Factors affecting use of ICTs for Rational Decision-making in Healthcare Organizations of Developing Countries (DCs)

[1]Najam Afaq Qureshi, [1]Kamran Ahmad Chishti, [2]Qamar Afaq Qureshi, [2]Irfanullah Khan

[1]Department of Pharmacy, Faculty of Life Sciences, Sarhad University of Science and Information Technology, Peshawar, Pakistan

[2]Department of Public Administration, Gomal University, Dera Ismail Khan, Pakistan

Abstract

The increasing pressure of business environment of the information age is forcing the organizations of the entire world to adopt and use Information and communication technologies (ICTs) in decision making. It is well reported that private sector organizations are using information system for achieving strategic advantages and gaining financial and business benefits more than its public counterpart. The literature nevertheless offers limited understanding in regard of the impacts of ICTs on public and private health sector organization in Pakistani context. This study aims to investigate the adoption and use of ICTs in decision making of both the public and private health organizations to figure out existing differences. Factors like human and organization; three enabling technologies (TPS, MIS and EIS) and three decision-making phases (intelligence, design and choice) have been used in designing the framework of the study. Data analyses reveal that organization is the strongest factor for the success of IT. Literature also highlights that Decision making process and enabling technologies are significantly positively related with effective decision making with enabling technologies as significant factor. The finding of the study reveals that the public health organizations are far behind in using ICTs in decision making than their private counterpart. The executives of public organizations neither take interest in the adoption and use of ICTs nor have awareness and experience to solve their problems. It is worth mentioning that the Government of Pakistan is moving towards digitization.

Key words: IT-usage factors (human & organization), Enabling Technologies (EIS, MIS, TPS), Decision-making process (intelligence, design, choice) and Effective decisions

INTRODUCTION

The impact assessment of ICTs on decision making process has now become a global issue and thereby gaining interest of researchers of both developed and developing societies (see for example Ahlan, 2005; Adebayo, 2007; Bradley, 2006). However, few studies have been conducted to evaluate the impacts of ICTs on decision making process in Pakistani healthcare organizations. To fill the existing gap in the literature the study at hand is undertaken to evaluate the impacts of ICTs on decision making process in public and private health organizations in KPK, Pakistan. The three dimensions of enabling technologies such as EIS, MIS and TPS have been used in this study for assessing the impacts of ICTs in Pakistan. Furthermore, factors like human and organization are also included to see their influence on the adoption and use of IS development. Beside three dimensions of enabling technologies and two organizational factors, three phases of decision making process (intelligence, design and choice) are also entered in the research framework used in this study.

Globally, the e-Health or health telematics sector is fast emerging as the third industrial pillar of the health sector after the pharmaceutical and the medical (imaging) devices industries. From a development perspective, ICTs are key instruments towards meeting the Millennium Development Goals (MDGs) related to health (Chetley, 2006). In this respect, the increasing adoption of ICT in health care services of developing countries, by both public and private sectors, has been a welcome trend. All across the world, governments are pledging and pooling more and more of their resources towards developing ICT tools and systems with the ultimate aim of facilitating management, streamlining surveillance and improving health care through better delivery of preventive and curative services (Burney et al, 2010). Research on the enabling technologies for decision-making is tabling new tools and techniques in the marketplace however, their applicability and usability calls for customized research. There is a lack of studies that evaluated the impacts of ICTs on decision making particularly in health sector in Pakistan (Anwar et al, 2012). This study attempts to unearth empirically-based definition of the local decision-situations, IT-related available options and the issues with an assumption of finding a 'reality-based solution-model' to help private and public sector organizations in KPK Pakistan.

LITERATURE REVIEW

Concept of Decision-making

A. Definitions

Webster's dictionary defined decision making as "the art of determining in one's own mind upon an opinion or course of action." Griffin (1984:232) define the decision-making is as "act of choosing one alternative from amongst a set of alternatives". According to Kreiter "decision making is a process of identifying and choosing alternative course of action in a manner appropriate to the demand of the situation. The act of choosing implies that alternative courses of action must be weighed and weeded out (Geol, 2003: 257)." Terry (1977: 131) is of the view that "the decisions based on facts are sound decisions and are applicable to a particular situation. Organizations installing computers have strong emphasis upon the use of facts in decision-making". According to Sisodia (1992) "decision-making involves discernible and separate activities. The first of such activities is information gathering, which is followed by evaluation of alternatives and finally a choice".

B. Type of Decisions

Managers make different types of decisions however most decisions fall into programmed and non programmed decisions. Programmed decisions are routine, repetitive and fairly structured. Non programmed decisions are typically one-shot decisions that are usually less structured and occur much less often than the programmed decisions (Certo, 2001:155).

C. ICTs and Decision-Making

Information and communication technologies (ICTs) are diverse set of technological tools and resources used to communicate, create, disseminate, store, and manage information. These technologies include computers, the Internet, broadcasting technologies (radio and television), and telephony. Successful infusion of ICT into organization in general and decision-making levels in particular, hangs-over the understanding of enabling technologies on one hand and the user requirements on the other. This understanding may result into best possible plans for developing and using ICT-based tools for decision-making. The emergence of global and information-based marketplace has forged a unique environment for today's business decisions (Boiney, 2000:32). As compared to early 1990s, today's markets are characterized by rapid change, increased competition and faster response and greater flexibility in terms of meeting differing customer requirements (McManus and Harper, 2004:2).

A decision is a judgment, choice between alternatives, right or wrong or almost right and probably wrong (Drucker, 1974:470). The term decision making refers to a range of activities, including defining and structuring a problem, identifying stakeholder values and objective, generating alternatives, identifying key uncertainties and possible consequences, evaluating the alternative and finally choosing a course of action and implementing it (Boiney, 2000:32). A key to good decision making is to explore and compare many relevant alternatives. The more alternatives there are the more computer assisted search and comparisons are needed (Turban et al., 2004:544). Modern decision making is an art that can be enhanced with science and technology. Decision support, expert, and executive information systems can be used to provide the artistic, scientific, and technological support needed for effective decision making. ICT is coming up with innovative solutions for the decision makers to use new tools, which are specific to different decision requirements and situations. For example, TPS and office automation tools are more helpful at the lower level, while MIS and EIS stand out for middle and the top management respectively. The core function of a computer-based information system (CBIS) is to transform data into information and knowledge that can be used to create competitive advantages (Eom, 2000:496). ICTs normally include computers, telecommunication technologies and associated software and operating systems (Walsham, 2000:105). On the basis of these technologies modern research has engendered frameworks, such as the management support system (MSS), that are designed to provide comprehensive and integrated support for the decision making process (Forgionne and Kohli, 2000). Decisions are increasingly made in a more decentralized fashion, often by teams that may be geographically dispersed across the globe, and in the face of over-whelming amounts of information and limited time (Boiney, 2000:32).

a. Transaction Processing System (TPS)

TPS 'processes thousands of routine transactions that occur every day in most organizations, including sales, payments made and received, inventory shipped and received, and employees payroll (Bioney, 2000:35)'. TPS process transactions in two ways a. ***batch processing***: where data are accumulated over a period of time and processed periodically .b ***real time processing***: data are processed immediately after a transaction occurs. Likewise, an online transaction processing system (OLTP) is one where transactions are processed as soon as they occur. A TPS may be fairly complex, involving customers, vendors, telecommunications, and different types of hardware and software (Turban et al., 2004:300). The operational level data within the TPS is the critical foundation for higher-level systems for example; the data are input to DSS, ESS and knowledge management (Bioney, 2000:35).

b. Management Information Systems (MIS)

Computer systems used by Tactical management (middle managers) that provides information in the form of reports and displays to managers and many professionals. For example sales managers may use their networked computers and web browsers to get instantaneous displays about the sales results of their products and access to their company's intranet for their daily sales analysis reports that evaluate sales made by each sales person. Fabunmi (2003) emphasizes that MIS is useful in making decisions to solve many of the problems in organizations. Such problems include poor program scheduling, poor estimate of staff requirements, and lack of accurate information on personnel and facilities, piling-up of administrative matters, lack of feasible budget estimates among others. Further MIS provides information that is needed for better decision-making on the issues affecting the organization regarding human and material resources (Adebayo, 2007).

c. Executive Information systems (EIS)

These systems provide critical information from a wide variety of internal and external sources in easy-to-use displays to executives and managers. Executives are of the opinion that the more use of EIS in their organizations, the more quickly and pertinent information will be available to them for making effective decisions. The number of times EIS is used by the executives, depends upon the extent of analysis/judgment in decision making see for example (Leidner and Elam ,1995).Usually senior executives used this system but nowadays it is being used at lower levels of management too (Watson et al.,1991).

Since executives' role fall into three categories such as *(a) strategic planning* executives develop goals and determine strategies for achieving goals *(b) management control* whereby executives influence the participants to implement the strategies and *(c) Task control* executives ensure that specific tasks are handled effectively; all the three activities require different types of information to scan the organizational environment and identifying threats and opportunities for appropriate decisions. Development and advancement in hardware, software, CD-Rom, web browser, data mining warehousing which are features of EIS and contribute to its fitness and enable the executives to focus on unstructured problems in a better way (Mathew, 2005).

Main factors for IT-Usage

It is well reported that there are several surrounding variables/factors which forcibly intervene in the ICT development and use. Management has to harness these factors in the favor of organizations. For example, resistance to change by the users can be neutralized by first giving the users a genuine participation in the project development and then providing them all possible resources of training and education about how to use new systems.

1. Human

The first task of the manager is to design and manage the flow of accurate and timely information because executives and the mangers always seek out for proper analysis and effective decision-making. Bradley (2006) says that as top and middle order managers want to avoid inadequacies in information storage and retrieval for the purpose of analysis and decision-making, they must fully support the implementation of ICTs/ETs and must provide required financial support. Managers perceive ICTs as facilitators in organizational decision making. The tasks of designing and managing information flow by the managers for effective decisions bound the managers of both public and private organizations to support CMC (computer mediated communication e.g. e-mails, computer conferencing etc), which has more positive features than face-to-face communication as keri (2007) highlighted that more than 85% of executives and managers claim that e-mail improves organizational

communication as it provides textual information and distributes them quickly. The staff in an organization must be highly committed and posses the knowhow to collect quality information. There are greater success rates for ICTs/Enabling technologies in the organization if there is a better coordination between IT- and non-IT staff, and better compensation especially for IT professionals to motivate them to work with devotion and interest. Managers of both public and private organizations must support CMC but since public organizations are different from private organizations therefore they require information systems and training of end users according to their needs. Due to self-contradictory properties of government organizations, the implementation of ICTs becomes very difficult (Archer, 2006). The implementation and success of ICTs in public organizations become a special case as many reports have revealed that government organizations are running at loss than earning profits as they are service providers for public interest as indicated by keri (2007) that in public sector organizations there is always misalignment between the end user and the new technological systems because of insufficient training and motivation of the employees therefore implementation of ICTs/enabling technologies are less in public sector organization.
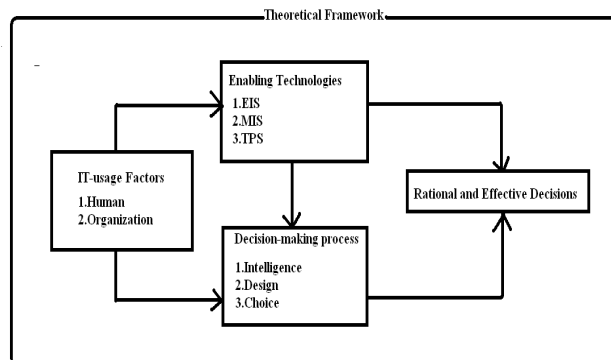
2. Organization

It is well documented that the structure, the nature of organizational design, style and character of an organization play a very important role in determining an organization's success/failure and the extent of the adoption and use of IT. A number of studies have focused specifically on the relationship between ICTs and organizational structure. Hage and Aiken (1969) argue that the type of control or delegation of decision making authority throughout the organization are the determining factors of IT/IS development. According to Grover (1993) decentralized decision making structure in the organization is one of the strong facilitators for the adoption of customer-based inter-organizational system. Likewise, Boynton et al. (1994) argues that decentralized structure facilitates the adoption and use of IT system in large and complex organizations. The term organizational design denotes that patterns of relationships that make up the structure of organization. Design characteristics greatly influence the performance of other managerial functions, such as planning, setting objectives or controlling. They can also influence interpersonal relationships, job satisfaction, leadership style, communications and work processes (McFarland, 1979: 297).

Interesting research on organization size and design was conducted by a team of researchers of employees at the University of Aston in Birmingham, England and found positive relationship between organizational design and IT usage. In their study Lu and Wang (1997) "investigated the relationship between management styles with user's participation and systems success over MIS growth stage. Their findings produced mixed results. On one hand they found that management styles were related to system success differently over MIS growth stages. For example, at the development and maturity stage both people oriented and task oriented styles had positive significant relationship with system success. On the other hand both styles have no effect on system success at the initiation stage. They argue that at the initiation stage, computers are being introduced to the organization and users must learn the new technology on their own. This in turn ended up creating dissatisfaction among the users".

Theoretical Framework

This framework is shown in the following. As diagrammed in Figure, rational and effective decisions are dependent to certain degree on the decision making process, enabling technologies and organizational factors.

Theoretical Framework

DISCUSSION

Several studies have evaluated the impacts of ICTs on decision-making process in both public and private health organizations (see for example, Ahlan, 2005; Adebayo, 2007; Macleod, 2007; Bradley, 2006; Mathew, 2005; Hughes, 2003 and Avital, 2003) but there is a lack of research studies that integrate ICTs and effective decision making in Pakistan. Since the Pakistani governments continue to provide huge IT investment for its designated e-government agencies, the need to understand the impacts of ICTs on effective decision making becomes more important. This study was intended to provide a better understanding of the impacts of enabling technologies in decision-making process at all management levels of both public and private health organizations in Pakistan. The influence of human and organization factors on the information system (IS) success is well documented (see for example, Ahlan, 2005; Mohammad et al., 2006; Andrew Georgiou et al., 2002). Human relations movement (behavioral approach to management) stresses that human element in an organization must be given importance in order to increase the organizational efficiency (Certo, 2001:37-38).

The success of IT is not possible in the organizations whereby the human element is not given importance and where is a lack of participation of end user in IS development proceedings as asserted by Macleod (2007) that design and implementation of the hard/software have greater success rates in the organizations whereby end users and IT-staff/professionals jointly develop an information system and as Bradly (2006) says that it is the human element which is related with the adoption of new technologies. Literature highlights that human force in private health organizations is highly qualified, professional, trained and well experienced as well as more committed to the adoption and use of IT in decision making process than the managerial staff of public health organization (see for example, Keri, 2007; Archer, 2006; Ahlan, 2005). Executives are responsible for overall management of the organization. They establish operating policies and guide the organization's interaction with its environment (Stoner and Wankle, 1986:15) and play different roles such as interpersonal, informational and decisional. Thus under information role they are responsible for transmitting the information received from outside or from other subordinates to the members of the organization and transmits information to outsiders on organization's plans, policies, actions and results (Robins and Decenzo, 2006: 37).

To play an informational role successfully, executives require and make the use of ICTs but research study of Ahlan (2005) reveals that executives of public organizations do not take interest in the adoption and use of ICTs; they do not possess awareness about ICTs and have no experience of using the same for solving their unstructured problems. Boiney (2000:32) and Turban, et al. (2004:549) argues that the need to speed up, coordinate and improve the aspects of decision-making has led managers to adopt enabling technologies. In the emerging ICTs environment, IT elements such as e-mail and group support facilities improve the coordination among the members of an organization in decision making. The use of these enabling technologies improves the organizational communication, which ultimately leads to effective decision-making. As highlighted by Keri (2007) that enabling technologies are very useful means for collection and dissemination of information that is why most of the executives and the managers of private health organizations use e-mails frequently because they believe that ICTs/ can convey things more effectively.

The results of the study conducted by Pluy (2004) that quick access to relevant and valid information is possible through computers and enabling technologies for example EIS. Similarly Adebayo (2007) argues that MIS

provides information that is needed for better decision-making on the issues affecting an organization regarding human and material resources. Majority of the managers try to be rational while making decisions but to do so they must follow the steps of rational making process i.e. defining the problem situation, develop the alternatives, evaluate the alternatives and select the best one available and finally implementation and monitoring of the decision (stoner et al., 2006:248). In addition Langley *et al.* (1995) states that the second step will not be effective until the availability of timely and accurate information to analyze the decision situation and generate as many alternatives as possible too stresses the importance of information and developing alternatives for effective decisions.

CONCLUSION

The aim of the study was to investigate the role of ICTs in decision-making of public and private hospitals in relation to effective decision-making. The findings of literature review provide a clear indication that the development and use of ICTs in decision making is more frequent in private health organizations than public health organization. The management of private health organizations is more experienced, professional and adaptive and takes more interest in the use of ICTs in decision making. On the other hand, there is slow adoption and use of ICTs in decision making of public health organization due to shortage of finance, availability of expertise, infrastructure etc. Furthermore, findings of the study provide a clear indication that factors like human and organization are, indeed, highly significant in the successful adoption of ICTs/enabling technologies in the context of both public and private health sectors but particularly for public health organizations.

Successful implementation of enabling technologies depends upon the use, access to computers, valued perceived of computers and process simplicity. An "organization" which is comprised of the decision making structure, extent of participation and style, was found to be the most influential contributors of organizational factors to the adoption and use of enabling technologies in Pakistan. The results of this study clearly indicate that highly centralized system of administration with limited extent of participation and task oriented style of the public sector organizations are the main factors responsible for limited adoption and use of IT. Given this it is now imperative that public health organization should adopt decentralized decision-making approach, increase the end user's participation in IS development and people oriented approach to compete with the private sector and to survive in this competing age.

A highly anticipated, "enabling technologies" is found as the most influential factor for effective decision making in both public and private health organizations. It is well documented that IT not only can be applied across all sectors of a given economies of the world, but it can also affect every function within the organization. The internet as one of the enabling technologies has itself become a new market place and directly affects what manager do every day, ranging from locating a new supplier at the best price to coordinating a project of the world for collecting and managing customers data. However, despite such theoretical assertions the literature reviews of various studies pinpoints limited adoption and use of ICTs in decision making especially in public health organizations. It is due to financial constraints, centralizations, lack of commitment and training and poor monitoring system. It is now essential to get rid all these issues to meet the increasing demand of ever changing world.

References

1) Adebayo, F. A. (2007). Management Information System for Managers. Ado-Ekiti: Green Line Publishers.

2) Ahlan, A. R. (2005). Information Technology Implementation: Managing IT Innovation in the Malaysian Banking Industry, Proceedings of the 12th European Conference on IT Evaluation (ECITE), Turky, Finland.

3) Andrew, G., & Michael, P. (2002). The role of health informatics in clinical audit: part of the problem or key to the solution? Journal of Evaluation in Clinical Practice Volume 8 (2):183-188.

4) Anwar, F., Shamim, A., & Khan S. (2012). Barriers in Adoption of Health Information Technology in Developing Societies. *International Journal of Advanced Computer Science*, 2(1).

5) Archer C., Jo, A., & D. K. (2006) Evading technological determinism in ERP implementation: Towards a consultative social approach, Australasian Journal of Information Systems, Volume 13 (2).

6) Boiney, L G. (2000) Decision making and IT/S. In: Zeleny, Milan (ed.) The IEBM handbook of information technology in business. Business Press. Thomson Learning. US. 32-39.

7) Bradley, N., Doebbeling M.D., Ann, F. C., William M.and Tierney, M.D. (2006). Priorities and Strategies for the Implementation of Integrated Informatics and Communications Technology to Improve Evidence-Based Practice Journal of General Internal Medicine, Volume 21 (2):50–57.

8) Burney, A., Mahmood,N., & Abbas, Z.(2010). Information and Communication Technology in Healthcare Management Systems: Prospects for Developing Countries. *International Journal of Computer Applications*. 4(2).

9) Certo, S. C. (2001). Modern management Prentice Hall, Case Western Reserve University ISSN 1535-6078.

10) Chetley, A. (2006). Improving health, connecting people: the role of ICT in the health sectors of developing countries a framework paper. *InfoDev*, 31 May 2006.

11) Drucker, P. F. (1974). Management: Tasks, responsibilities, practices. Heinmann: London.

12) Eom, S. B. (2000). Data warehousing. In: Zeleny, Milan (editor) The IEBM handbook of information technology in business. Business Press, Thomson Learning. Pp 496-503.

13) Fabunmi, M. (2003). Management Information Systems in Education. In:Babalola JB (ed.). Basic Text in Educational Planning.Ibadan:Department of Educational Management, University of Ibadan.

14) Forgionne, G. A., & Rajiv, K. (2000). Management support system effectiveness: further empirical evidence. Journal of the Association for Information Systems. Volume 1, (3).

15) Forgionne, G. A., & Rajiv, K. (2000). Management support system effectiveness: further empirical evidence. Journal of the Association for Information Systems. Volume 1, (3).

16) Geol, S.L. (2003). Advanced Public Administration. Deep & Deep Publications Pvt. LTD, New Delhi.

17) Griffin, (1997). Management, ALTBS publishers India.

18) Hage, J., & Aiken, M. (1969). Routine Technology, Social Structure, and Organization Goals, Administrative Science Quarterly, Volume 14 (1): 366-376.

19) Keri, K. S. (2007). The Successive Use of Information and Communication Technologies at Work , Communication Theory, Volume 17 (4) : 486–507.

20) Langley, A., Mint berg, H., Pitcher, P., Posada, E. & Saint-Macary, J. (1995). Opening Up decision-making: the View from the Black Stool, Organisation Science, Volume 6 (3):190-205.

21) Leidner, D. E., & Elam, J. J. (1995). The impact of executive information systems on organizational design, intelligence, and decision making. Organization Science, Volume 6 (6):645-665.

22) Lu, H. P. and Wang, J. Y. (1997). The Relationship between Management Styles.

23) MacFarland, D. E. (1979). Management: foundations and practices. Mac Millan publishing co., INC, New York.

24) Matthew, I. E. (2005). Executive Information Systems and the top-officers' roles: An exploratory study of user-behavior model and lessons taught, Australasian Journal of Information Systems, Volume 13 (1).

25) McLeod, L., Stephen, G., MacDonnell & Bill, D. (2007). User participation in contemporary IS development: An IS management perspective, Australasian Journal of Information Systems, Volume 15 (1).

26) McManus, J. & Trevor, W. (2004). Information systems project management: Methods, tools and techniques. Pearson Education, Limited, UK.

27) Pluye, P. R & M. Grad (2004). How information retrieval technology may impact on physician practice: an organizational case study in family medicine Journal of Evaluation in Clinical Practice Volume 10 (3): 413–430.

28) Rockart, J.F. & Short, J. E. (1989). IT in the 1990s: Managing interdependence. Sloan Management Review, Volume 30 (3): 7- 17.

29) Sisodia, R. H. (1992). Development of Information Systems for Education. Englewood Cliffs, New Jersey: Prentice Hall

30) Stephen P., Robins & David. D. (2006). Fundamentals of management, Pearson Education.

31) Stoner, F. A., Edward, F., & Daniel, R. G. Jr. (2006). Management, prentice hall6th edition

32) Stoner, J. A., & Charles, w. (1986). Management, prentice hall.

33) Terry, R. G. (1977). Principles of management, 7th edition, Richard D Irwin

34) Turban, E., Ephraim, M. & James, W. (2004). Information technology for management: Transforming organizations in the digital economy. 4th Edition.

35) Walsham, G. (2000). IT/S in developing countries. In: Zeleny, Milan (editor) The IEBM handbook of information technology in business. Business Press, Thomson Learning. Pp105-109.

36) Watson. H. J., Rainer, K., & Koh, C. (1991). Executive information systems: A framework for development and a survey of current practices. MIS Quarterly, volume5 (1):13-30.

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