

INFORMATION SYSTEM SOPHISTICATIONS FOR ENHANCING THE PERFORMANCE OF WOMEN TECHNOPRENEUR BUSINESS

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Abstract

Theoretically, technopreneurs are technological based entrepreneurs who are into the core businesses involving technology-based sector. They make use of such kind of technology to come out with new or innovative products through a process of development and commercialization. The businesses are generally marked with high growth potential and high leverage of knowledge and intellectual property. Potential technopreneur must be equipped with information system (IS) sophistications where it is vital important to sustain their long live of business. Practically, there are six types of IS, common identified as Executive Information System (EIS), Management Information System (MIS), Decision Support System (DSS), Knowledge Information System (KWS), Marketing Information System (MKIS), and Transaction Information System (TPS) where final aimed to sustain the performance of technopreneurs business. However, there are questions arises about capability and suitability of IS resources in uses of technopreneurs business, as well as to gear-up the business performance. The objective of this paper is to overview the fundamental concept, capability and constrains of every types of IS sophistications with specific reference to capability and suitability to the technopreneurs business. Un-structured interview approach has been used to explore the insight of IS sophistications. In general, this study found that most IS sophistications have unique capability to support and manage the performances of the technopreneurs business. Specifically, DSS is seen as important IS sophistications to support decision making for execute specific decision although the DSS still lacks on certain part. The paper is suggest a guideline on how do develop and implementing the IS as important platform for the future growth of the technopreneurs business.

Keywords: Information System Sophistications, Technopreneurs Business

Introduction

Theoretically, technopreneurs are entrepreneurs who are into the core businesses involving technology-based industries as well as ICT-based business. They make use of such kind of technology to come out with new or innovative products through a process of development and commercialization. Recently, Shakya (2007) conceptualized technopreneur as an entrepreneur who is technology savvy, creative, innovative, dynamic, dares to be different and take the unexplored path, and very passionate about their work. They take challenges and strive to lead their life with greater success. They don't fear to fail. With regard to scholars as mention above, a competitive advantage exists when a firm has a product or service that is perceived by its target market customers as better than that of its competitors. As implication of knowledge based economy, Abd Rozan (2001) pointed out that technopreneurs play a vital role in creating and promoting new ICT goods and services to the local and overseas markets to fulfill the customers demand. In a liberalized environment, newly ICT businesses can fairly compete against already established companies with ICT. The increment of technology knowledge society has contributed to the development of Information Technology (IT) markets locally and globally.

The businesses are generally marked with high growth potential and high leverage of knowledge and intellectual property where finally contribute to the nation growth. Potential technopreneurs must be equipped with information system (IS) resources where it is vital important to sustain their long live of business. Undeniable, innovativeness as mention by Jeroen and Hartog (2007) and Abdul Manaf Bohari (2008), is one of the crucial skills of a technopreneur, is researched to be nurtured by the examples of through leadership. Innovative ideas are mostly stimulated by their leaders. The ability of a leader to encourage and stimulate these skills is also one of the factors that determine success and failure. Therefore, a competitive advantage is a significant and has long-term benefits that women entrepreneurs firms enjoy over its competition.

The implementation of information system resources is potential to create new venture and opportunities, as well as emerging of new challenges. According to Abdul Manaf Bohari (2008), issues related to information system resources among the business are:

- Recognize that IT often is the primary enabler of business solutions.
- Increase the technological maturity of the business entities.
- Create a fabulous vision of the future of IT and promote it to an executive level in business management.
- Implement the IT architecture that will support the business vision.
- Manage IT info-structure's safety, with high security and guarantee.

The Internet is a platform for implementing the information system resources, both locally and globally. With regard to Abd Rozan (2001), Jeroen and Hartog (2007); and Abdul Manaf Bohari (2008), O'Brian (2007) synthesis that some of success impacts after using Internet sophistication are:

- Ability to offer quality products and services at a competitive price and provide related services especially services after sales.
- Marketing strategy creativity and developing a personal relationship with the social cultural and norms of societies. This includes frequent visits to the relevant business services, seminars, conferences, and business official's events and activities.

- Develop a close relationship with a local business agent and his customers in both the business and non-business sectors are most important. This is because most foreign products are sophisticated in local nature.

With regard to the implementation of information system resources in organization, some issues are highlighted especially related to capability and suitability of information system resources to the technopreneurs business. In detail, as example, McIvor (2005) pointed out two questions about this matter:

1. How critical is this ICT activity for the organization in order to obtain or maintain its competitive advantage?
2. How capable is the organization to perform this ICT activity, relative to external providers

Besides being theoretically interesting, there are questions arises about capability and suitability of IS resources in uses of technopreneurs business, as well as to support the decision making process.

Objective of The Paper

The objective of this paper is to overview the fundamental concept, capability and constrains of every types of IS resources with specific reference to capability and suitability to the technopreneurs business.

Capability of Information System Resources

Theoretically, Tippins and Sohi (2003) proposed that information technology resources must made up of three components; knowledge, operations, and objects in an organization. Applying to the individual level, an effective agent must be knowledgeable in information technology, willing to utilize information technology in daily operations, and provided with information technology facilities and supports. These co-specialized resources will be indicated in term of the ability to understand and utilized the information technology for the benefit of the firm. As evident of the capability of knowledge component, as mention by Tippins and Sohi (2003), MacGregor (2004) coined that IS will increasingly empower firms to participate in knowledge management by facilitating connectivity, helping them to create and deliver products and services on global scale. By taken ideas from these scholars, practically, there are sixth types of IS, that available to the organization, as identified as Executive Information System (EIS), Management Information System (MIS), Decision Support System (DSS), Knowledge Information System (KWS), Marketing Information System (MKIS), and Transaction Information System (TPS). Some of technopreneurs has developed IS for achieved their strategic advantages where final aimed to sustain the performance of technopreneurs business.

Basically, information system resources in modern management, suppose related to information system management, including the information system architecture; operational, middle and upper management level of information system; knowledge based information system and global based information system. The information system architecture encourages students to realize that they must be able to identify and understanding the various types of information system which are divide into main and second categories. Actually, these options are design accordingly to hierarchy of organizations and so that every level of management is have ability to use the systems as tools for competitive, effective and digitally-enabled. Moreover, for the global view, we need to explore the knowledge management system and geographical information system. Inside discussion, systems requirements, ability, functionality, capability and environment challenge are the main issues that we must have. Finally, the obligation and

responsibility of every person in organization is important for you to understand how organizations can ensure that their information systems are used in an ethically and socially responsible way, finally create high value added to internal and external stakeholders of organization.

Recently, the businesses will drive the major changes in IS resources in the coming years. This is because of the emerging new technology and application that available in market and for that reason, we can see more and more companies relying on information technology to success in business. In fact, there is considerable organizational resistance to new information systems because they change many important organizational dimensions, such as organization culture, structure and hierarchy, policy and procedure, politics and power, and work styles. Simply, the changes in technology are deflected, absorbed, and defeated by organizational routine task and common arrangements, structures of management, and people's views and perceptions. But, in this simple argument the only way to bring about change is to change the technology life cycle, task of works, structure of management, and people's perceptions simultaneously.

Principally, the hierarchical structure of organizations is close related to IS resources. Knowledge about organization structure is important and the most widely used organizational structure as a basic indication for design and develop new information system. In general, the functional structures of organization are used to define both, hierarchical structure and organizational features. There are major types of information systems that correspond to the hierarchal structure and this is the reasons why information systems are classified by their organization structure. Thus, this classification provides a match between the needs of organizational management entities and the support provided by information system. Here, we assumed that each information system type provides basic applications support in three major categories which are communication (Internal and external), collaboration (work delegation, meeting, and decision making), and data access (including knowledge sharing, networking and total solution for database management).

Structurally, the major types of information systems support headquarters mostly top of the hierarchical structure, divisions, departments, and specific teams in organization. The examples are transactional information system, office automation system, decision support system, management information system, and executive information system. Other systems are enterprise-wide, inter-organizational, and global or international based information system. Such systems can either stand-alone or be inter-connected each others in differs location, time and market. In addition, the three levels of the organizational hierarchy are operational (bottom level of organization), management (middle level of organization), and strategic (upper level of organization). Types of information systems include transaction processing systems and office automation systems at the operational level, decision-support systems and management information systems at the management level, and executive support systems at the strategic level. But, why the managers need to use and utilize the information system? What is explanation behind of these IS resources?

According to Turban, McLean and Wetherbe (2007), Stir and Raymond (2005); and Senn (1998), there are four major types of information systems used in organizations. Table 1 illustrated the main concepts of systems, objective and application of information system in the real organization, as illustrates from these scholars.

Table 1: Main Component of Information Systems Classification.

Type of System	Objective of System	System Application in
Transaction Processing System (TPS)	Process routine business event data (daily operation data) at the operational level of the organization.	Grocery Store Checkout, Cash Register and Bank Customer Services Counter.
Office Automation System (OAS)	Always refers as Personal Productivity Software. OAS design to support a wide range of pre-defined, day-to-day work activities (individuals and small groups) and have a small database for managing routine task related to daily operation.	Microsoft Office package such as MS Word Processor, MS Excel, MS Access, MS Power Point, MS FrontPage, MS Outlook, MS Publisher, MS InfoPath, and MS Tools.
Management Information System (MIS)	Extract data form TPS and then converted it into valuable information to manager. So, MIS produce detailed information and analyses of data to help manage an organization as we as firm objective. MIS located at middle level of organization hierarchy.	Inventory Management System, Manager Planning System, Quality Information System, and so on.
Decision Support System (DSS)	Always located middle level of organization hierarchy. DSS provide analysis tools, technique, and decision support data to help the manager performance the process of decision making. At the same time, manager has right to access the organization databases in order to support quantitative decision making and execution.	Decision Analyses Software, Lumina, GDSS based software, DSS online based systems, and so on.

Instead of main category and others support system that available in market, you also need to know about information systems that functionally serving each of the major functional areas of a business. In the other word, in every functional of organization such as marketing, manufacturing, finance, account, human resource, and management, they have special design of information system. In every department, the information systems are developing to support the activities and process related to the department function and objective. Based of some resources from Parson, Oja and Low (1999), Rayport (2002), Rayport and Jaworski (2001), Sabherwal and Chan (2001) and O'Brian (2007), functional based information systems are includes:

- Department of Sales and Marketing

According to O'Brian (2007), sales and marketing information systems help the firm to identify and tracking a customers and potential customers for the organization's products and services. In practice, the firm will develop customer database that contain the data and information about their customers. Overall, these systems help the firm to develop, promote, sell, and provide ongoing customer support for the firm's products and services and to ensure

the sale activity maintain the daily, weekly, and monthly performance. Specific sales and marketing information systems include customer order processing, pricing analysis, and sales trend forecasting.

- Department of Manufacturing and Production

Based on Sabherwal and Chan (2001), manufacturing and production information systems provide information for production planning, product development, production or service scheduling, quality management, material handling, and controlling the flow of products and services within the organization. We know that operation and manufacturing are the core activity of business, and mostly, the performances of production are depending on this department. Sometime, this department called as “a machine or generator” for transforming the raw materials into valuable products and services to end customers. Specific manufacturing and production information systems include machine control system, raw material planning, production capacity planning, material resources planning, quality assurance planning, and facilities location determination.

- Department of Finance and Accounting

Oja and Low (1999) pointed out that information systems that related to Finance and Accounting purpose are well design and develop for today's business performance. That is why the samples of Financial Information Systems and Accounting Information Systems are always available in the market. Basically, these systems track the organizations financial assets and fund flows. In addition, Financial and Accounting systems include accounts receivable, budgeting, and profit planning. In practices, these two systems should have inter-network with others information resources such as marketing, procurement, production, and so on because the costs related to the organization activities should accounted into the firm operation costing and annually budget principles.

- Department of Human Resources

Human resources information systems as explain by Rayport (2002) and Rayport and Jaworski (2001), purposely develop to manage human resources activities, events and long term strategic planning of staffs in organization. Basically, human resources information system has tools and capability to maintain the human performances and behaviour by maintaining employee work records and enhancing employee skills. By this way, the firm will have the chance to evaluate the job performance either monthly or annually. Information systems for human resources purposes also can supply lots of related training, learning, and practical experience especially to new employee and at the narrow down the skills and knowledge gaps between experience staffs and newest staffs in organization. In some organization, human resources information system functionally supports the short and long term planning for employee compensation, including pensions and benefits, legal and regulatory requirements, and career development. Sometime, this system includes training and development schedules, monthly compensation analysis, and human resources planning for the advance.

Methodology of the Study

The method used is un-structured interview with the key person of academician and practitioners that related to the areas of IS resources, technopreneur, and entrepreneurship. This interview session are conducted among lecturers in the area expertised of IS resources (3 persons), technopreneur (2 persons) and entrepreneurship (4 persons).

Meanwhile, the practitioners were selected are from technopreneur firm, as listed as MSC Status Firm of Malaysia, which is involved 4 persons. Basically, IS resources capability and suitability are the major concern of the study. By the way, this un-structured interview session conducted using 4W1H approach, where refers to What, Why, When, Where and How. In detail, the respondent possible to respond: (a) what is IS resources that available to technopreneur?; (b) why IS resources important to the technopreneur business; (c) when IS resources is needs in supporting the technopreneur business; (d) where are IS resources should located in the hierarchy of technopreneur firm; and (e) how IS resources can contributes to the current and future prospect of the technopreneur business. Interview session will conduct in-persons with them and it depends on availability of respondents to be interviewed.

In addition, findings of this study will supported and validated by using literature review resources.

Findings & Discussion

In general, this study found that most IS resources have unique capability to support and manage the performances of the technopreneurs business. In details, each of IS resources has unique capability and ability, especially to support technopreneurs activity to achieved the growth and performances.

Executive Information System (EIS)

Theoretically, Executive Information System or EIS is a system designed for top level managers or executive level manager in organization. EIS will provide very high-level approach, aggregate information, and high value information to support executive-level decision making and execution. Basically, the information is extract from middle-level information system such as MIS, DSS and KMS where the information derived from all these are error free, more precise with high reliability to end users. For example, EIS might range from Current News Retrieval Systems, Market Stock Update Information System, Disaster Smart Systems, Global Detection System, Business Smart Alert System, and so on. With this, it is clear that some of the major decision-making areas can be supported through an ESS which includes support for defining an overall company vision, support for long term and short term strategic planning, support for strategic human resources planning (organizing, compensation, rewarding, and staffing), support for strategic control process and monitoring, and support for crisis management both in firm and inter firms. These premises are sources from opinions of O'Brian (2007); Turban, McLean andWetherbe, (2007); Laudon and Laudon (2007); Stir and Raymond (2005); Kroenka (1999); Senn (1998); and Kroeber (1998).

In term of definition, most of scholars such as of O'Brian (2007); Turban, McLean and Wetherbe, (2007); Laudon and Laudon (2007); Stir and Raymond (2005); Chaffey (2002) and Anderson and Post (1997) agreed that EIS is defined as information systems originally designed to support the strategic information needs of top management. However, the usage of EIS is spreading to lower levels of management and business professionals because EIS is now linked to every level of information system in organization. In other hand, EIS are easy to use and has enable business executives to retrieve information tailored to their needs and preferences. Thus, EIS can provide some of the ordinary information about a firm's critical success factors to executives and then, used to support their planning and control responsibilities to ensure their company's continues improve form time to time. In term of executive level, EIS has some capability, as listed below:

- ESS helps business managers make unstructured and semi-structured decisions.
- ESS focus on the information needs of senior management in firm.
- ESS extracts and combines data from both internal and external sources.
- ESS creates a generalized computing to ensure executive level familiar with it.
- ESS provide communications environment that focused on real problems.
- ESS helps senior executives monitor and controlling the overall organizational performance and indicators.
- ESS provides executives with tools for tracking activities of their competitors and spot problems surrounding the firms.
- ESS helps the firms to identify opportunities and treats to organization.
- ESS provides analyses tools to help managers to do some of the forecast trends especially on the current market.

Historically, Hogg (2002) and Parson, Oja and Low (1999) mention that ESS is specially designed to be used by senior-level management and applied in strategic matters such as high-level decision making and provides a mean of tracking critical success factors of company. EIS are used to support individuals in a management capacity and that, some of the important characteristics of an EIS system are:

- Easy to use interface.
- Have drill down capabilities.
- Tailored to individual executives used.
- Trend analysis tools.
- Ad hoc analysis services.
- Critical Success Factors tools.
- Provide exception reporting and summary.
- Powered by Intelligent based tools.
- Integration with DSS database ant tools.
- Status access available every time.
- Support the need for external data requirement.
- Deal with critical situations such as high degree of uncertainty and unpredictable.
- Futures based orientation of information prediction.
- Linked with value-added business processes.

In real situation, although EIS benefits are not easily measured, several benefits are generated to enhance the decision making efficiency. By using ESS, it can increase flexibility in problem solving as EIS provide the ability and tools to analyze, compare, and highlight the current trends of industry. ESS also helps the managers to monitor company strategic performance and by doing that, the firm can dramatically improve management performance. Thus, the company can increase management's span of control and this will make the company well organized. ESS also allows executives to shape the problems in a more flexible way and offer an ability to analyze and highlight the trends quickly. In addition, ESS can change the working culture of organizations and at the same time, allowing them to push decision making task to the lower level of organization.

Management Information System (MIS)

Basically, MIS can be conceptualized as an integrated collection of people, procedures, databases, hardware and software tools that provide middle level managers and decision makers with the wide range of information to help achieve organizational strategy and long term objectives. Meanwhile, the main objectives of using an MIS is to help the managers achieve firm's goals by providing managers with insight into the regular task of operations of the organization and then, they have abilities to manage, control, organize, and plan more effectively and efficiently. In short, MIS provides managers with wide range of information, typically to support effective decision making and provides feedback in daily operations. Meaning to say that MIS report are generated and formulated from TPS report and supply in more simple form such as weekly or monthly report on operation. But, the primary difference between the TPS report and MIS report is that MIS reports support managerial decision making at the higher levels of management.

In routine operation, most of scholars such as O'Brian (2007); Laudon and Laudon (2007); and Stir and Raymond (2005) believed MIS provide capabilities as such pre-specified reports and responses to managers on a periodic, exception, demand, or push reporting basis, to meet their need for information to support decision making process in the middle level of managers. For that, MIS supply managers with reports based primarily on data extracted from TPS and have an internal orientation. The examples of MIS report include sales force management report, credit and payment report, inventory control report, human resources performance report, monthly budgeting report, cost control report, and so on. At the same time, MIS have unique abilities on decision making activities and then, MIS support analytical tasks in organizations by accessing, organizing, summarizing and displaying information to support routine decision-making in the every functional department of organization such as marketing and sales, production and operation, financial and accounting, human resources, and so on.

In term of hierarchy of organization, MIS are more focuses in supporting the middle management activities such as reporting operational efficiency, monitoring weekly performance, controlling the effectiveness of sales, and maintaining the productivity rate of the firm. In fact, MIS reports are prepared by extracting information from the corporate level of organization and the most related resources are corporate database. Some arrangements need to do to transform and process the data structures according to the needs of the decision making purposes. In term of problem type, normally, MIS is used only with more structured problems, compared to unstructured problems. So that, MIS are vital important because MIS have the ability to supports primarily task and activities in the organization. But, the function of all MIS systems actually based on firm's requirement, especially in term of decision execution. Therefore, some will make automatic decisions and replace the decision maker. It is depending on user's need and requirement what they are supposed to do with MIS.

In addition, O'Brian (2007); Laudon and Laudon (2007); Stir and Raymond (2005); Hamelink (2000); Kroenka (1999); Ayres (1999), and Allee (1997) premises that the general characteristics of MIS are includes:

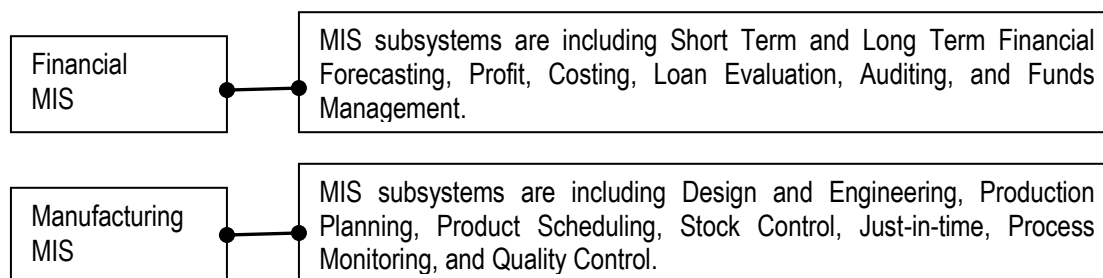
- (a) Emphasis: An MIS usually emphasizes information, data and knowledge related to the middle managers purposes.
- (b) Approach: An MIS is typically can be used as an indirect support system that uses regularly to produce reports, either weekly, monthly or quarterly.
- (c) System: An MIS using hardcopy reports that may be delivered to MIS managers once a week or a month. But, MIS may not provide immediate results that based on current status of event or activities.

- (d) Speed: An MIS's response time is usually longer because of the procedure and organization rules on it. But, today MIS is send faster in between of department or inter-department in organization.
- (e) Output: An MIS, however, typically is oriented toward printed reports and documents. This is important because MIS reports are valuable to the middle and top managers in organization. In addition, MIS report can be used a technical document and suggest some suggestion on how to improve the organizational performance.
- (f) Development: MIS managers are usually more directly involved in its development, from the first stage until the last of system implementation in the firm. User involvement usually as a means to produce better systems that provides high quality of output and tools. In many cases of MIS design, user involvement is the most important factor to create the successful system that meet the whole requirement of organization.

The three key resources of IS and MIS in organization are information, information technology, and people. In general, the most important resource is people which involved every staffs in organization. Simply, human resources are the heart of any business firm, regardless of its industry and the extent to which it uses technology. Human resources are the strategic platform to transform organization goals and mission, and finally, help the firm to achieve the long term strategic planning of organization. In contrast, the least important is really information technology. Overall, staffs and information technology should be managed carefully because in some organization the information technology has more negative impacts rather than positives side.

Centrally, the data resources that uses in MIS are originated from both internal and external sources of organization. But, the most significant data is from internal source such as organization's various TPS, DSS, OAS, and others kind of systems. Also, data warehouses and data marts are important sources that provide important input data to MIS. At the same time, external sources of data for MIS include internet, extranets, business portal, customer's databases, suppliers, dealer, business agents, competitors, and the stockholders. So, these types of data sources will combine to design and produces the MIS reports to be distributed to managers. These reports are includes Planning and Scheduling reports, Key-Indicator of Firm Performance, Analyses and Demand reports, Markets Distribution reports and so on. In addition, MIS also providing routine summary reports for various purposes, including planning, controlling, and decision making. The usual examples include sales and profit per customer, customer demand per region, relocation of equipment, company competition analysis, inventory and purchasing control, capital investment analysis, and so on. Finally, it is clear that MIS deals with summarized and compressed data from both internal and external sources and sometimes analyze of that summarize data before deliver it to managers.

Actually, as most organizations are structured along functional areas or departments, MIS can be divided in the same manner and by the way, MIS typically support the management activities as well as finance, accounting, manufacturing, marketing, and human resources. Each MIS system in every department supposes to be action as manager informative support assistance that composed inputs, processing subsystems, and outputs. Figure 1 shows the means of MIS function and related processing subsystems.



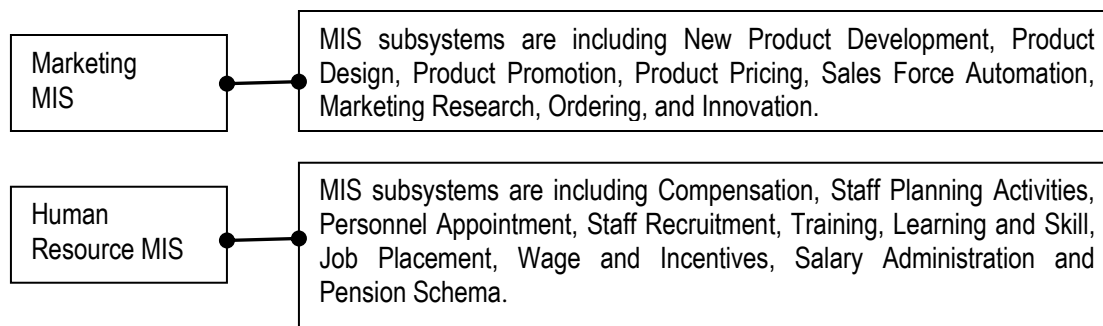


Figure 1: MIS Functional and Processing Subsystems.

Decision Support System (DSS)

In general, Decision Support Systems or DSS are interactive and computer-based information systems that are designed and developed to support and supply any information for managers in term of decision making process. That means, DSS helps the managers from the beginning until the last implementation decision making process of organization. Commonly, DSS have the model and database to provide information tailored to support semi-structured and unstructured decisions faced by individual managers in every level of management So that, decision makers in every department have a chance to use and support their argument and rational behind the decision that have been made by them. Because of that, DSS developer must designed DSS that meets decision maker's own insights and judgments and then, maybe utilized the certain model as well as analytical process modeling that leading to a specific decision.

From literature survey of O'Brian (2007); Turban, McLean andWetherbe, (2007); Laudon and Laudon (2007); Stir and Raymond (2005); Kroenka (1999); Senn (1998); and Kroeber (1998), DSS is conceptualized as an IT tools that is designed specifically to meet the expectations and needs of decision making activities and commonly, providing managerial user computer support for complex decision process and sometimes non-routine business decision-making. DSS are available in two modes which are individual application and group based applications, also known as Group Support Systems (GDSS). The individual applications are used by individual or single purposes, while GDSS used and support staffs working together in a group setting toward a common organization goal. According to GDSS usage, you need to think about suitable size of DGSS group. The size of GDSS group, effectively are around 8-10 per group. This is because GDSS is designed to use around that size and for that, GDSS are connectable with all types of database and networks systems, since employees can be geographically dispersed in workgroups. In future, GDSS can be used in mobile environment and then, the decision makers can make the decision without limit to the office environment.

Specifically, DSS is seen as important IS resources to support decision making for execute specific decision although the DSS still lacks on certain part. Decision making is one capability expected from the IS capability. It is impossible to make good decisions (accurate and high in reliable) without enough and precise information in each phase and activity of the decision-making process. Making decisions while processing information manually is growing increasingly difficult due to the increasing number of alternatives, time pressure, unpredictable change in

environment, decision complexity, cultural factors, and gaining access to remote information and expertise. While these trends complicate decision making process in management, computerized support systems as well as we discuss can be of enormous help. For instance, computerized business modeling can examine numerous alternatives very fast, can provide a systematic risk analysis, supply predictive figure and data and can be integrated with communications systems and databases, either insight and oversight of organization. Information system also can be used to support group work, for instance group decision support system.

DSS is very effective at handling unstructured problems that always cannot be easily programmed as well as structured programmed. DSS has the ability to supports individuals, small groups, and the entire level of managers in organization. In the short run, the users typically have more control over a DSS and the users have chance to utilize DSS in the maximum ways, with concern to their decision making need. In another dimension, DSS can be viewed as a decision approach rather than a precise methodology for decision making. According to Abdul Manaf (2008) and Casolaro and Gobbi (2007), some of characteristic of DSS systems, are:

- DSS function as support system for all aspects and phases of decision making and DSS initiative is does not mean to replace the decision maker. So that, managers still make the decisions with some help from DSS.
- DSS support is provided for decision makers at all management levels, whether individual or groups form. But, mainly DSS provides suitable tools for semi-structured and unstructured situations and at the same time, DSS bringing together human judgment and computerized information. This is important to make the decision that is more toward human dimension, and not just a set of decision procedures.
- DSS emphasizes actual decisions and never suggest 'test and pre-test' decision. So that, DSS also stress on decision-making styles which is more toward human based artificial decision making.
- DSS support for several interdependent and sequential decisions. For this task, DSS must have complete database of previous and present decision because this record should be guiding the decision maker to execute anything about decision.
- DSS is a direct support system that provides interactive reports on computer screens. So that, DSS supports all phases of the decision-making process such as intelligence, design, choice, and implementation.
- The end user can adapt the system over time for unpredictable situations. Hence, DSS are still effective in every situation and simply applied in many condition whatever changes arise in the internal and external environment of DSS organization.
- DSS utilizes several models according to the organizational need. Sometime, DSS also utilize knowledge management component that allows the efficient and effective solution to very complex problems.

Actually, DSS provide material, procedures, tools and methods for analysis the solution of semi-structured problems, which often are unique or rapidly changing in real life of business environment. Mostly, all of DSS software will provide the same capability such as "what if" analysis. This analysis is most usable and popular for all business because it can be applied in many areas of business. DSS also use data from external sources and this is very important because external data are most applicable for any decision making process. That is why some of the expertise called DSS supports "right now" analysis and well designed for analytical purposes and are flexible for any time, any where and any situation. Thus, there are no reasons for not using DSS in the organization because DSS is related to every person who is involved in decision making process.

Knowledge Information System (KWS)

Knowledge Management System (KMS) is very important as it is related to knowledge worker. It is also important to you to know the related concept with knowledge management that is tacit knowledge, explicit knowledge, basic technology for knowledge management, and supportive technology for knowledge management. Before we define all the terms definition, we want to define what we meant by knowledge management. Basically, from literature survey of Kushwaha (2011); O'Brian (2007); Laudon and Laudon (2007); Stir and Raymond (2005); Rayport (2002); Johnson (2000); Miller and Garnsey (2000) and so on, knowledge management is a process that helps people and organizations to identify, select, organize, manage, disseminate, transfer, and apply any kind of information, expertise, and practices, with the aimed to improve the organizational learning culture and promote the best way of using knowledge. Knowledge management can be a part of the organization's memory and can typically reside within the organization in an unstructured manner. Knowledge management is important nowadays because most of the international and local firm tend to turn themselves to be knowledge firms and hope so, their workers will be knowledge worker together with their company vision and mission.

In term of technopreneur business, Shakya (2007); Rayport and Jaworski (2001); and McKay (2001) share same opinion that knowledge management brings different meaning to different people, and because it is still a new field, knowledge management is the process of accumulating and creating knowledge efficiently for learning organization and help them to manage a knowledge base application, and facilitate staffs with the concepts of knowledge sharing within the organization. It is a must for a new company and for the traditional company to try very hard to enrich themselves with the concept and practices of knowledge management. In actual situation, knowledge management is the set of processes developed in an organization and is used to create, maintain, disseminate, and encourage the firm's knowledge sharing cultures.

With regard to knowledge based economy, an organizational knowledge facilitates the process of information development, workflow design, and information use throughout an organization's infrastructure and toward the end, will create benefit to their employees, stakeholders, business partners, and potential customers. Therefore, they are four (4) main areas that technoprenuer should concentrate on:

- Knowledge identification which is critical to decision making process and decision makers in every level of organization.
- Knowledge discovery and analysis where the firm can use IT tools as well as search engines, databases, and data mining and this is important to ensure the specific knowledge must be found, analyzed and put into right views.
- Establishment of organizational knowledge bases which is through organizational knowledge and best practices that must be stored in the form of knowledge base format and is indexed and properly maintained form time to time. This kind of knowledge base platform contains limited knowledge and is used for solving very specific problem in real practice of organization.
- Knowledge dissemination and use which focus on target audiences in wide range of market or places and then technologies are put into place to enable knowledge delivery when needed by community or people.

KWS have their own roles in the enterprise based organization. Basically, it will improve the process of learning in the organization. Knowledge management plays important roles in term of codifying related knowledge and experience and then, making the collected knowledge and experience available to every person. It also provides links

to both internet and external sources of knowledge and then ensures process of transferring is well done. With regard to internal process within organization, these include every single activity of organizational process, as well as creating knowledge, discovering the knowledge, exploring the new knowledge, codifying knowledge, repository knowledge, sharing knowledge, and distributing knowledge. In terms of what kind of organizational processes that are supported by knowledge management application; it should include the following:

- Knowledge work based systems to support knowledge creation process and information repository and storage activities.
- Artificial intelligence based systems to support knowledge discovery, knowledge codification, and sharing especially among new staffs in organization.
- Group work collaboration systems to support knowledge sharing, learning, and group based activities, including group based decision making activities.
- Office Automation System and any types of ICT tools to support knowledge distribution, dissemination, and transfers activities within organization.

Recently, the organizational KMS runs should be success in the real environment, accordingly to the knowledge management system cycle. This kind of knowledge management practices is really important to the firms where it involves six steps that are performed iteratively as knowledge is dynamically refined over time. The steps includes create knowledge, capture knowledge, refine knowledge, store knowledge, manage knowledge, and disseminate knowledge. Thus, knowledge management process will continue from time to time and there is no ending for knowledge creation and distribution, as well as knowledge generated in every day business activities and transactions.

Marketing Information System (MKIS)

Generally, technoprenuer's managers believe that the marketing strategies have a great influence on the business performance especially on market penetration and market product distribution. That means that, the managers believe that marketing activities has a position related to the organization performance. This is a logical perspective since marketing determines products and services that the firm offers and then delivers that offering to customers. That is why the marketers should has a primary influence on everything the firm does, including its use of computing and any kind of technology. In reality, the use of marketing information is often cited as a critical facet of decision-making process and the practitioner believes that Marketing Information System or MKIS did improve both the efficiency and the effectiveness of the decision making process in the company. This is because of the use of computer assisted information processing and communication technologies led to more rapid and more accurate identification of problems and opportunities related to marketing world.

Practically, from literature survey of O'Brian (2007); Laudon and Laudon (2007); Stir and Raymond (2005); Mclvor (2005); Rayport (2002); and Sabherwal and Chan (2001) pointed out the use of MKIS in every marketing management supports the comprehensiveness of data gathering and analysis. This is important because MKIS offers many tools and services to help marketing staffs to perform their works. MKIS support the activities such as pricing of products or services, sales analysis, predicting trend of price of products, managing salesperson productivity, maintaining new products and service, analyse the product innovation process, establishing the market planning, and

many more. In fact, there are sixth (6) reasons why MKIS is vital to a technopreneur manager or marketing persons in technopreneur business firms:

- Capital management: MKIS will help the managers in terms of capital management in marketing decision.
- Increased productivity: MKIS is one of the important tools that plays critical role in increasing the productivity of firms including high growth in efficiency.
- Strategic opportunity: MKIS is one avenue for achieving a marketing strategic advantage by establishing the products differentiation strategy.
- Exploring the new sources of business: MKIS will make the managers realize new sources of business opportunity, as well as develop new products, design new services, establishing new marketing niche, and so on.
- Maintaining market demand: Many marketing management activities are supported by computerized information systems and by this, the marketing function will generate accurate demand for the company's product or services and then the company will generate enough product for meet that demand.
- Analyze customer's needs: MKIS is concerned with identifying the customers for the firm's new products or services, determining what customers need or want, planning and developing new brand of products and services to meet their needs, and then, advertising and promoting these products and services.

In addition, MKIS is one avenue for achieving a strategic advantage by differentiating themselves from competitors and others in the real place. Therefore, the company will have to follow the current changes in market especially in business practice and management event. MKIS is beneficial for any person who works in marketing department and overall, MKIS is design for supports all marketing activities. In detail, Table 2 shows how MKIS possible to supports the marketing activities of technopreneur firm in the real world of business.

Table 2: Marketing Activities Supported by MKIS.

Selected Activities	Activities supported by MKIS
Sales analysis and trend	MKIS monitor any trends that affect new products sales and new opportunities and support long term and short term planning of products and services. At the same time, MKIS helps to monitor the current performance of competitors. For example the MKIS collects, assemble and analyzes sales information that can be segregated along several dimensions for early detection of any kind of problems and opportunities.
Pricing of products or/and services	Sales volumes are mostly determined by the prices of products or services. However, pricing is always difficult decision, and may need to be changed frequently according to market prices. Many companies are using MKIS online to support pricing decisions making because price is a major determinant of profit. Thus, MKIS is applicable for this activity.
Salesperson productivity	Salesperson differs from each other where some of them excel in selling certain products, while others excel in selling to a certain type of customer in a certain geographical zone. Thus, MKIS provide tools for support the managers in term of analyzing performance of the sales staff. Kind of information generated by MKIS is sales data by salesperson, product distribution, market segmentation, and many more.

New products, service, and market planning	The introduction of new or renew products and services can be high risky to the business. Therefore, MKIS provide special tools for analysis, planning, and forecasting in order to ensure the products and services can be sold as their targeted. These can be executed with the aid of MKIS because MKIS supply precise information about market and on the other hand, MKIS can be used in conducting the market research.
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As a conclusion, MKIS has never been an alternative to an organizational information system but must cooperate with similar systems throughout the firm. MKIS must be developed within an organizational information system strategic planning. In the next decade, MKIS will be one of the “killer applications” for knowledge organization. Therefore, the organization must be prepared with the innovation tools and technology that will be introduced by the advance MKIS. At the same time organizations must built up long term strategies for developing and setting human capital in order to adopt MKIS as a real time system to compete in the actual market.

Transaction Information System (TPS)

Basically, TPS support the monitoring collection, storage, processing and dissemination of the organization’s routine business transactions. TPS is established for handling the problems related to work flow data to organization. So that, TPS provides the input data for many other applications including computerized decision- making to the next level of information systems. In addition, TPS are considered critical to the success of any organization since they support the core business operations, such as purchasing of materials, billing customers, preparing payroll, and shipping goods to customers. In practice, it’s very difficult to complete all of tasks, but TPS will facilitate and provide necessary tools to the organization to handle this complex works.

Practically, from opinions of Abdul Manaf (2008); O’Brian (2007); Laudon and Laudon (2007); Stir and Raymond (2005); Mclvor (2005); and Rayport (2002), TPS that has in organization are available in two modes which are real time processing and batch processing. Real time processing means that this kind of TPS will process the data simultaneously once the data flow into the TPS database. By this way, TPS will have up-date data and make the TPS available to use as a real time system. But, it is not difficult to design real time system and many factors account into out consideration as well as database design, processing capacity, networks access, and hardware and software requirements. For the second one, batch processing, TPS will assemble and collect the raw data and then, when the data is sufficient enough the TPS will process it in group. Means that TPS will process the raw data based on group purposes and assign standard procedures to every single procedures of data processed. For both, real time processing and batch processing, the organization must have enough capacity on database system management.

In term of architecture, TPS design is related to the function of department as well as marketing, manufacturing, accounting, human resources, research and innovation, and so on. Simply, they are five types of TPS include sales and marketing systems, manufacturing and production systems, finance and accounting systems, and human resources systems. Here, some examples on how TPS can support each function of department of are describes:

- Sales and Marketing Systems

This type of TPS will provide services related to customer, sales and event management, promotion program and tracking, price changes and monthly bonus program, year end sales, and dealer communications including others

external partners in industry. The examples include sales order and advance information systems, sales commission and reward systems, and event support systems. Suppose, marketing department must have this kind of TPS because they are dealing with various types of data in every days business transaction. For a large company that operating online business, it is better to have TPS online mode because this company need more capacity in term of data processing.

- Manufacturing and Production Systems

This type of TPS will provide daily, weekly and monthly scheduling, purchasing activities and planning, shipping and transformation management, receiving and confirmation, and operations basic functions. The examples of manufacturing systems include machine control systems, purchase order systems, and quality control systems, as you learn before. TPS will help manufacturing department to handle all the activities related to production process, from the first point material purchased, until the product completed and send to the final customers.

- Finance and Accounting Systems

This type of TPS will provide general requirement of accounting and financial basis activities such as general ledger, billing, account statement, auto debit program, and cost accounting functions. Examples of finance and accounting based systems include general ledger system, payroll system, accounts receivable and payable system, and funds management systems. It's up to the organization to choose and utilizes any categories of the finance and accounting basic that offer to them, as long as the system can support needs of organization. Because of certain parts of production are complicated, so TPS will helps the managers to deal with the complicated data volume and value.

- Human Resource Systems

This type of TPS will provide anything related to human resources management such as personnel records, works benefits, compensation and reward, labour relations, pension schema, and training functions. The basic examples are employee records system, benefit systems, and employee skills inventory system. But, other types include admissions system, evaluation system, grade records system, course records system, and alumni records system (for a university). Specifically, they are many examples of HRIS for university purposes and the best common examples of transaction processing systems for a university include an academic registration system, treasury systems, transcript system, curriculum planning system, class control and schedule systems, and an alumni benefactor system.

Fundamentally, every organization have their own problems regarding IS resources implementation and cause of that, every organization have their own approach on how to settle the problem related to information systems. The management challenges include the pressure between designing systems that both serve specific interests in the firm but that also can be integrated to provide vary organization-wide information, the requirements for management and employee training to use systems properly. Almost, the need to establish priorities on which systems most merit corporate attention and funding also identified as a main problem in organization. Because of the problem can affect the organization image and prestige, so how do you settle the problems? Maybe, challenges can be narrow down by including inventorying the firm's information systems to establish organization-wide information needs, employee and management training programme, and establishing a system for accounting for the costs of information systems and managing demand for them. It's just one of the solutions and for others organizations it could be not suitable. This is

because of the human factors such as motivations, ethics, cultures, and structure of works are differs and so that, every organization have their own solutions.

Discussion

One of capability that supply by these IS resources is integration capability among the IS. For example, there is related relation between organizational levels to transaction processing systems, executive information systems, and management information systems. This relationship is very important because different types of information systems support individuals in organizations, depending on the roles and the tasks performed by every level of individuals in organization. For line managers and operators such as supervisors to make operational decisions, which are the day-to-day decisions that aim to keep the organization's operations moving smoothly. They can utilize the TPS typically to capture the operational information relevant for decision making at this level.

For the top management, they usually makes strategic decisions and execution as capability expected from the IS resources. These are relatively mid-term and long-term planning decisions that deal with the organization's objectives as a whole and the allocation of resources to achieve these objectives. These individuals may rely on EIS for some of their decision making and forecasting. Commonly, types of data needed are high value data which more on executive summary of overalls information from TPS and MIS. Lastly, tactical levels or managerial decisions are made by middle managers, who prepare short-term work plans, job procedures, and department policies with which to begin implementing the organization's long-term strategies. For these persons, MIS provide the primary support at this level, along with some DSS. At the same time, MIS and DSS should be having good network with TPS and EIS and for that, MIS must play an important roles especially functionally as coordinator and integration parts between this the top and lower levels of management for the organization.

Recently, the Internet and other kinds of on-line information systems provide capabilities to the IS resources of the organization, includes technopreneur firm. By using EIS as example, there are several ways where the Internet and on-line based technology can enhance such a system. First, the system interfaces is a well-friendly and understood interface and is suppose to make it easier for end users. Maybe, it is less costly to create user friendly interface system. Secondly, the Internet is an important source of external data and information to EIS and therefore, EIS must have good link with others kind of resources supplier. At the same time, enterprise based systems for example, functioned as an eliminator for the problem of data being unavailable or available in different formats. This kind of system also handles problems related to having to access hundreds or even thousands of incompatible systems around their link. Therefore, enterprise based systems permits data to be gathered from world wide perspective so that it can be more easily analyzed and used by senior management in organization. In market, we can see that there are various types of EIS platform offered to firms and it is up to them to select which one of it are suitable to meet their purpose.

By compared DSS to another system such as MIS, TPS and OAS, actually DSS users are usually more directly involved in its development from the first stage until systems implemented in organization. User involvement usually brings better systems characteristics that provide superior support and extra tools. But, for all types of systems, user involvement is the most important factor for the development of a successful system. So here, the question is what are the basic components of DSS that needs consider by tehcnoprenuer? Actually, they are three basic components of DSS systems include a DSS database systems, DSS software system, and DSS user interface component. For the

next step, could you explain all these three components? Firstly, DSS database is a collection of current information and historical data from a number of applications or groups or another's data sources, organized for easy access by a range of applications. The DSS database may be a small database residing on our computer. Sometime, it may be a massive data warehouse that is continuously updated by major organizational information sources especially TPS. Secondly, the DSS software system is a collection of software tools used for data analysis, including a collection of mathematical and statistical models, analytical models, searching tools, OLAP tools, data warehouse, and also data mining technique. It's very important to know about various kinds of DSS models and for that, there have many options such as model base, libraries of statistical model, optimization model, forecasting model, sensitivity analysis model, predicting model, and forecasting models. Thirdly, DSS user interface are the interface that permits easy interaction between users and the DSS software tools. It's better to have interactive interface to make sure the DSS are familiar and compatible with the users.

Suggestion and Conclusion

In future, advanced capability that expected from IS resources are includes expert system, Customer Relationship Management System (CRM System) and Enterprise Resource Planning System (ERP System) and these IS has potential to operating together with this main information systems as mention before This is important because sometime the organizational information system needs more data and support from others resources especially external database.

- Expert System

Mimic human expert in a particular area of business. So, this system provides answers, solutions or special advice to support management activity (routine and non-routine). Simple application is Automated System for analyzing bank loan applications and Sales Force Automation System.

- CRM System

Purposely design for customer based problems solving. Thus, CRM support interaction between the sales persons and managers and its customers. For examples, Siebel's Suite (e-Business software products) has introduced Siebel Sales Package to organization to helps them on how to deal with the world wide needs and expectations of the customers.

- ERP System

Basically design for managing the internal and external resources that related to organization operation performance. ERP is vital important because the organization must handle the business teams and partners and maintain their relationship for a long term of business. ERP has ability to support and integrate all facets of the business, including planning, manufacturing, sales and promotion, marketing, suppliers and dealers, and so on. The best ERP software is SAP R/3 (Systems, Applications, and Products in Data Processing-Release 3) and now the organization utilizes the SAP R/3 for local and global business venture and collaborations.

IS resources have become essential for helping organizations deal with changes in global view business enterprise. IS resources provide firms with communication and analytic tools for conducting transaction and managing businesses on a global scale. In fact, IS resources is the foundation of new knowledge-based products and services in knowledge economies and help firms manage their knowledge assets as well as they can. Practically, IS resources it possible for businesses to adopt more flexible arrangements of employees and management that can coordinate with other organizations across great location and geographical barriers. Therefore, every business organizations are trying to become more competitive and efficient by transforming themselves into digital firms where nearly all core business processes and relationships with customers, suppliers, and employees are digitally enabled. In future, the Internet is a main platform to bring about the convergence of technologies that is further widening the use of information systems in business and transforming industries and business models.

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