792.000	1056.000	264.000	660.000	660.000	1056.000	264.000	660.000	660.000	1056.000	792.000	3168.000	TOT.MIN./MAX.
34	AVER.MAX.WEIG	8.250	8.250	16.500	24.750	33.000	8.250	20.625	20.625	33.000	8.250	20.625	20.625	33.000	24.750	99.000	MIN.MAX.AVER.

-M.C.S.A.M.-REAL.MOD.-ANAL.-4

Mon, May 29, 1989 3:02 pm

	ENTERORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P2 - 2.5	P1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	MIN.CUM.WEIG.	MAX.CUM.WEIG.	REAL
1	1	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	79
2	2	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	36.9
3	3	5	5	10	15	20	5	12.5	12.5	20	5	12.5	12.5	20	15.000	60.000	39
4	4	3	3	6	9	12	3	7.5	7.5	12	3	7.5	7.5	12	9.000	36.000	27.9
5	5	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	51.1
6	6	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	66.8
7	7	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	69.5
8	8	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	72
9	9	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	74
10	10	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	51.3
11	11	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	75.3
12	12	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	80.3
13	13	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	60.5
14	14	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	60.1
15	15	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	61.5
16	16	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	54.8
17	17	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	67.2
18	18	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	71
19	19	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	74
20	20	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	90
21	21	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	82
22	22	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	49.2
23	23	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	61.1
24	24	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	73
25	25	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	65.5
26	26	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	64
27	27	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	59.2
28	28	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	62
29	29	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	66.8
30	30	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	84
31	31	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	70.5
32	32	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	58.4
33	CUMULATIVE	264.000	264.000	528.000	792.000	1056.000	264.000	660.000	660.000	1056.000	264.000	660.000	660.000	1056.000	792.000	3168.000	2057.900

BRAZIL-ACT.SCEN.-MCSAM-SAMPLE

Mon, May 29, 1989 3:49 pm

	ENTERORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	FRIEDMANN	BREHENY	CHRISTENSEN
1	1	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	1.000	1.000	1.000
2	2	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000	1.000	2.500	2.500
3	3	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000	1.000	2.500	2.500
4	4	3	0	6	0	0	3	0	0	0	3	0	0	0	12.000	6.000	3.000	3.000
5	5	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	10.000	10.000	10.000
6	6	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	10.000	10.000	10.000
7	7	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	10.000	10.000	10.000
8	8	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	10.000	10.000	10.000
9	9	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	10.000	10.000	10.000
10	10	5	5	0	0	0	5	0	0	0	0	0	12.5	0	22.500	5.000	5.000	12.500
11	11	7	7	0	0	0	0	17.5	0	0	7	0	0	0	31.500	7.000	17.500	7.000
12	12	7	7	0	0	0	0	17.5	0	0	7	0	0	0	31.500	7.000	17.500	7.000
13	13	3	3	0	0	0	0	7.5	0	0	0	0	7.5	0	18.000	3.000	7.500	7.500
14	14	3	3	0	0	0	0	7.5	0	0	0	0	7.5	0	18.000	3.000	7.500	7.500
15	15	3	3	0	0	0	0	7.5	0	0	0	0	7.5	0	18.000	3.000	7.500	7.500
16	16	5	5	0	0	0	5	0	0	0	5	0	0	0	15.000	5.000	5.000	5.000
17	17	3	3	0	0	0	3	0	0	0	3	0	0	0	9.000	3.000	3.000	3.000
18	18	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	10.000	10.000	10.000
19	19	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	1.000	1.000	1.000
20	20	3	0	6	0	0	0	7.5	0	0	3	0	0	0	16.500	6.000	7.500	3.000
21	21	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	10.000	10.000	10.000
22	22	3	0	6	0	0	0	7.5	0	0	0	0	7.5	0	21.000	6.000	7.500	7.500
23	23	6	0	12	0	0	0	15	0	0	0	0	15	0	42.000	12.000	15.000	15.000
24	24	5	5	0	0	0	5	0	0	0	5	0	0	0	15.000	5.000	5.000	5.000
25	25	10	10	0	0	0	10	0	0	0	0	0	25	0	45.000	10.000	10.000	25.000
26	26	10	10	0	0	0	10	0	0	0	0	0	25	0	45.000	10.000	10.000	25.000
27	27	6	0	12	0	0	0	15	0	0	0	0	15	0	42.000	12.000	15.000	15.000
28	28	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	1.000	1.000	1.000
29	29	1	0	2	0	0	0	2.5	0	0	1	0	0	0	5.500	2.000	2.500	1.000
30	30	1	0	2	0	0	0	2.5	0	0	0	0	2.5	0	7.000	2.000	2.500	2.500
31	31	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	1.000	1.000	1.000
32	32	1	1	0	0	0	0	2.5	0	0	1	0	0	0	4.500	1.000	2.500	1.000

•BRAZIL-ACT.SCEN.-MCSAM-AN.1

Mon, May 29, 1989 3:53 pm

	ENTERORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	COMMENTS
1	1	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	LOWEST
2	2	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000	
3	3	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000	
4	4	3	0	6	0	0	3	0	0	0	3	0	0	0	12.000	
5	5	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	
6	6	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	
7	7	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	
8	8	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	
9	9	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	
10	10	5	5	0	0	0	5	0	0	0	0	0	12.5	0	22.500	
11	11	7	7	0	0	0	0	17.5	0	0	7	0	0	0	31.500	
12	12	7	7	0	0	0	0	17.5	0	0	7	0	0	0	31.500	
13	13	3	3	0	0	0	0	7.5	0	0	0	0	7.5	0	18.000	
14	14	3	3	0	0	0	0	7.5	0	0	0	0	7.5	0	18.000	
15	15	3	3	0	0	0	0	7.5	0	0	0	0	7.5	0	18.000	
16	16	5	5	0	0	0	5	0	0	0	5	0	0	0	15.000	
17	17	3	3	0	0	0	3	0	0	0	3	0	0	0	9.000	
18	18	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	
19	19	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	LOWEST
20	20	3	0	6	0	0	0	7.5	0	0	3	0	0	0	16.500	
21	21	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	
22	22	3	0	6	0	0	0	7.5	0	0	0	0	7.5	0	21.000	
23	23	6	0	12	0	0	0	15	0	0	0	0	15	0	42.000	
24	24	5	5	0	0	0	5	0	0	0	5	0	0	0	15.000	
25	25	10	10	0	0	0	10	0	0	0	0	0	25	0	45.000	HIGHEST
26	26	10	10	0	0	0	10	0	0	0	0	0	25	0	45.000	HIGHEST
27	27	6	0	12	0	0	0	15	0	0	0	0	15	0	42.000	
28	28	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	LOWEST
29	29	1	0	2	0	0	0	2.5	0	0	1	0	0	0	5.500	
30	30	1	0	2	0	0	0	2.5	0	0	0	0	2.5	0	7.000	
31	31	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	LOWEST
32	32	1	1	0	0	0	0	2.5	0	0	1	0	0	0	4.500	
33	CUMULATIVE	161.000	138.000	46.000	0.000	0.000	115.000	115.000	0.000	0.000	109.000	0.000	130.000	0.000	653.000	TOTAL CUM.
34	AVERAGE	5.031	-	-	-	-	-	-	-	-	-	-	-	-	20.406	AVERAGE
35	SUPPORTING	-	1*	2*	-	-	1*	1*	-	-	2*	-	1*	0		

•BRAZIL-ACT.SCEN.-MCSAM.-AN.2

Mon, May 29, 1989 3:56 pm

	ENTER ORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	DESCENDING	COMMON FA.
1	26	10	10	0	0	0	10	0	0	0	0	0	25	0	45.000	45.000	2
2	25	10	10	0	0	0	10	0	0	0	0	0	25	0	45.000	42.000	2
3	27	6	0	12	0	0	0	15	0	0	0	0	15	0	42.000	31.500	2
4	23	6	0	12	0	0	0	15	0	0	0	0	15	0	42.000	30.000	7
5	12	7	7	0	0	0	0	17.5	0	0	7	0	0	0	31.500	22.500	1
6	11	7	7	0	0	0	0	17.5	0	0	7	0	0	0	31.500	21.000	1
7	21	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	18.000	3
8	18	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	16.500	1
9	9	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	15.000	2
10	8	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	12.000	1
11	7	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	9.000	1
12	6	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	7.000	1
13	5	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	6.000	2
14	10	5	5	0	0	0	5	0	0	0	0	0	12.5	0	22.500	5.500	1
15	22	3	0	6	0	0	0	7.5	0	0	0	0	7.5	0	21.000	4.500	1
16	15	3	3	0	0	0	0	7.5	0	0	0	0	7.5	0	18.000	3.000	4
17	14	3	3	0	0	0	0	7.5	0	0	0	0	7.5	0	18.000		
18	13	3	3	0	0	0	0	7.5	0	0	0	0	7.5	0	18.000		
19	20	3	0	6	0	0	0	7.5	0	0	3	0	0	0	16.500		
20	24	5	5	0	0	0	5	0	0	0	5	0	0	0	15.000		
21	16	5	5	0	0	0	5	0	0	0	5	0	0	0	15.000		
22	4	3	0	6	0	0	3	0	0	0	3	0	0	0	12.000		
23	17	3	3	0	0	0	3	0	0	0	3	0	0	0	9.000		
24	30	1	0	2	0	0	0	2.5	0	0	0	0	2.5	0	7.000		
25	3	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000		
26	2	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000		
27	29	1	0	2	0	0	0	2.5	0	0	1	0	0	0	5.500		
28	32	1	1	0	0	0	0	2.5	0	0	1	0	0	0	4.500		
29	31	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000		
30	28	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000		
31	19	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000		
32	1	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000		

•BRAZIL-ACT.SCEN.-MCSAM.-AN. 3

Mon, May 29, 1989 3:58 pm

	ENTER ORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RAN.	COM.FA.RAN.
1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	0	0	1	2	3	4	1	2.5	2.5	4	1	2.5	2.5	4	0	0
3	1	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	16*
4	2	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000	13*
5	3	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000	13*
6	4	3	0	6	0	0	3	0	0	0	3	0	0	0	12.000	10*
7	5	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	4*
8	6	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	4*
9	7	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	4*
10	8	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	4*
11	9	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	4*
12	10	5	5	0	0	0	5	0	0	0	0	0	12.5	0	22.500	5*
13	11	7	7	0	0	0	0	17.5	0	0	7	0	0	0	31.500	3*
14	12	7	7	0	0	0	0	17.5	0	0	7	0	0	0	31.500	3*
15	13	3	3	0	0	0	0	7.5	0	0	0	0	7.5	0	18.000	7*
16	14	3	3	0	0	0	0	7.5	0	0	0	0	7.5	0	18.000	7*
17	15	3	3	0	0	0	0	7.5	0	0	0	0	7.5	0	18.000	7*
18	16	5	5	0	0	0	5	0	0	0	5	0	0	0	15.000	9*
19	17	3	3	0	0	0	3	0	0	0	3	0	0	0	9.000	11*
20	18	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	4*
21	19	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	16*
22	20	3	0	6	0	0	0	7.5	0	0	3	0	0	0	16.500	8*
23	21	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	4*
24	22	3	0	6	0	0	0	7.5	0	0	0	0	7.5	0	21.000	6*
25	23	6	0	12	0	0	0	15	0	0	0	0	15	0	42.000	2*
26	24	5	5	0	0	0	5	0	0	0	5	0	0	0	15.000	9*
27	25	10	10	0	0	0	10	0	0	0	0	0	25	0	45.000	1*
28	26	10	10	0	0	0	10	0	0	0	0	0	25	0	45.000	1*
29	27	6	0	12	0	0	0	15	0	0	0	0	15	0	42.000	2*
30	28	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	16*
31	29	1	0	2	0	0	0	2.5	0	0	1	0	0	0	5.500	14*
32	30	1	0	2	0	0	0	2.5	0	0	0	0	2.5	0	7.000	12*
33	31	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	16*
34	32	1	1	0	0	0	0	2.5	0	0	1	0	0	0	4.500	15*
35	50.3%	161.000	138.000	46.000	0.000	0.000	115.000	115.000	0.000	0.000	109.000	0.000	130.000	0.000	653.000	0
36	SUP.TH.RANK	0	1*	2*	0	0	1*	1*	0	0	2*	0	1*	0	0	8*
37	[illegible]	[illegible]	[illegible]													

Mon, May 29, 1989 4:02 pm

BRAZIL-LOW GR.SC.-MCSAM-SAMPLE

	ENTER ORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RANK	FRIEDMANN	BREHENY	CHRISTENSEN
1	1	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	1.000	1.000	1.000
2	2	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000	1.000	2.500	2.500
3	3	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000	1.000	2.500	2.500
4	4	3	0	6	0	0	3	0	0	0	3	0	0	0	12.000	6.000	3.000	3.000
5	5	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	10.000	10.000	10.000
6	6	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	10.000	10.000	10.000
7	7	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	10.000	10.000	10.000
8	8	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	10.000	10.000	10.000
9	9	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	10.000	10.000	10.000
10	10	5	5	0	0	0	5	0	0	0	0	0	12.5	0	22.500	5.000	5.000	12.500
11	11	5	5	0	0	0	0	12.5	0	0	5	0	0	0	22.500	5.000	12.500	5.000
12	12	5	5	0	0	0	0	12.5	0	0	5	0	0	0	22.500	5.000	12.500	5.000
13	13	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000	1.000	2.500	2.500
14	14	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000	1.000	2.500	2.500
15	15	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000	1.000	2.500	2.500
16	16	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	1.000	1.000	1.000
17	17	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	1.000	1.000	1.000
18	18	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	10.000	10.000	10.000
19	19	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	10.000	10.000	10.000
20	20	1	0	2	0	0	0	2.5	0	0	1	0	0	0	5.500	2.000	2.500	1.000
21	21	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	1.000	1.000	1.000
22	22	3	0	6	0	0	0	7.5	0	0	0	0	7.5	0	21.000	6.000	7.500	7.500
23	23	3	0	6	0	0	0	7.5	0	0	0	0	7.5	0	21.000	6.000	7.500	7.500
24	24	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	1.000	1.000	1.000
25	25	10	10	0	0	0	10	0	0	0	0	0	25	0	45.000	10.000	10.000	25.000
26	26	10	10	0	0	0	10	0	0	0	0	0	25	0	45.000	10.000	10.000	25.000
27	27	3	0	6	0	0	0	7.5	0	0	0	0	7.5	0	21.000	6.000	7.500	7.500
28	28	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	1.000	1.000	1.000
29	29	1	0	2	0	0	0	2.5	0	0	1	0	0	0	5.500	2.000	2.500	1.000
30	30	1	0	2	0	0	0	2.5	0	0	0	0	2.5	0	7.000	2.000	2.500	2.500
31	31	1	1	0	0	0	0	1	0	0	1	0	0	0	3.000	1.000	1.000	1.000
32	32	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	1.000	1.000	1.000

Mon, May 29, 1989 4:05 pm

BRAZIL-LOW GR.SC.-MCSAM-AN.1

	ENTER ORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RANK	COMMENTS
1	1	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	LOWEST
2	2	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000	
3	3	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000	
4	4	3	0	6	0	0	3	0	0	0	3	0	0	0	12.000	
5	5	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	
6	6	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	
7	7	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	
8	8	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	
9	9	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	
10	10	5	5	0	0	0	5	0	0	0	0	0	12.5	0	22.500	
11	11	5	5	0	0	0	0	12.5	0	0	5	0	0	0	22.500	
12	12	5	5	0	0	0	0	12.5	0	0	5	0	0	0	22.500	
13	13	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000	
14	14	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000	
15	15	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000	
16	16	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	LOWEST
17	17	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	LOWEST
18	18	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	
19	19	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	
20	20	1	0	2	0	0	0	2.5	0	0	1	0	0	0	5.500	
21	21	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	LOWEST
22	22	3	0	6	0	0	0	7.5	0	0	0	0	7.5	0	21.000	
23	23	3	0	6	0	0	0	7.5	0	0	0	0	7.5	0	21.000	
24	24	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	LOWEST
25	25	10	10	0	0	0	10	0	0	0	0	0	25	0	45.000	HIGHEST
26	26	10	10	0	0	0	10	0	0	0	0	0	25	0	45.000	HIGHEST
27	27	3	0	6	0	0	0	7.5	0	0	0	0	7.5	0	21.000	
28	28	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	LOWEST
29	29	1	0	2	0	0	0	2.5	0	0	1	0	0	0	5.500	
30	30	1	0	2	0	0	0	2.5	0	0	0	0	2.5	0	7.000	
31	31	1	1	0	0	0	0	1	0	0	1	0	0	0	3.000	LOWEST
32	32	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	LOWEST
33	CUMULATIVE	133.000	118.000	30.000	0.000	0.000	105.000	68.500	0.000	0.000	93.000	0.000	100.000	0.000	514.500	TOTAL CUM.
34	AVERAGE	4.156	-	-	-	-	-	-	-	-	-	-	-	-	16.078	AVERAGE
35	SUPPORTING	-	1*	2*	-	-	1*	2*	-	-	2*	-	1*	-	-	

-BRAZIL-LOW GR.SC.-MSCAM-AN. 2

Mon, May 29, 1989 4:07 pm

	ENTERORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RANK	DESCENDING	COMMON FA.
1	26	10	10	0	0	0	10	0	0	0	0	0	25	0	45.000	45.000	2
2	25	10	10	0	0	0	10	0	0	0	0	0	25	0	45.000	30.000	7
3	19	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	22.500	3
4	18	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	21.000	3
5	9	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	12.000	1
6	8	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	7.000	1
7	7	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	6.000	5
8	6	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	5.500	2
9	5	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	3.000	8
10	12	5	5	0	0	0	0	12.5	0	0	5	0	0	0	22.500		
11	11	5	5	0	0	0	0	12.5	0	0	5	0	0	0	22.500		
12	10	5	5	0	0	0	5	0	0	0	0	0	12.5	0	22.500		
13	27	3	0	6	0	0	0	7.5	0	0	0	0	7.5	0	21.000		
14	23	3	0	6	0	0	0	7.5	0	0	0	0	7.5	0	21.000		
15	22	3	0	6	0	0	0	7.5	0	0	0	0	7.5	0	21.000		
16	4	3	0	6	0	0	3	0	0	0	3	0	0	0	12.000		
17	30	1	0	2	0	0	0	2.5	0	0	0	0	2.5	0	7.000		
18	15	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000		
19	14	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000		
20	13	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000		
21	3	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000		
22	2	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000		
23	29	1	0	2	0	0	0	2.5	0	0	1	0	0	0	5.500		
24	20	1	0	2	0	0	0	2.5	0	0	1	0	0	0	5.500		
25	32	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000		
26	31	1	1	0	0	0	0	1	0	0	1	0	0	0	3.000		
27	28	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000		
28	24	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000		
29	21	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000		
30	17	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000		
31	16	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000		
32	1	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000		

-BRAZIL-LOW GR.SC.-MCSAM-AN. 3

Mon, May 29, 1989 4:10 pm

	ENTERORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RANK	COMMON
1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	0	0	1	2	3	4	1	2.5	2.5	4	1	2.5	2.5	4	0	0
3	1	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	9•
4	2	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000	7•
5	3	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000	7•
6	4	3	0	6	0	0	3	0	0	0	3	0	0	0	12.000	5•
7	5	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	2•
8	6	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	2•
9	7	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	2•
10	8	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	2•
11	9	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	2•
12	10	5	5	0	0	0	5	0	0	0	0	0	12.5	0	22.500	3•
13	11	5	5	0	0	0	0	12.5	0	0	5	0	0	0	22.500	3•
14	12	5	5	0	0	0	0	12.5	0	0	5	0	0	0	22.500	3•
15	13	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000	7•
16	14	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000	7•
17	15	1	1	0	0	0	0	2.5	0	0	0	0	2.5	0	6.000	7•
18	16	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	9•
19	17	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	9•
20	18	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	2•
21	19	10	10	0	0	0	10	0	0	0	10	0	0	0	30.000	2•
22	20	1	0	2	0	0	0	2.5	0	0	1	0	0	0	5.500	8•
23	21	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	9•
24	22	3	0	6	0	0	0	7.5	0	0	0	0	7.5	0	21.000	4•
25	23	3	0	6	0	0	0	7.5	0	0	0	0	7.5	0	21.000	4•
26	24	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	9•
27	25	10	10	0	0	0	10	0	0	0	0	0	25	0	45.000	1•
28	26	10	10	0	0	0	10	0	0	0	0	0	25	0	45.000	1•
29	27	3	0	6	0	0	0	7.5	0	0	0	0	7.5	0	21.000	4•
30	28	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	9•
31	29	1	0	2	0	0	0	2.5	0	0	1	0	0	0	5.500	8•
32	30	1	0	2	0	0	0	2.5	0	0	0	0	2.5	0	7.000	6•
33	31	1	1	0	0	0	0	1	0	0	1	0	0	0	3.000	9•
34	32	1	1	0	0	0	1	0	0	0	1	0	0	0	3.000	9•
35	41.5%	133.000	118.000	30.000	0.000	0.000	105.000	68.500	0.000	0.000	93.000	0.000	100.000	0.000	514.500	0
36	SUP.TH.RANK	0	1•	2•	0	0	1•	2•	0	0	2•	0	1•	0	0	5•
37	AVER.WEIGHT	4.156	4.72	4.28	0	0	5.83	4.89	0	0	4.65	0	[illegible]	0	[illegible]	[illegible]

BRAZIL-MED.GR.SC.-MCSAM-SAMPLE

Mon, May 29, 1989 4:13 pm

	ENTER ORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RANK	FRIEDMANN	BREHENY	CHRISTENSEN
1	1	5	0	10	0	0	0	0	12.5	0	0	12.5	0	0	35.000	10.000	12.500	12.500
2	2	4	0	0	12	0	0	0	0	16	0	0	10	0	38.000	12.000	16.000	10.000
3	3	5	0	0	0	20	0	0	12.5	0	0	0	12.5	0	45.000	20.000	12.500	12.500
4	4	3	0	0	9	0	0	0	0	12	0	7.5	0	0	28.500	9.000	12.000	7.500
5	5	5	0	0	15	0	0	0	12.5	0	0	12.5	0	0	40.000	15.000	12.500	12.500
6	6	5	0	0	15	0	0	0	12.5	0	0	12.5	0	0	40.000	15.000	12.500	12.500
7	7	5	0	0	15	0	0	0	12.5	0	0	12.5	0	0	40.000	15.000	12.500	12.500
8	8	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	30.000	40.000	25.000
9	9	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	30.000	40.000	25.000
10	10	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	30.000	40.000	25.000
11	11	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	30.000	25.000	25.000
12	12	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	30.000	25.000	25.000
13	13	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	20.000	40.000	40.000
14	14	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	20.000	40.000	40.000
15	15	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	30.000	40.000	25.000
16	16	10	0	0	30	0	0	0	25	0	0	0	0	40	95.000	30.000	25.000	40.000
17	17	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	30.000	25.000	25.000
18	18	10	0	0	30	0	0	0	25	0	0	0	0	40	95.000	30.000	25.000	40.000
19	19	5	0	0	0	20	0	0	12.5	0	0	12.5	0	0	45.000	20.000	12.500	12.500
20	20	6	0	0	18	0	0	0	15	0	0	0	15	0	48.000	18.000	15.000	15.000
21	21	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	30.000	40.000	40.000
22	22	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	30.000	25.000	25.000
23	23	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	30.000	25.000	25.000
24	24	10	0	20	0	0	0	0	0	40	0	25	0	0	85.000	20.000	40.000	25.000
25	25	10	0	0	30	0	0	0	25	0	0	0	0	40	95.000	30.000	25.000	40.000
26	26	5	0	0	15	0	0	0	0	20	0	12.5	0	0	47.500	15.000	20.000	12.500
27	27	10	0	0	30	0	0	0	25	0	0	25	0	0	80.000	30.000	25.000	25.000
28	28	5	0	0	15	0	0	0	12.5	0	0	0	0	20	47.500	15.000	12.500	20.000
29	29	5	0	0	15	0	0	0	12.5	0	0	12.5	0	0	40.000	15.000	12.500	12.500
30	30	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	30.000	25.000	25.000
31	31	5	0	0	15	0	0	0	12.5	0	0	12.5	0	0	40.000	15.000	12.500	12.500
32	32	10	0	0	30	0	0	0	25	0	0	25	0	0	80.000	30.000	25.000	25.000

-BRAZIL-MED.GR.SC.-MCSAM-AN.1

Mon, May 29, 1989 4:15 pm

	ENTER ORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RANK	COMMENTS
1	1	5	0	10	0	0	0	0	12.5	0	0	12.5	0	0	35.000	
2	2	4	0	0	12	0	0	0	0	16	0	0	10	0	38.000	
3	3	5	0	0	0	20	0	0	12.5	0	0	0	12.5	0	45.000	
4	4	3	0	0	9	0	0	0	0	12	0	7.5	0	0	28.500	LOWEST
5	5	5	0	0	15	0	0	0	12.5	0	0	12.5	0	0	40.000	
6	6	5	0	0	15	0	0	0	12.5	0	0	12.5	0	0	40.000	
7	7	5	0	0	15	0	0	0	12.5	0	0	12.5	0	0	40.000	
8	8	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	
9	9	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	
10	10	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	
11	11	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	
12	12	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	
13	13	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	
14	14	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	
15	15	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	
16	16	10	0	0	30	0	0	0	25	0	0	0	0	40	95.000	
17	17	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	
18	18	10	0	0	30	0	0	0	25	0	0	0	0	40	95.000	
19	19	5	0	0	0	20	0	0	12.5	0	0	12.5	0	0	45.000	
20	20	6	0	0	18	0	0	0	15	0	0	0	15	0	48.000	
21	21	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	HIGHEST
22	22	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	
23	23	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	
24	24	10	0	20	0	0	0	0	0	40	0	25	0	0	85.000	
25	25	10	0	0	30	0	0	0	25	0	0	0	0	40	95.000	
26	26	5	0	0	15	0	0	0	0	20	0	12.5	0	0	47.500	
27	27	10	0	0	30	0	0	0	25	0	0	25	0	0	80.000	
28	28	5	0	0	15	0	0	0	12.5	0	0	0	0	20	47.500	
29	29	5	0	0	15	0	0	0	12.5	0	0	12.5	0	0	40.000	
30	30	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	
31	31	5	0	0	15	0	0	0	12.5	0	0	12.5	0	0	40.000	
32	32	10	0	0	30	0	0	0	25	0	0	25	0	0	80.000	
33	CUMULATIVE	253.000	0.000	70.000	624.000	40.000	0.000	0.000	402.500	368.000	0.000	182.500	287.500	260.000	2234.500	TOTAL CUM.
34	AVERAGE	7.906	-	-	-	-	-	-	-	-	-	-	-	-	69.828	AVERAGE
35	SUPPORTING	-	-	2*	1*	3*	-	-	1*	2*	-	3*	1*	2*		

•BRAZIL-MED.GR.SC.-MCSAM-AN. 2

Mon, May 29, 1989 4:18 pm

	ENTERORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RANK	DESCENDING	COMMON FA.
1	21	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	110.000	1
2	13	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	100.000	2
3	14	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	95.000	7
4	8	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	85.000	1
5	9	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	80.000	8
6	10	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	48.000	1
7	15	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	47.500	2
8	16	10	0	0	30	0	0	0	25	0	0	0	0	40	95.000	45.000	2
9	18	10	0	0	30	0	0	0	25	0	0	0	0	40	95.000	40.000	5
10	25	10	0	0	30	0	0	0	25	0	0	0	0	40	95.000	38.000	1
11	24	10	0	20	0	0	0	0	0	40	0	25	0	0	85.000	35.000	1
12	11	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	28.500	1
13	12	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000		
14	17	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000		
15	22	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000		
16	23	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000		
17	27	10	0	0	30	0	0	0	25	0	0	25	0	0	80.000		
18	30	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000		
19	32	10	0	0	30	0	0	0	25	0	0	25	0	0	80.000		
20	20	6	0	0	18	0	0	0	15	0	0	0	15	0	48.000		
21	26	5	0	0	15	0	0	0	0	20	0	12.5	0	0	47.500		
22	28	5	0	0	15	0	0	0	12.5	0	0	0	0	20	47.500		
23	3	5	0	0	0	20	0	0	12.5	0	0	0	12.5	0	45.000		
24	19	5	0	0	0	20	0	0	12.5	0	0	12.5	0	0	45.000		
25	5	5	0	0	15	0	0	0	12.5	0	0	12.5	0	0	40.000		
26	6	5	0	0	15	0	0	0	12.5	0	0	12.5	0	0	40.000		
27	7	5	0	0	15	0	0	0	12.5	0	0	12.5	0	0	40.000		
28	29	5	0	0	15	0	0	0	12.5	0	0	12.5	0	0	40.000		
29	31	5	0	0	15	0	0	0	12.5	0	0	12.5	0	0	40.000		
30	2	4	0	0	12	0	0	0	0	16	0	0	10	0	38.000		
31	1	5	0	10	0	0	0	0	12.5	0	0	12.5	0	0	35.000		
32	4	3	0	0	9	0	0	0	0	12	0	7.5	0	0	28.500		

•BRAZIL-MED.GR.SC.-MCSAM-AN. 3

Mon, May 29, 1989 4:20 pm

	ENTERORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RANK	COM.FA.RAN.
1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2	0	0	1	2	3	4	1	2.5	2.5	4	1	2.5	2.5	4	0	0
3	1	5	0	10	0	0	0	0	12.5	0	0	12.5	0	0	35.000	12*
4	2	4	0	0	12	0	0	0	0	16	0	0	10	0	38.000	11*
5	3	5	0	0	0	20	0	0	12.5	0	0	0	12.5	0	45.000	9*
6	4	3	0	0	9	0	0	0	0	12	0	7.5	0	0	28.500	13*
7	5	5	0	0	15	0	0	0	12.5	0	0	12.5	0	0	40.000	10*
8	6	5	0	0	15	0	0	0	12.5	0	0	12.5	0	0	40.000	10*
9	7	5	0	0	15	0	0	0	12.5	0	0	12.5	0	0	40.000	10*
10	8	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	3*
11	9	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	3*
12	10	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	3*
13	11	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	5*
14	12	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	5*
15	13	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	2*
16	14	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	2*
17	15	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	3*
18	16	10	0	0	30	0	0	0	25	0	0	0	0	40	95.000	3*
19	17	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	5*
20	18	10	0	0	30	0	0	0	25	0	0	0	0	40	95.000	3*
21	19	5	0	0	0	20	0	0	12.5	0	0	12.5	0	0	45.000	9*
22	20	6	0	0	18	0	0	0	15	0	0	0	15	0	48.000	7*
23	21	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	1*
24	22	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	5*
25	23	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	5*
26	24	10	0	20	0	0	0	0	0	40	0	25	0	0	85.000	4*
27	25	10	0	0	30	0	0	0	25	0	0	0	0	40	95.000	3*
28	26	5	0	0	15	0	0	0	0	20	0	12.5	0	0	47.500	8*
29	27	10	0	0	30	0	0	0	25	0	0	25	0	0	80.000	5*
30	28	5	0	0	15	0	0	0	12.5	0	0	0	0	20	47.500	8*
31	29	5	0	0	15	0	0	0	12.5	0	0	12.5	0	0	40.000	10*
32	30	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	5*
33	31	5	0	0	15	0	0	0	12.5	0	0	12.5	0	0	40.000	10*
34	32	10	0	0	30	0	0	0	25	0	0	25	0	0	80.000	5*
35	79.0%	253.000	0.000	70.000	624.000	40.000	0.000	0.000	402.500	368.000	0.000	182.500	287.500	260.000	2234.500	0
36	SUP.TH.RANK	0	0	2*	1*	3*	0	0	1*	2*	0	3*	1*	[illegible]	[illegible]	[illegible]

BRAZIL-HIG.GR.SC.-MCSAM-SAMPLE

Mon, May 29, 1989 4:25 pm

	ENTER ORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RANK	FRIEDMANN	BREHENY	CHRISTENSEN
1	1	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	20.000	40.000	40.000
2	2	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	30.000	40.000	40.000
3	3	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	30.000	40.000	40.000
4	4	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	30.000	40.000	40.000
5	5	1	0	0	3	0	0	0	0	4	0	0	0	4	11.000	3.000	4.000	4.000
6	6	1	0	0	3	0	0	0	0	4	0	0	0	4	11.000	3.000	4.000	4.000
7	7	1	0	0	3	0	0	0	0	4	0	0	0	4	11.000	3.000	4.000	4.000
8	8	10	0	20	0	0	0	0	25	0	0	0	25	0	70.000	20.000	25.000	25.000
9	9	10	0	20	0	0	0	0	25	0	0	0	25	0	70.000	20.000	25.000	25.000
10	10	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	30.000	25.000	25.000
11	11	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	30.000	40.000	25.000
12	12	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	30.000	40.000	25.000
13	13	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	30.000	40.000	25.000
14	14	10	0	20	0	0	0	0	25	0	0	0	25	0	70.000	20.000	25.000	25.000
15	15	10	0	20	0	0	0	0	25	0	0	0	25	0	70.000	20.000	25.000	25.000
16	16	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	20.000	40.000	40.000
17	17	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	30.000	25.000	25.000
18	18	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	20.000	40.000	40.000
19	19	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	30.000	40.000	40.000
20	20	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	30.000	25.000	25.000
21	21	10	0	0	30	0	0	0	25	0	0	0	0	40	95.000	30.000	25.000	40.000
22	22	10	0	20	0	0	0	0	25	0	0	0	0	40	85.000	20.000	25.000	40.000
23	23	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	30.000	25.000	25.000
24	24	10	0	20	0	0	0	0	25	0	0	0	25	0	70.000	20.000	25.000	25.000
25	25	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	20.000	40.000	40.000
26	26	1	0	0	3	0	0	0	2.5	0	0	0	2.5	0	8.000	3.000	2.500	2.500
27	27	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	30.000	25.000	25.000
28	28	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	20.000	40.000	40.000
29	29	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	20.000	40.000	40.000
30	30	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	30.000	40.000	25.000
31	31	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	30.000	40.000	40.000
32	32	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	30.000	40.000	25.000

BRAZIL-HIG.GR.SC.-MCSAM-AN.1

Mon, May 29, 1989 4:28 pm

	ENTER ORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RANK	COMMENTS
1	1	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	
2	2	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	HIGHEST
3	3	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	HIGHEST
4	4	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	HIGHEST
5	5	1	0	0	3	0	0	0	0	4	0	0	0	4	11.000	
6	6	1	0	0	3	0	0	0	0	4	0	0	0	4	11.000	
7	7	1	0	0	3	0	0	0	0	4	0	0	0	4	11.000	
8	8	10	0	20	0	0	0	0	25	0	0	0	25	0	70.000	
9	9	10	0	20	0	0	0	0	25	0	0	0	25	0	70.000	
10	10	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	
11	11	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	
12	12	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	
13	13	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	
14	14	10	0	20	0	0	0	0	25	0	0	0	25	0	70.000	
15	15	10	0	20	0	0	0	0	25	0	0	0	25	0	70.000	
16	16	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	
17	17	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	
18	18	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	
19	19	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	HIGHEST
20	20	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	
21	21	10	0	0	30	0	0	0	25	0	0	0	0	40	95.000	
22	22	10	0	20	0	0	0	0	25	0	0	0	0	40	85.000	
23	23	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	
24	24	10	0	20	0	0	0	0	25	0	0	0	25	0	70.000	
25	25	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	
26	26	1	0	0	3	0	0	0	2.5	0	0	0	2.5	0	8.000	LOWEST
27	27	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	
28	28	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	
29	29	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	
30	30	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	
31	31	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	HIGHEST
32	32	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	
33	CUMULATIVE	284.000	0.000	240.000	492.000	0.000	0.000	0.000	302.500	652.000	0.000	0.000	377.500	532.000	2596.000	TOTAL CUM.
34	AVERAGE	8.875	-	-	-	-	-	-	-	-	-	-	-	-	81.125	AVERAGE
35	SUPPORTING	-	-	2*	1*	-	-	-	2*	1*	-	-	2*	1*	-	

•BRAZIL-HIG.GR.SC.-MCSAM-AN. 2

Mon, May 29, 1989 4:32 pm

	ENTER ORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RANK	DESCENDING	COMMON FA.
1	31	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	110.000	5
2	19	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	100.000	6
3	4	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	95.000	6
4	3	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	85.000	1
5	2	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	80.000	5
6	29	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	70.000	5
7	28	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	11.000	3
8	25	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	8.000	1
9	18	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000		
10	16	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000		
11	1	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000		
12	32	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000		
13	30	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000		
14	21	10	0	0	30	0	0	0	25	0	0	0	0	40	95.000		
15	13	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000		
16	12	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000		
17	11	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000		
18	22	10	0	20	0	0	0	0	25	0	0	0	0	40	85.000		
19	27	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000		
20	23	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000		
21	20	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000		
22	17	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000		
23	10	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000		
24	24	10	0	20	0	0	0	0	25	0	0	0	25	0	70.000		
25	15	10	0	20	0	0	0	0	25	0	0	0	25	0	70.000		
26	14	10	0	20	0	0	0	0	25	0	0	0	25	0	70.000		
27	9	10	0	20	0	0	0	0	25	0	0	0	25	0	70.000		
28	8	10	0	20	0	0	0	0	25	0	0	0	25	0	70.000		
29	7	1	0	0	3	0	0	0	0	4	0	0	0	4	11.000		
30	6	1	0	0	3	0	0	0	0	4	0	0	0	4	11.000		
31	5	1	0	0	3	0	0	0	0	4	0	0	0	4	11.000		
32	26	1	0	0	3	0	0	0	2.5	0	0	0	2.5	0	8.000		

•BRAZIL-HIG.GR.SC.-MCSAM-AN. 3

Mon, May 29, 1989 4:33 pm

	ENTER ORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	CUM.WEIG.RANK	COM.FA.RANK	Column 17	Column 18
1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
2	0	0	1	2	3	4	1	2.5	2.5	4	1	2.5	2.5	4	0	0		
3	1	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	2*		
4	2	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	1*		
5	3	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	1*		
6	4	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	1*		
7	5	1	0	0	3	0	0	0	0	4	0	0	0	4	11.000	7*		
8	6	1	0	0	3	0	0	0	0	4	0	0	0	4	11.000	7*		
9	7	1	0	0	3	0	0	0	0	4	0	0	0	4	11.000	7*		
10	8	10	0	20	0	0	0	0	25	0	0	0	25	0	70.000	6*		
11	9	10	0	20	0	0	0	0	25	0	0	0	25	0	70.000	6*		
12	10	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	5*		
13	11	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	3*		
14	12	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	3*		
15	13	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	3*		
16	14	10	0	20	0	0	0	0	25	0	0	0	25	0	70.000	6*		
17	15	10	0	20	0	0	0	0	25	0	0	0	25	0	70.000	6*		
18	16	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	2*		
19	17	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	5*		
20	18	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	2*		
21	19	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	1*		
22	20	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	5*		
23	21	10	0	0	30	0	0	0	25	0	0	0	0	40	95.000	3*		
24	22	10	0	20	0	0	0	0	25	0	0	0	0	40	85.000	4*		
25	23	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	5*		
26	24	10	0	20	0	0	0	0	25	0	0	0	25	0	70.000	6*		
27	25	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	2*		
28	26	1	0	0	3	0	0	0	2.5	0	0	0	2.5	0	8.000	8*		
29	27	10	0	0	30	0	0	0	25	0	0	0	25	0	80.000	5*		
30	28	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	2*		
31	29	10	0	20	0	0	0	0	0	40	0	0	0	40	100.000	2*		
32	30	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	3*		
33	31	10	0	0	30	0	0	0	0	40	0	0	0	40	110.000	1*		
34	32	10	0	0	30	0	0	0	0	40	0	0	25	0	95.000	3*		
35	88.7%	284.000	0.000	240.000	492.000	0.000	0.000	0.000	302.500	652.000	0.000	0.000	377.500	532.000	2596.000	0		
36	SUP.TH.RANK	0	0	2*	1*	0	0	0	2*	1*	0		2*	1*	0	4*		

Mon, May 29, 1989 4:36 pm

M.C.S.A.M.-BRAZIL PLANNED MODEL

	ENTERORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	MIN.CUM.WEIG.	MAX.CUM.WEIG.	COMMENTS
1	1	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	LOWEST
2	2	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	LOWEST
3	3	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	LOWEST
4	4	5	5	10	15	20	5	12.5	12.5	20	5	12.5	12.5	20	15.000	60.000	
5	5	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
6	6	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
7	7	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
8	8	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	HIGHEST
9	9	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	HIGHEST
10	10	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
11	11	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
12	12	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
13	13	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	
14	14	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	
15	15	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	
16	16	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
17	17	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	
18	18	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	HIGHEST
19	19	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
20	20	5	5	10	15	20	5	12.5	12.5	20	5	12.5	12.5	20	15.000	60.000	
21	21	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
22	22	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
23	23	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
24	24	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
25	25	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	HIGHEST
26	26	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
27	27	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
28	28	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	LOWEST
29	29	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	LOWEST
30	30	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	
31	31	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	LOWEST
32	32	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	
33	MAX.PLAN.WEIG	212.000	212.000	424.000	636.000	848.000	212.000	530.000	530.000	848.000	212.000	530.000	530.000	848.000	636.000	2544.000	MIN./MAX.-TOT
34	AVER.PLAN.WEI	6.625	6.625	13.250	19.875	26.500	6.625	16.562	16.562	26.500	6.625	16.562	16.562	26.500	19.875	79.500	MIN./MAX.-AV.

-MCSAM-BRAZIL PLAN.MOD.-ANAL.-1

Mon, May 29, 1989 4:40 pm

	ENTER ORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	MIN.CUM.WEIG.	MAX.CUM.WEIG.	DESCENDING	COM.FA.
1	25	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	30.000	4
2	18	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	24.000	4
3	9	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	21.000	10
4	8	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	18.000	6
5	21	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	15.000	2
6	12	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	12.000	6
7	11	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000		
8	10	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000		
9	27	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000		
10	26	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000		
11	24	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000		
12	23	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000		
13	22	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000		
14	19	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000		
15	16	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000		
16	7	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000		
17	6	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000		
18	5	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000		
19	32	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000		
20	30	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000		
21	17	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000		
22	15	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000		
23	14	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000		
24	13	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000		
25	20	5	5	10	15	20	5	12.5	12.5	20	5	12.5	12.5	20	15.000	60.000		
26	4	5	5	10	15	20	5	12.5	12.5	20	5	12.5	12.5	20	15.000	60.000		
27	31	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000		
28	29	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000		
29	28	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000		
30	3	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000		
31	2	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000		
32	1	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000		

-MCSAM-BRAZIL PLAN.MOD.-ANAL.-2

Mon, May 29, 1989 4:43 pm

	ENTER ORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	MIN.CUM.WEIG.	MAX.CUM.WEIG.	PLANNED	DESCENDING	COM.FA.
1	25	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	71.2	71.2	1
2	18	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	63.7	63.7	1
3	21	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	59.5	59.5	1
4	12	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	57.2	57.2	2
5	11	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	57.2	56.2	2
6	9	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	56.2	55.7	2
7	8	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	56.2	55	1
8	27	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	55.7	54.7	1
9	23	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	55.7	53.2	1
10	10	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	55	51.7	1
11	13	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	54.7	48.5	1
12	16	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	53.2	47.2	2
13	22	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	51.7	47	1
14	14	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	48.5	45.6	1
15	30	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	47.2	43.2	1
16	15	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	47.2	43	1
17	19	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	47	41.7	1
18	32	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	45.6	40.6	1
19	24	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	43.2	40	1
20	17	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	43	39	1
21	3	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	41.7	38.3	1
22	4	5	5	10	15	20	5	12.5	12.5	20	5	12.5	12.5	20	15.000	60.000	40.6	37.7	1
23	2	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	40	37.5	1
24	31	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	39	36.3	1
25	28	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	38.3	35.2	1
26	29	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	37.7	27.7	3
27	20	5	5	10	15	20	5	12.5	12.5	20	5	12.5	12.5	20	15.000	60.000	37.5		
28	26	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	36.3		
29	1	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	35.2		
30	7	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	27.7		
31	6	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	27.7		
32	5	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	27.7		

•MCSAM-BRAZIL PLAN.MOD.-ANAL.-3

Mon, May 29, 1989 4:46 pm

	ENTERORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	MIN.CUM.WEIG.	MAX.CUM.WEIG.	COMMENTS
1	1	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	LOWEST
2	2	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	LOWEST
3	3	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	LOWEST
4	4	5	5	10	15	20	5	12.5	12.5	20	5	12.5	12.5	20	15.000	60.000	
5	5	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
6	6	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
7	7	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
8	8	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	HIGHEST
9	9	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	HIGHEST
10	10	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
11	11	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
12	12	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
13	13	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	
14	14	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	
15	15	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	
16	16	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
17	17	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	
18	18	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	HIGHEST
19	19	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
20	20	5	5	10	15	20	5	12.5	12.5	20	5	12.5	12.5	20	15.000	60.000	
21	21	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	
22	22	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
23	23	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
24	24	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
25	25	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	HIGHEST
26	26	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
27	27	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	
28	28	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	LOWEST
29	29	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	LOWEST
30	30	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	
31	31	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	LOWEST
32	32	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	
33	MAX.PLAN.WEIG	212.000	212.000	424.000	636.000	848.000	212.000	530.000	530.000	848.000	212.000	530.000	530.000	848.000	636.000	2544.000	MIN./MAX.-TOT
34	AVER.PLAN.WEI	6.625	6.625	13.250	19.875	26.500	6.625	16.562	16.562	26.500	6.625	16.562	16.562	26.500	19.875	79.500	MIN./MAX.-AV.

•MCSAM-BRAZIL PLAN.MOD.-ANAL.-4

Mon, May 29, 1989 4:47 pm

	ENTERORDER	INTERAC.WEIG.	CP 1 - 1	PP 1 - 2	CP 2 - 3	PP 2 - 4	V - 1	P 2 - 2.5	P 1 - 2.5	L - 4	C - 1	B - 2.5	E - 2.5	P - 4	MIN.CUM.WEIG.	MAX.CUM.WEIG.	PLANNED
1	1	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	35.2
2	2	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	40
3	3	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	41.7
4	4	5	5	10	15	20	5	12.5	12.5	20	5	12.5	12.5	20	15.000	60.000	40.6
5	5	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	27.7
6	6	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	27.7
7	7	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	27.7
8	8	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	56.2
9	9	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	56.2
10	10	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	55
11	11	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	57.2
12	12	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	57.2
13	13	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	54.7
14	14	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	48.5
15	15	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	47.2
16	16	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	53.2
17	17	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	43
18	18	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	63.7
19	19	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	47
20	20	5	5	10	15	20	5	12.5	12.5	20	5	12.5	12.5	20	15.000	60.000	37.5
21	21	8	8	16	24	32	8	20	20	32	8	20	20	32	24.000	96.000	59.5
22	22	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	51.7
23	23	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	55.7
24	24	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	43.2
25	25	10	10	20	30	40	10	25	25	40	10	25	25	40	30.000	120.000	71.2
26	26	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	36.3
27	27	7	7	14	21	28	7	17.5	17.5	28	7	17.5	17.5	28	21.000	84.000	55.7
28	28	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	38.3
29	29	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	37.7
30	30	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	47.2
31	31	4	4	8	12	16	4	10	10	16	4	10	10	16	12.000	48.000	39
32	32	6	6	12	18	24	6	15	15	24	6	15	15	24	18.000	72.000	45.6
33	CUMULATIVE	212.000	212.000	424.000	636.000	848.000	212.000	530.000	530.000	848.000	212.000	530.000	530.000	848.000	636.000	2544.000	1498.300