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The Impact of Management Information Systems Adoption in Managerial Decision Making: A Review

Summary

Data are the lifeblood of today's organizations, and the effective and efficient management of data is considered an integral part of organizational strategy. Successful organizations should collect high quality data which will lead to high quality of information. For a successful and effective managerial decision making, it is necessary to provide accurate, timely and relevant information to decision makers. Management Information System is type of information systems that take internal data from the system and summarized it to meaningful and useful forms as management reports to use in managerial decision making. Management information system improves information quality and subsequently affects on managerial decision-making. This research provides a better and clearer understanding of technology adoption and information system success in managerial decision making by reviewing current literature. The expected outcome of this study is propose integrated model for MIS and managerial decision making.

1. Introduction

Management Information Systems is a system that converts data into information, communicated in an appropriate form to managers at levels of an organization. The information can contribute to effective decision making or planning to be carried out (Patterson, 2005). MIS basically involves the process of collecting, processing, storing, retrieving and communicating the relevant information for the purpose of efficient management operations and for business planning in any organizations. Thus, the success of effective decision-making, is consider as the heart of administrative process, is highly dependent partly on available information, and partly on the functions that are the components of the process (Nath & Badgujar, 2013). MIS Provide information in the form of pre specified reports and displays to support business decision making (O'Brien & George, 2007).MIS is define as type of information systems that transform data to information and summarized the information to Meaningful and useful forms as management reports to use it in managerial decision making. Figure 1 show the relationship between management information systems and decision-making. The problem is that no documented evaluation model to evaluate the success of MIS. In addition the existing IS success model only focus on technology. Therefore, there

is need to design and develop such an evaluation model which focus on technology and management that can be used by managers.
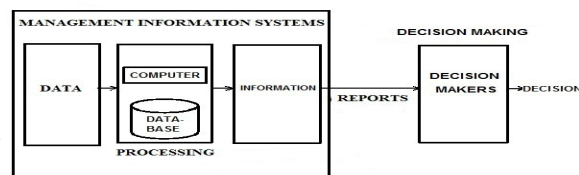

Figure 1 Relationship between Management Information Systems and Decision-Making

2. Literature Review

2.1. Technology Adoption Model

The Technology Acceptance Model, developed by Davis is one of the most influential research model in studies of the determinates of information systems and information technology acceptance to predict intention to use and acceptance of information systems and information technology by individuals. In the Technology Acceptance Model, there are two determinants including perceived ease of use and perceived usefulness (Chen, Li, & Li, 2011).

Perceived usefulness (PU) - This was defined by Fred Davis (1989) as "the degree to which a person believes that using a particular system would enhance his or her job performance".

Perceived ease-of-use (PEOU) - Davis (1989) defined this as "the degree to which a person believes that using a particular system would be free from effort". Perceived usefulness and perceived ease-of-use of the system leads to IS Success. In our study we focus on how can adopt the technology to MIS success and improve the quality of MIS. High quality of MIS improves information quality and subsequently affects on managerial decision making.

2.2. IS Success Model

De Lone & McLean (1992) performed a review of the research published during the period 1981–1987, and created taxonomy of IS success based upon this review. In their 1992 paper, they identified six variables or components of IS success: system quality, information quality, use, user satisfaction, individual impact, and organizational impact (Petter, De Lone, & McLean, 2008). Based from De Lone & McLean study, technology acceptance model, and literature review we adopt taxonomy of MIS success measures. In this study we identified six variables or components of MIS success: MIS quality, information quality, top management support, perceived usefulness, decision maker's satisfaction and quality of managerial decision making. In this study we assume that the system quality affects on information quality, and there are direct relationship between information quality and managerial decision making. In addition we replacing use by usefulness, because the management information systems success measure is the benefits or useful of use.

2.2.1. Replacing Use By Usefulness

As reported by De Lone and McLean (1992) many researchers have used Use as an objective measure of system success. The implication is that if a system is used, it must be useful, and therefore successful. However, non-use does not necessarily mean a system is not useful, it may simply mean that the potential user has other more pressing things to be done (Seddon & Kiew, 1995). The broad concept of use as a measure of information system success only makes sense for voluntary or discretionary users as opposed to captive users, this constructs (use) was omitted from the developed model (Visser, Biljon, & Herselman, 2013). According to Peter B. Seddon (1997) the critical factor for IS success measurement is not system use but that net benefits should flow from use. A successful system will provide benefits such as

helping the user do more or better work in the same time, or to take less time to achieve as much work of the same quality as was done in the past. Perceived usefulness is a perceptual indicator of the degree to which the stakeholder believes that using a particular system has enhanced his or her job performance. Many of researchers support of replacing use by usefulness such as Chen H., 2010; Hsieh & Cho, 2011; Hussein, Abdul Karim, & Hasan, 2007; Landrum, Prybutok, Strutton, & Zhang, 2008; Pai & Huang, 2011.

2.2.2. MIS Quality Measures

One of the most studied dimensions of IS success is system quality. It refers to measures of the information processing system itself (DeLone & McLean, 1992). System quality is the desirable characteristics of an information system. System quality being measured by ease of use, system flexibility, system reliability, and ease of learning, as well as system features of intuitiveness, sophistication, flexibility, and response times (Petter et al., 2008). Quality of management information system impacted on the information and on the organization as a whole. High quality of management information systems means high quality of information, perceived usefulness, decision makers' satisfaction and increase the quality of managerial decision making. There are a lot of measures for the system quality and these measures differ from one researcher to another. Table 1 shows the system quality measures. The common measures for system quality that used / adopted by previous researchers are ease of use, flexibility, response time and reliability. Ease of use is the degree to which decision makers believes that using MIS for managerial decision making would be free from effort. Low flexibility of the system may cause lower satisfaction of users of the system and affect on the quality of the information. Response time is the length of time taken by a system to respond to an instruction. Decision makers need timely information to make right decision. Lengthy system response times may cause lower satisfaction of decision makers. Reliability is Degree to which the user and decision makers can trust the MIS.

Table 1 System Quality Measures

Measures \ Authors	Baraka et al. (2013)	Cheng, Y. (2012)	Sedera & Gable (2004)	A.Halawi et al. (2008)	Chien, & Tsaur (2007)	Ifinedo & Nahar (2006)	Armstrong et al. (2005)	Livari, J. (2005)	DeLone & McLean (2003)	Bharati & Chaudhury (2004)	Petter & McLean (2009)	Park, et al. (2008)	Petter et al. (2008)	Percentage
Ease of use			X	X	X	X	X		X	X			X	61.5%
Reliability	X		X				X		X	X	X	X	X	61.5%
Response time	X	X		X	X			X	X				X	53.8%
Flexibility	X		X	X	X		X			X			X	53.8%
Integration			X	X		X		X						30.8%
convenience of access				X				X		X	X			30.8%
Ease of learning			X	X		X							X	30.7%
User requirements or expectations			X	X		X	X							30.8%
Availability	X								X			X		23%
System accuracy			X		X	X								23%
Customization			X					X						15.4%
Sophistication			X										X	15.4%
functionality		X									X			15.4%
efficient						X								7.7%
Adaptability										X				7.7%
Usability										X				7.7%
has good features						X								7.7%
Recoverability								X						7.7%
usefulness of IS				X										7.7%
User-interface design		X												7.7%
interactivity		X												7.7%
Security											X			7.7%
intuitiveness													X	7.7%
Intelligent	X													7.7%
Language								X						7.7%
System features			X											7.7%

Table 2 Information Quality Measures

Measures \ Authors	Alkhattabi et al. (2011)	Petter et al. (2008)	Armstrong et al. (2005)	Bovee et al. (2003)	DeLone & McLean (2003)	Eppler & Muenzenmayer (2002)	Kahn et al. (2003)	Klein, B.D. (2002)	Lee et al. (2002)	Naumann, & Rolker (2000)	Percentage
Completeness	X	X		X	X		X	X	X	X	80%
Relevancy	X	X		X	X		X	X	X	X	80%
Accuracy	X	X	X	X		X		X		X	70%
Understandability	X	X			X		X		X	X	60%
consistency	X		X			X	X	X	X	X	60%
Conciseness	X	X				X	X	X	X	X	60%
Timeliness		X			X		X	X	X	X	60%
Amount of information	X					X	X	X	X	X	50%
Accessibility	X		X		X		X	X	X		50%
Reputation	X					X	X	X	X		40%
Objectivity	X					X	X	X	X		40%
Believability	X					X	X	X	X		40%
Security				X			X		X	X	40%
Verifiability	X									X	20%
Availability	X									X	20%
clear		X			X						20%
Value added							X			X	20%
Response time	X									X	20%
Free of error							X		X		20%
Usability		X									10%
Latency										X	10%
sufficient		X									10%
up-to-date		X									10%
About exactly what I need provides reports		X									10%
Integrity			X								10%
Comprehensive				X							10%
Ease of manipulation						X					10%
Ease of operation									X		10%
Applicable				X							10%
Correct				X							10%
Current				X							10%
Convenient				X							10%
Traceable				X							10%
Interactive				X							10%
Maintainable				X							10%
Fast				X							10%
Interpretability		X					X	X	X		40%
Existence		X									10%
Personalization				X							10%
Secure						X					10%
Customer support										X	10%
Documentation										X	10%
Price										X	10%
Reliability										X	10%

2.2.3. Information Quality Measures

Information Quality is the desirable characteristics of the management information system outputs. Information quality measures of information system output rather than measure the quality of the system performance (De Lone & McLean, 1992). Quality of information affect on managerial decision-making. There are a lot of measures for the information quality and these measures differ from one researcher to another. Table 2 shows the information quality measures. And the common measures for information quality that used / adopted by previous researchers are accuracy, completeness, conciseness, consistency, relevance, timeliness, amount of information, accessibility, and understandability.

To help decision makers to make right decisions, the information should to be accurate or free of error, complete or contain all the details required, in a form that is short enough, presented in the same format, relevant to the purpose for which it is required, available quickly and timely to support information needs, appropriate amount of information, easy to access, and easy to understand.

2.2.4. Top Management Support Measures

Top management support of information systems refers to the degree to which top management understands the importance of the IS function and the extent to which it is involved in IS activities (Ragu-Nathan, Apigian, Ragu-Nathan, & Tu, 2004). Top management support refers to management approval and continuous support not only during the IS project implementation but also throughout the operational phase of the system (Al-Adaileh, 2009).It is reasonable that, when managers dedicate a high level of resources to support information technology; they tend to foster a greater use of information systems within that organization. If senior executives support using an IS, they may establish some reward systems to encourage staff to use the IS. Under this circumstance, staffs are more willing and satisfied while facing an information system. As individual outcomes improve, the performance of the whole company would increase (Cho, 2007). Literature review suggests a linkage between top management

support and the success of IT systems (Al-Gharbi & Naqvi, 2008).

Table 3 Top Management Support Measures

Measures	Al-Gharbi & Naqvi (2008)	Hartono et al (2007)	Ragu-Nathan et al. (2004)	Urbach et al. (2010)	Rouibah et al (2009)	Chen, R. & Hsiao, J.(2012)	Percentage
Encourage or support to use MIS and adoption of new technology				X	X	X	50%
Top management support us to get all the resources needed for the implementation	X	X				X	50%
Management supports the system implementation		X					16.6%
Management prioritizes the system implementation		X					16.6%
Overall management Support is good (supported the system)	X						16.6%
Management participates in the system implementation		X					16.6%
Top management involvement with IS function is strong			X				16.6%
Top management is interested in IS function			X				16.6%
Top management understands the importance of IS			X				16.6%
Top management supports the IS function			X				16.6%
Top management considers IS as a strategic resource			X				16.6%
Top management understands IS opportunities			X				16.6%
Top management keeps the pressure on operating units to work with IS			X				16.6%
leadership support				X			16.6%
TMS is much interested in IS usage rate					X		16.6%
TMS frequently mentions the various problems and matters related to IS development and operation					X		16.6%
TMS Makes and effort to provide stable funding for the system development and operation activities					X		16.6%
TMS tries to take part in deciding in what order the ISs should be implemented					X		16.6%
TMS is favorable to computerization of tasks					X		16.6%
TMS is much concerned with the performance of IS operation					X		16.6%
TMS persists to have latest technology					X		16.6%
Top manager having active participation in the system decision-making process						X	16.6%

2.2.5. Decision Makers Satisfaction Measures

User Satisfaction is Recipient Response to the Use of the Output of an Information System (De Lone & McLean, 1992). User Satisfaction is Users' level of satisfaction with reports, Web sites, and support services (Petter et al., 2008). User satisfaction refers to the recipient response to the use of the output of IS (Halawi, McCarthy, & Aronson, 2008). Decision makers satisfaction is define as the degree to which a decision makers believe that the management information system and the information (reports) available to them meets their requirements. There are a lot of measures for the users' satisfaction and these measures differ from one researcher to another. Table 4 shows the users satisfaction measures. And the common measures for user satisfaction that used / adopted by previous researchers are system meets our needs or expectations, and overall we satisfied with the system.

Table 4 Measures of Satisfaction

Measures	A.Halawi et al.(2008)	Armstrong et al.(2005)	Wu & Wang (2006)	Cho, V.(2007)	Sorum et al.(2011)	Lai et al.(2009)	Chen,H.(2010)	Hartono et al.(2007)	Percentage
Overall we satisfied with the system	X	X	X		X	X			62.5%
System meets our needs or expectations	X	X	X		X				50%
Satisfied with system efficiency	X	X					X		37.5%
Satisfied with system effectiveness	X	X					X		37.5%
Satisfied with system performance				X					12.5%
Short response time for general inquiries					X				12.5%
Short response time to users with specific problems					X				12.5%
As a whole, The system is successful						X			12.5%
I am satisfied with the sufficient information of system that meets my work needs.							X		12.5%
The end users have been satisfied with the experience of the meeting supported by the system								X	12.5%
The end users have been satisfied with the output of the meeting supported by the system								X	12.5%
The end users have been satisfied with the experience of the decision making process supported by the system								X	12.5%
The end users have been satisfied with the output of the decision making process supported by the system								X	12.5%
The end users have been satisfied with the overall experience of using the system								X	12.5%

2.2.6. Perceived Usefulness Measures

Perceived usefulness defined by Fred Davis (1989) as "the degree to which a person believes that using a particular system would enhance his or her job performance". Perceived usefulness of management information systems affect on decision makers satisfaction and managerial decision making. Perceived usefulness is defined as the degree to which a decision makers believes that using a particular system would enhance his or her decision. For example decision makers believe that the using the management information systems will accomplish decision more easily, accomplish decision more quickly, enhance effectiveness on the making decision, increase job productivity, and improve job performance. Table 5 shows the usefulness measures. And the common measures for perceived usefulness that used / adopted by previous researchers are enables me to accomplish tasks more quickly, enhances effectiveness of the job, easier to do my job, improve job performance, and improve the job productivity.

Table 5 Perceived Usefulness Measures

Measures \ Authors	Joo & Sang (2013)	Dulcic et al (2012)	Nasri & Charfeddine(2012)	Teo, T. (2010)	Djamasbi et al (2010)	Porter, & Donthu (2006)	Burton-Jones & Hubona (2006)	Lai & Li (2005)	Shih, H. (2004)	Legris et al (2003)	Percentage
Using system enhances my effectiveness on the job	X		X	X	X		X	X	X	X	80%
improve my productivity			X	X	X	X	X			X	70%
Using system enables me to accomplish tasks more quickly	X	X					X	X	X	X	60%
Using system improves our work performance.		X	X		X		X		X	X	60%
Using system makes it easier to do my job	X					X	X	X		X	50%
Overall, useful in my job.								X	X	X	30%
Using system gives greater control over our work.		X								X	20%
Overall, I find system useful for our work.		X				X					20%
Using system supports critical aspects of our work.		X								X	20%
Using system improves our work efficiency.		X						X			20%
Using system improves the quality of our work.		X								X	20%
Using system makes it more convenient to accomplish our strategies and goals.		X									10%
Using system demonstrates our inventiveness to our business partners.		X									10%
enable me to communicate more quickly			X								10%
improve my work				X							10%
useful tool in my work				X							10%
enables me to make better decisions								X			10%
Using system allows me to accomplish more work than would otherwise be possible									X		10%

2.3. Impact of MIS in Managerial Decision Making

MIS has great contribution to increased competitiveness and effectiveness of managers in decision-making process and solve different problems that appeared in managing an organization (Nath & Badgujar, 2013). MIS produces information products that support many of the day-to-day decision-making needs of managers and business professionals. Reports, displays, and responses produced by MIS provide information that these decision makers have specified in advance as adequately meeting their information needs (O'Brien & George, 2007). A management information system comprises computer-based processing and/or manual procedures that provide useful, complete, and timely information. This information must support management decision making in a rapidly changing business environment. The MIS system must supply managers with accurate, quick and complete information. Good decision making requires quality data and timely information; an MIS is specifically designed to provide information on a timely basis. An MIS also provides different types of information based on users' need to improve effectiveness and efficiency (Shim, 2000). Effective use of information systems in management decision making gives power to managers and help

organization succeed (Namani, 2010). Caniëls & Bakens, (2012) confirmed that there are strong relationship among information systems and decision making. In addition, Abdel and Mahmoud (2009) confirmed that there is strong relation between management information systems and managerial decision making process.

2.4. Quality of Managerial Decision Making

Managerial Decision Making is selecting alternative from among set of alternatives to solve the particular problem (Djamasbi, Strong, & Dishaw, 2010). The quality of decision making construct is composed of items such as: a perceived increase in the quality of decisions and reduction of the time required for decision making (McLeod, 1990). Quality of decision making include items such as : reduces the time of my decision making, helps me to better manage the budget for activities, helps me to better allocate resources, helps me to better monitor activities, and improves the quality of my decisions (Caniëls & Bakens, 2012).

3. Conceptual Framework and Hypotheses Development
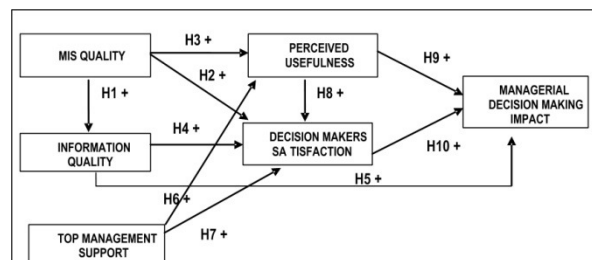

Figure 2 Conceptual Framework

- **Effect of MIS Quality on information quality, perceived usefulness, and decision makers satisfaction**

High quality of the system leads to high quality of the information. Raymond & Bergeron (Raymond & Bergeron, 2008) confirms that the quality of information output by a PMIS is strongly associated to the technical and service aspects of the system, that is, to system quality. Gorla, Somers and Wong (2010) supported that System quality is positively associated with information quality. A system that utilizes user-friendly and modern technologies (such as GUI – graphical user interfaces) can present information to users in an easy-to-understand format, enabling them to use information systems effectively. Ifinedo (2011) supported that Higher ERP system quality will be

positively related to higher ERP system information.

High quality of the system leads to decision makers' satisfaction. Wu & Wang (2006) supported that the system quality, had a significantly positive influence on user satisfaction. Livari (2005) supported that perceived system quality is a very significant predictor of user satisfaction. Landrum et al. (2008) supported that System quality is positively correlated with user satisfaction. Hussein et al. (2007) supported, indicating that higher level of IS competency leads to higher degree of satisfaction in system quality, information quality, system quality and overall user satisfaction. A. Halawi et al. (2008) supported that there is a positive relationship between system quality and user satisfaction of a knowledge management system. Bharati & Chaudhury () supported that System quality is directly and positively correlated to decision-making satisfaction so an increase in the quality of the system leads to an increase in decision-making satisfaction.

High quality of the system leads to perceived usefulness. Landrum et al. (2008) supported that System quality is positively correlated with usefulness. Hwang, Chang, Chen and Wu (2008) supported that Systems Quality had a strong direct effect on Perceived Usefulness. Park, Zo, Ciganek and Lim (2011) supported that System quality has a positive influence on perceived usefulness. Chen (2010) supported that System quality as perceived by employees is significantly associated with the perceived usefulness of e-learning systems.

H1: There is significant relationship between MIS quality and information quality.

H2: There is significant relationship between MIS quality and decision makers satisfaction.

H3: There is significant relationship between MIS quality and perceived usefulness.

- **Effect of information quality on decision makers satisfaction, and managerial decision making**

High quality of the information leads to decision makers' satisfaction. Landrum et al. (2008) supported that Information quality is positively correlated with user satisfaction. Wu & Wang (2006) supported that the extent of knowledge or information quality in KMS is positively associated with user satisfaction. Livari (2005) supported that perceived information quality predicts user satisfaction. According to Caniëls & Bakens (2012) A higher quality of the PMIS information output is

associated with higher levels of satisfaction of project managers. A. Halawi et al. (2008) supported that there is a positive relationship between knowledge quality and user satisfaction of a knowledge management system.

Information quality impact on quality of managerial decision making. Caniëls & Bakens (2012) supported and indicates that a greater quality of the PMIS information output is significantly and positively associated with decision making by project managers. The quality of the information produced by the PMIS is directly related to the quality of decision making. Bharati & Chaudhury (2004) supported that Information quality is directly and positively correlated to decision making satisfaction so an increase in the quality of the information leads to an increase in decision-making satisfaction.

H4: Information quality gives positive significant impact to decision makers satisfaction.

H5: There are significant relationship between information quality and managerial decision making.

- **Effect of top management support on perceived usefulness, and decision makers' satisfaction.**

Top management support impact on perceived usefulness. Chen & Hsiao (2012) supported that top management support positively influences perceived usefulness. In addition Shih & Huang (2009) supported that top management support strongly, directly and positively affects perceived usefulness.

Top management support impact on decision makers' satisfaction. Cho (2007) supported that Top management support positively affects user satisfaction. In addition Urbach, Smolnik and Riempp (2010) supported that Top management support has a significant impact on user satisfaction.

H6: There is significant relationship between top management support and perceived usefulness.

H7: There is significant relationship between top management support and decision makers satisfaction.

- **Effect of perceived usefulness on decision makers satisfaction, and managerial decision making**

Perceived usefulness impact on decision makers

satisfaction. Landrum et al. (2008) supported that Usefulness is positively correlated with user satisfaction. Hwang et al. (2008) supported that Perceived Usefulness had a strong direct effect on User Satisfaction. Park et al. (2011) supported that Perceived usefulness has a positive influence on user satisfaction. Lai, Wang and Chou (2009) supported that Usefulness had a significant positive effect on user satisfaction. Ainin, Bahri and Ahmad (2012) supported that Perceived usefulness will have a significant, positive relationship with user satisfaction level.

Perceived usefulness impact on the quality of managerial decision making. Hwang et al. (2008) supported that Perceived Usefulness had a strong direct effect on Net Benefits. Park et al. (2011) supported that Perceived usefulness has a positive influence on organizational benefit.

H8: Perceived usefulness gives positive significant impact to decision makers' satisfaction.

H9: Perceived usefulness gives positive significant impact to managerial decision making.

- ▪ **Effect of decision makers satisfaction on managerial decision making**

Decision makers satisfaction impact on quality of managerial decision making. Petter and McLean (2009) supported that there is a significant, positive relationship between User Satisfaction and Net Benefits. Hwang et al. (2008) supported that User Satisfaction have strong direct effect on Net Benefits. Park et al. (2011) supported that User satisfaction has a positive influence on organizational benefit. Balaban, Mu and Divjak (2013) supported that Electronic Portfolio user satisfaction has a positive effect on net benefits. Urbach et al. (2010) supported that User satisfaction has a positive influence on the individual impact of an employee portal. Petter & Fruhlingb (2011) supported that User Satisfaction is positively associated with Individual Impact. Caniëls & Bakens (2012) supported that Greater satisfaction of the project manager with PMIS is associated with intensified use of PMIS information in a multi project environment. and Intensified use of PMIS information has a positive impact on the quality of decision making in a multi project environment.

H10: Decision makers' satisfaction gives positive significant impact to managerial decision making.

4. Conclusions

In summary, the proposed theoretical model for this study, as depicted in Figure 2 comprises a combination of three models:

- ▪ The original D&M IS Success model.
- ▪ The Updated D&M IS Success model.
- ▪ The Technology Acceptance Model.

Based on above models and literature review we proposed theoretical model. This model consists of six variables or components: MIS quality, information quality, top management support, perceived usefulness, decision makers' satisfaction and quality of managerial decision making.

5. Acknowledgement

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