

A Theoretical Review on Organizational Information Systems for Analysing Spatial Issues: A Perspective of Modern Business

Abdul Manaf Bohari^{#1}, Ruslan Rainis[#], Malliga Marimuthu[#]

[#] School of Humanities, Universiti Sains Malaysia, 11800 Penang, Malaysia

E-mail: manafdr@uum.edu.my; abdulmanaf.bohari@yahoo.com

¹ College of Business, Universiti Utara Malaysia, 06010 UUM Sintok, Kedah, Malaysia

Abstract— Organizational Information Systems (OIS) is established purposely to support an organization in managerial and routine works, as well as important to decision making process. Theoretically, there are six types of OIS, commonly identified as Executive Information System (EIS), Management Information System (MIS), Decision Support System (DSS), Knowledge Information System (KWS), Office Automation System (OAS) and Transaction Information System (TPS). Some organizations have developed OIS for achieving their strategic advantages where the final aim is to sustain the performance of the organization. However, there are questions that arise about OIS uses in analyzing a spatial issue which refers to geographical locations. The objective of this paper is to overview the fundamental concept, capability and constraints of every type of OIS with specific reference to spatial issues. Spatial issues refer to concurrent and real-time based issues that arise from the external environment which can affect directly on organization performance. This literature review is driven from a business perspective where OIS capability and ability to handle spatial issues will be discussed. In general, this study found that most OIS have limited capability to handle and manage spatial issues. Although DSS can support decision making for executive specific decisions related to spatial issues, however DSS still lacks on visualized spatial issues geographically, as well as spatial issues tied to geographical location. This paper suggests to develop a Geographical Information System (GIS) as one of OIS to discover all kinds of spatial issues.

Keywords - Organizational Information Systems; Spatial Issues; Geographical Information System

I. INTRODUCTION

Fundamentally, an organization uses information systems for a variety of purposes that finally aim to achieve organizational performance. When an information system is wisely implemented, these systems can add something of value to an organization within the constraints of its structure and culture. Practically, the implementation of an information system is an organizational change process and it continuously changes over time, with consideration on how people and the organization environment adapt to it, as in ([1], [2], [3]). In addition, opportunities for change of an organization's information systems (OIS) can be identified commonly during the early strategic phase of system formulation that will usually focus on the current needs of systems specification for value-adding processes to the organization [4]. However, there is a question that arises on how an information system may respond to any change of the external environment, as well as spatial issues on the real marketplace. What kind of strategy should be considered

for making the OIS more spatial-friendly? Most of the valuable information is tied to spatial, but do OIS have the capability to capture and analyze the data in spatial form, as in ([5], [6], [7])? These questions are important that determine whether OIS has the capability to be applied to handle any types of spatial issues around the globe.

Commonly, the businesses will drive the major changes in information technology, including OIS in the coming years. This is because of the emerging of latest technology and applications that are available in the market and for that reason, more companies are relying on adaptive information systems to succeed and keep track on the market trend, as in ([8], [9], [10], [11]). In addition, there is considerable organizational resistance to adapt new OIS such as organization culture, structure and hierarchy, policy and procedure, politics and power, and work styles. The changes in technology are deflected, absorbed, and defeated by organizational routine tasks and common arrangements, structures of management, and people's views and perceptions [12]. Moreover, OIS is needed to be reviewed to understand whether it is good enough to handle any change in the external environment, such as market,

competition, new entrance, and so on, where most of these are exist in spatial environment.

Theoretically, the array of information systems available to businesses can help businesses achieve higher levels of productivity and financial worth. For that, management challenges include the tension between building systems that both serve specific interests in the firm but that also can be integrated to provide organization-wide information, the need for management and intrenal parties to use systems properly, and the need to establish priorities on which systems most merit corporate attention and funding, as in ([4], [12], [13]). However, in practices, challenges can be addressed by including ability of the firm's OIS to establish organization-wide information needs, includes establish link with any external factors that exist in the geographical environment. Regarding this matter, different OIS will posed different kind of problems and it depend to firm for re-formulate their strategy to make OIS become more friendly for spatial analysis, as well as analyzing the external factors from the geographical environments point of view.

II. ORGANIZATIONAL INFORMATION SYSTEMS

Nowadays, OIS have become essential for helping firms deal with changes in global challenges of business enterprise. Information systems provide firms with application and tools for communication and analytic, as well as for conducting transaction and managing businesses on a global scale. Most of knowledge based organization believes that information systems are the foundation of new knowledge-based products and services in knowledge economies era, as in [14]. Information systems also make 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. But, not all of OIS can used for meet the purpose of analysing any event related to location and geographical issues.

Practically, the vast majority of organizations still have a traditional hierarchical structure of management which maintain their three level of management (lower, middle and upper level of management), as in ([4], [12], [15], [16], [17]). Therefore, the most common arrangement and rules of information systems is one that follows the hierarchical management structure. Table 1.0 illustrated the main concepts of each OIS systems, objective and application of information system in the real organization.

In addition, OIS can applied in many ways, where is depend on what type of OIS needed by the firm. The basic reason is OIS must be designed to provide a match between the needs of every organizational entities and the support provided by information system, as in ([16], [17], [18], [19]) Consequently, that is why OIS application should be classified according to organizational structure, tasks and routine. In addition, some of international organizations initiate to build up their OIS for the headquarters, for divisions, for departments, and event for specific tasks [20]. Table 2.0 illustrated applications of each OIS in modern organization, including commercial firms.

TABLE I
TYPES OF ORGANIZATIONAL INFORMATION SYSTEMS.

Type of System	Objective of System
Transaction Processing System (TPS)	Process routine business event data (daily operation data) at the operational level of the organization.
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.
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.
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.
Knowledge Worker System (KWS)	Knowledge workers system ordinary used by knowledge worker level to find information, interpret information, and analyze information. This is really important to meet the latest requirement of knowledge workers on information technology.

TABLE II
TYPES OF OIS APPLICATIONS.

Type of System	System Application in
Transaction Processing System (TPS)	Grocery Store Checkout, Cash Register and Bank Customer Services Counter.
Office Automation System (OAS)	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)	Inventory Management System, Manager Planning System, Quality Information System, and so on.
Decision Support System (DSS)	Decision Analyses Software, Lumina, GDSS based software, DSS online based systems, and so on.
Knowledge Worker System (KWS)	Internet-based search engines and data mining tools; intelligent support systems to apply expert judgment; and various decision support and analytical tools.

In practice, OIS is applicable to used in business sector especially retailing business. Retailing is one of important sectors in business that contributes and generates highly profitability for overall business sectors. Retailing also one of the most important sectors that has influence on the others sector within industry, such as distributors, small and medium sized of business, corporation, and even non-profit

organization [7]. From time to time, retailing sectors need to scanning and understanding their environment, especially external environment because it's have dramatically impact toward their operation and performance [21]. On the one hand, positive change of environment as well as economic rise-up, highly increase in consumer income, lifestyles, and expenses, lower inflation rate, and many more actually influencing retailer profitability to shift in better stage. On the other hand, the negative meltdown economic as well as economic crisis, supreme crisis, market turndown, felt in commodity price, oil and energy crisis, environment issues, and many more will cause negative impacts toward their performance and profitability. Thus, to adapt with the changes taking place in the current market and to satisfy the needs, desires and expectation of customers, the business alike to review their OIS requirement, purposely to handle non-stop spatial issues around their business environment.

III. OIS AND SPATIAL ISSUES

In today's globalizing economy competition is getting more fierce and sophisticated. That means it becomes more difficult for products and services to differentiate themselves from other offerings than ever before. Many products and services face new competition from substitutes and from completely new offerings industry outsiders. Since product differences are closed at an increasing speed and many companies try to win the battle for customers by price reductions, products and services tend to become commodities [22]. In addition, although customer values based oriented are become more important, retailers can gain market share and thrive in a difficult economy if they clearly differentiate themselves from competitors, as in ([7], [21], [23]). Based on point, how OIS as such ESS, MIS and DSS can tackles issues regarding spatial event, as well as competition and dramatically changes in geographical environment?

Some of marketplace question is not tied-up with OIS specification and function. There questions are included:

- Where are customers located?
- What are characteristics of buyers in the marketplace (market segmentation, classification of residential areas)?
- Where are firm competitors located?
- What is the potential turnover in a region for product?
- What market share can expect for every single retailer?
- Where should firm locate their new branch?
- Should firm expand an existing branch? Or close the others branch?
- How should firm promote their product?
- Where and how should firm advertise their product? [7].

In business point of view, some of reasons why product fail to meet the demand is because of product it self with unrecognized brand, bad features, and product characteristics and not link with the customer value in the marketplace, as in ([6], [7], [9], [24], [25]). Specifically, unable to recognize the pattern of customer values also brings other problems to marketers in identified their potential and current based customers. In addition, failure in analyze the real customers needs toward the product in the spatial environment especially for get more visualization

and imagination of what, why, when, who, and how it be happened, would be affecting the future of retailers profitable. Spatial environment should be used as platform for analysis because it is the best ways on understanding the customer value, market competition, and barriers of entry to the markets, customer niches, and many more. This supported in [26] that argued the existing of product or new product in the retailing industry supposes will creating new competition among retailers. Thus, with more demanding customers and increasing global competition, companies struggle to introduce products to market more quickly while countering low new-product success rates. In addition, OIS has no ability to support or supply ant data related to spatial environment.

For most businesses, the primary means of growth involves the acquisition of new customers. This could involve finding customers who previously were not aware of the product, were not candidates for purchasing the product (for example, baby diapers for new parents), or customers who in the past have bought from their competitors. Possibly some of these customers might have been the customers previously, which could be an advantage (more data might be available about them) or a disadvantage (they might have switched as a result of poor service), as in [27]. In any case, DSS can often help segment these prospective customers and increase the response rates that an acquisition marketing campaign can achieve. However, DSS has no ability to visualize the spatial issues because of lacking in some parts.

IV. RESULTS

In general, most of OIS is updated and purposely design for help the business in performance routine works of business. OIS in theoretical point of view is not spatial-based system as it in nature setting. Even, the existing of OIS is not for handle of any spatial issues as well as issues of location, site, distance, competition, market force, and many more. However, there are a few initiatives to integrated OIS with spatial platform, as exemplified of DSS. Because of modern era of business just like facing by the business today, OIS need to recheck for search better solution especially related to spatial issues. The result of theoretical overviewed on OIS is shows below:

A. Executive Information Systems

Executive Information Systems (EIS) are interactive computer-based systems and subsystems intended to help decision makers use data, information, knowledge and/or models to identify and solve problems and make decisions. All types of EIS help business decision makers to answer questions relevant to a decision situation [19]. One of the major tasks of a manager in any organization is decision making. Decision-making is a difficult task and need all the support it can get from available executive decision-making tools. Various companies are turning to executive support tools to help them analyze sales figures, track business strategies, managing a merger and many other managerial tasks.

Fundamentally, EIS supports senior managers and for that system designed specifically to provide top management with high quality information in a form that is

easy to access, easy to use and relevant to decision making [20]. EIS are typically used directly by top management, and focuses on manager's information needs across several areas. Rather than being limited to a single recurring type of decision, as decision support systems, EIS are intended to be flexible tools that provide information support and analysis capability for a wide range of executive decisions.

Commonly, EIS characteristics are:

- Tailored executives information needs.
- Extract, filter, compress, and track critical data.
- Provide on-line status access, trend analysis exception reporting, and "drill-down".
- Access and integrate a broad range of internal and external data.
- User-friendly and require minimal or no training to use.
- Used directly by executives without the assistance of intermediaries. [14].

The most fundamental capability of an ESS is giving executive's access to timely, relevant internal and external data. The internal data include TPS or MIS data, financial data, office systems and modelling/analysis and external data. The executives also can draw upon variety of internal and external data.

However, EIS is not spatial-based system as it in nature exists. Although EIS has widely used by executive level, but EIS has been not enough capability to visualize any kind of spatial issues. One of reasons is users has no capability to understand and using any spatial variables on EIS. Even, the report that summarized by EIS is ordinary in fact and compress report with no element of spatial.

B. Management Information Systems

Basically, MIS is placed in the middle level of management of organization. MIS is design for meet the purposes of middle managers, specifically on their data requirements and any kind of decision making tasks. 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 [17]. Specifically, 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 than, they have abilities to manage, control, organize, and plan more effectively and efficiently [14]. In short, we can find that an MIS provides managers with wide range of information, typically to support effective decision making and provides feedback in daily operations.

In addition, MIS Common Characteristics are:

- MIS provide 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 in the middle level managers.
- MIS supply managers with reports based primarily on data extracted from TPS and have an internal orientation. The examples of MIS report includes sales force management report, credit and payment report, inventory control report, human resources performance report, monthly budgeting report, cost control report, and so on.

- MIS has unique abilities on decision making activities and 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. ([14], [15], [16], [17], [19]).

MIS is not considers as spatial-friendly system because it has no platform for visualized any spatial variables. MIS also has no function for using any spatial data where is also important part of business analysis. For example, how the business can understand market force competition without any visual data? Thus, MIS need to re-design with specific consideration on spatial-based variables.

C. Decision Support Systems

Basically, Decision Support Systems (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. 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 [12]. Practically, 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 [15]. In addition, DSS are designed to meets decision maker's own insights and judgments. DSS also maybe utilized the certain model as well as analytical process modelling that leading to apply in a specific decision making.

DSS defines as 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, as in ([15], [16], [17]). Some of important characteristics of DSS are:

- DSS defines as 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 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 bringing together human judgment and computerized information. ([12], [14], [17], [18], [19]).

DSS is proven and applied by many business firms for support decision making activity within organization. However, DSS has not using any spatial data as on of decision making proses. In fact, formulation decision without any spatial can create bias to the finale results. For example, if the manager wants to have decision on either

continue or close the store, it might be on how strong the customer can contribute to the performance of the store. Formulating the result of customer by financial items as such income is not really enough. In practice, DSS manager need to have some information on customer such as density, socio demographic and lifestyle. The best supplier for this kind of information is spatial-based information technology.

D. Knowledge Information Systems

Basically, 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, as in [13]. Knowledge management can be a part of the organization's memory and can typically reside within the organization in an unstructured manner [3]. 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 addition, knowledge management brings different meaning to different people, and because it is still a new field, we can say that 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, as in ([2], [4], [9], [12]). 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. However, knowledge management is not really completed without take into account any spatial variable as one of its component. In nature, knowledge management should cover, both non-spatial and spatial information where functionally for discovers all kind of knowledge.

Fundamentally, knowledge management systems (KMS) are building upon three technology sets, as described below:

- Communication technology: provided access to knowledge and interchange of knowledge.
- Collaboration technology: providing support for group work.
- Storage and retrieval technology: providing the means to capture, store and manage explicit and tacit knowledge [17].

However, KMS is not spatial-based system where it only focused on non-spatial data. Therefore, KMS need to redesign by take into account of any spatial data as one of its variables.

E. Office Automation Systems

Basically, OAS defines as a software based system that help operation level management to complete and performance their daily tasks and make all the work done as well as organization's requirement and needs [4]. Here, we can imagine that OAS is all about using the computer based information system as tools to support the routine tasks of operational level of organization.

OAS are applied in vary areas of management and currently, this system are applied in transportation management, banking management, front office management, travel and tour management, office management system, pharmacy and healthcare office, and so on, as in [14]. For transportation sectors such as cross-boarder business, OAS mainly design purposely for managing the trade and transportation industry activities and types of software products are including OAS Freight and OAS Trade [4].

In addition, OAS supposes can help the organization to achieve higher performance which final aimed is to improve productivity and quality of works. It has become apparent that the OAS developers must understand more about the environment of work performed at all levels of a modern organization [15]. So, to make sure the OAS software are applicable to every level of management, OAS technology must be have good enough abilities to serve information-processing requirements at those levels in effectively ways .

OAS in nature is not design for handle any kind of spatial issues. OAS is purposely used for internal use only. However, OAS must relate to spatial data because all kind of activities around the globe is related to spatial matter. For example, if the travel agency want to plan where the best location for build-up is new branch of the agency, spatial data is related issues to them. They will take into account about which location has provided the best attraction to tourist. In addition, they also what to know about the accessibility to interested location for their customer because it involved cost and budget of travelling. By this way, spatial information as well as driving time, distance, cost of transportation and many more is important data to consider.

F. Transaction Information Systems

TPS functionally support the monitoring collection, storage, processing and dissemination of the organization's routine business transactions. TPS is established for handling and managing the problems related to work flow data to organization. TPS used as platform to provides the input data for many other applications including computerized decision-making to the middle level of information systems [16]. In addition, TPS are considered as one of critical success factors of any organization since they support the core business operations, such as purchasing of materials, billing customers, preparing payroll, and shipping goods to customers [14]. 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.

Theoretically, TPS design is related to the function of department as well as marketing, manufacturing, accounting, human resources, research and innovation, and so on. As an example, they are five types of TPS includes sales and marketing systems, manufacturing and production systems, finance and accounting systems, and human resources systems [17]. In addition, short descriptions of TPS in functional department are:

- Sales and Marketing Department - 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.

- Manufacturing and Production Department - 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 Department - 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.
- Human Resource Department - 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. ([4], [18], [19], [20]).

Currently, TPS is available in online platform where offers better services to customer without limits to time, day and location of customer. However, TPS online has no ability to trace where is the customer located. TPS online has no visualise function where it is vital important for it operation. By developed new spatial function into TPS it will helps in identified where customer is located.

V. SUGGESTIONS & CONCLUSIONS

Because of weakness and limitations of OIS for capture and analyzed spatial issues, GIS is suggested as the latest application of OIS. OIS based geographical platform is potentially as a new paradigm for developed the future characters of OIS. In theory, GIS is a decision based application system that constructs and displays maps and other graphics to the users. GIS has the ability to display geographical based information that support decisions especially related to geographical distribution of people and other resources around the globe, as in ([28], [29], [30]). In short, GIS is born-made for capture, visualized and managing any kind of spatial problems that were continuously exist around the physical places, as such as geographical location on the business firm.

GIS have been growing rapidly in every single of segment of business, s well as OIS. In today's marketplace, many of the world's leading commercial organizations, as well as Pest Control Company, Levi Strauss & Co., HSBC bank, Suzuki Motor Corporation, Kentucky Fried Chicken, Domino's Pizza, and many more are relying on GIS technology to enhance strategic competitiveness and improve efficiency in how they operate in the real environment of business and establishing the strategic business planning for the future performance [7]. GIS are increasingly being employed by the business community purposely for location-based services, supply chain management, management of field-distributed equipment, geographical marketing and promotion, and the spatial web. GIS spatially enabling the business to create unique advantage to competing in market environment, acquiring new customers, retain customers, grow the business performance, make better decisions, develop new products and services, and optimize workflow of business processes,

as in ([4], [5], [21]). However, OIS has no capability as have by GIS.

GIS has capability on data visualization technology that captures, stores, validates, integrates, manipulates and displays data using digitized maps. GIS has the capabilities of integrating maps with spatial orientation, that is with geographical location and other databases and end-users can generate information for their purpose as well as managing, planning, problem solving, decision making, monitoring, and coordinating all the activities using GIS tools [29]. In addition, in many cases we can find that the integrative features and the intelligent organization of the data within a GIS will help firms to increase the quality of its decisions making activities and process [30]. This is also the best reason why the business professionals use GIS to manage their business operations, either as stand alone system or integrated system with other application.

Moreover, GIS is a computer-based system used for capturing, storing, checking, integrating, manipulating, and displaying data using digitized maps or virtual maps. Every record has an identified geographical location which is based on point of grid and spatially oriented databases which can be integrated with maps to provide easy visualization of the data [17]. Towards the end, GIS produce high quality information and many scholars believed that GIS can produce precise information as well as the real situation in the real geographical environment. This is differs compared to any OIS where OIS only can serve non-spatial data as it output. Therefore, OIS need to redesign with take consideration on spatial data.

Nowadays, GIS establish for as one of solution for handling and dealing with the character and structure of spatial and non-spatial data and usually its methods utilize for performing geographical based activities such as acquisition, data capture (analog and digital based), data organisation, classification and qualification, spatial based analysis, display and presentation, distribution and dissemination, management, as well as the objectives of GIS design and development in organization [7]. In addition, GIS is used to managing and handling any field and research related to geographically issues with highly capabilities tools and solutions for solved spatial based issues

In conclusion, OIS is now being used in all aspects of business. There is not a single transaction occurs in daily business, but involve more than one billions transaction from various types of business in one time. Because of spatial change so fast, OIS has push into the back to confront with the change. Ideally, any kind of spatial issues have direct impact toward OIS and organizational performances, both short and long run. It is suggest to organization especially to the businesses to upgrade their OIS to GIS based for ensure they can serve better to world wide customers and retrain them to make a long term benefit to the firms. By applied GIS as alternative ways of OIS, firms will be able to adaptive to any changes in the external environment, as well as changes of socio-economic, physical, lifestyle, current issues, and many more.

ACKNOWLEDGMENT

We would like to thank Universiti Sains Malaysia for funding this research project through the USM-RU-PGRS Research Grant

REFERENCES

- [1] Allee, V. (1997). *The knowledge evolution: Expanding organizational intelligence*. Boston: Butterworth-Heinemann.
- [2] Evans, N. (2003). *The needs for enterprise innovation*. Retrived on May 24 2005, from <http://www.informit.com>
- [3] Parson, J.J., Oja, D., & Low, S. (1999). *Computers, technology and society* (2nd ed.). Cambridge: Course Technology.
- [4] Abdul Manaf Bohari (2008). *Management Information System*. Kuala Kumpur: Asia e-University Publication.
- [5] Environmental System Research Institute (ESRI) (2007). *GIS for retail business*. GIS Best Practice (Febuary 2007). California: ESRI.
- [6] Environmental System Research Institute (ESRI) (2002). *ArcView business analyst: The value added*. An ESRI White Paper June 2002. California: ESRI.
- [7] Abdul Manaf Bohari, Prof Ruslan Rainis & Malliga Marimuthu (2009). An Overview Of Customers Value Issues in The Global Retailing Business. *The Third Asia Pasific Marketing Conference 2009*. Organized by Faculty of Economy and Business, Universiti Malaysia Sarawak. Lokasi: Damai Beach Resort, Kuching, Sarawak. 9-11 December 2009.
- [8] Torkzadeh, G. & Dhillon, G. (2002). Measuring factors that influence the success of internet commerce. *Information Systems Research*, 13(2), pp. 187-204.
- [9] Huber, F., Herrmann, A., & Morgan, R.E. (2001). Gaining competitive advantage through customer value oriented management. *Journal of Consumer Marketing*, 18(1), 41- 53.
- [10] Ertmer, P.A. (1999). Addressing first and second-order barriers to change: Strategies for technology integration. *Educational Technology Research and Development*, 47(4), 47-61.
- [11] Chow, G.C. (1967). Technological change and the demand for computers, *American Economic Review*, 57, pp. 27-30.
- [12] Anderson, D.L. & Post, G.V. (1997). *Management information systems: Solving business problems with information technology*. New York: Irwin Publisher.
- [13] Hamelink (2000). *ICT for information age*. New Jersey: Prentice Hall.
- [14] O'Brian, J.A. (2007). *Management information systems: Managing information technology in the busines enterprise*. New York: MacGrawHill Irwin.
- [15] Kroeber, D.W. (1998). *Management information system: A handbook for modern managers*. Washington: Penguin Publication Team.
- [16] Kroenka, D. (1999). *Management information system*. Washington: Mitchell Publishing.
- [17] Laudon & Laudon (2007). *Management information systems*. New York: McGraw-Hill.
- [18] Senn, J.A. (1998). *Information technology in business* (2nd ed). New Jersey: Prentice Hall.
- [19] Stir & Raymond (2005). *Principles of information system*. Kanada: Thomson.
- [20] Turban, E., McLean, E. & Wetherbe, J. (2007). *Information technology for management: Making connection for strategic advantages* (2nd ed). New York: John Wiley & Sons.
- [21] Berman, B. & Evans, J.R., (2007). *Retail management: A strategic approach*. New Jersey: Pearson Prentice Hall.
- [22] Recklies, D. (2006). *Effective executive*. Tripura: ICFAI University Press.
- [23] Janiak, S. (2009). *The age of transformation: A retail outlook for 2009 and beyond*. New York: Deloitte Touche Tohmatsu.
- [24] Graf, A. & Maas, P. (2008). Customer value from a customer perspective: A comprehensive review. *Journal of Financial Business*, 58, 1-20.
- [25] Gupta, S. & Zeithaml, V. (2006). Customer metrics and their impact on financial performance. *Mark Sci* 25(6),718 -739.
- [26] Cicekoglu, S. (2005). *Supply chain management viewpoint: The case for product life cycle management*. Chicago: Accenture Inc.,
- [27] Sumathi, S., & Sivanandam, S.N. (2006). Data mining in customer value and customer relationship management. *Studies in Computational Intelligence (SCI)*, 29, 321 - 386.
- [28] Toppen, F., & Wapenaar, H. (1994). *GIS in business: Tools for marketing analysis*. The Hague: EGIS Foundation
- [29] Church, R.L.. & Murray, A.T. (2008). *Business site selection, location analysis and GIS*. Singapore: John Wiley & Sons, Inc.,
- [30] Dodge, M., McDerby, M., & Turner, M. (2008). *Geographic visualization: Concepts, tools and applications*. Singapore: John Wiley & Sons, Inc.,