An Evolution of Corporate Software Support Systems

Shrawan Kumar Trivedi[*]   Ankit Sharma

Indian Institute of Management Indore, Indore, Madhya Pradesh, India - 453556

* E-mail of the corresponding author: f10shrawank@iimidr.ac.in

Abstract

This paper is a brief literature survey on Software Support Systems (SSSs) and Knowledge Management (KM). This paper aims to evaluate strategic decision making perspective where enterprise information and knowledge management plays a vital role. For this evaluation, Software Support Systems (SSSs) and Knowledge Management (KM) which helps in selecting different types of support systems and human factors that affect adoption of such computer based systems in organizations are reviewed. This paper helps to analyze different types of the software support systems and system adoption concepts for the enterprises. This paper also includes concepts related to the Knowledge Management, which helps organizations to learn. Organizations knowledge and the support systems help the enterprises to take strategic decisions. Concerned literature describes Software Support Systems (SSSs) as Corporate Portals (CPs), Decision Support Systems (DSSs), Group Decision Support Systems (GDSSs), Computerized Decision Support Systems, and Adaptive Decision Support System (ADSSs). In addition, Technology Acceptance Model (TAM) that analyzes factors which would affect peoples in the enterprises is included. The factors, such as individual perception, ease of use and usefulness are analyzed.

Keywords: Software Support Systems, Knowledge Management, Technology Acceptance Models.

1. Introduction

Information and knowledge management plays an important role for decision making process in the organizations. Executives need information from internal and external sources for decision making process. Most of the organizations have the plethora of information, which have the strong need to effective use. In recent years, new information acquisition and analytical methods are adopted by the organizations. Information system and internet played a very important role. The effective use of information is important for taking strategic decisions by organizations.

A number of Expert systems and decision making software support systems are in use by the organizations. This paper focuses on different types of expert systems, decision making systems, and factors that affect decision making process of the organizations. This paper elaborate software support system such as Corporate Portals, Decision Support Systems (DSSs), Group Decision Support Systems (GDSSs), Web Based Support Systems (WBSSs), Computer Support Systems (CSSs), and Adaptive Decision Support Systems (ADSSs) with the help of strong literature survey. Paper also explains the concept of these systems and their effective use in the organization.

The concept of Knowledge Management can be effectively used for the decision making process. This paper includes the concept of the Technology Acceptance Models (TAM). It has been seen that individuals' perceptions, usefulness and ease of use are the important factors in adoption of such type of support systems.

2. Literature Survey

This paper contains brief literature surveys, which have taken the concept of strategic Decision Making and Knowledge Management.

Topics	Authors	year	Main Idea

Corporate Portals (CPs)	Hind Benbya, Giuseppina Passiante, Nassim Aissa Belbaly	2004	With the strong literature review and an analysis of early adopters for corporate portals, this paper addresses the strength of this tool that helps to synchronize and support knowledge process.
	Hsin Hsin Chang, I. Chen Wang	2011	This paper is based on a study which explores the integration of internal and external business processes and coordination of collaborative design teams. An initial qualitative investigation explores the practical applications of Enterprise information portals (EIP) in an automobile company.
Group Support System (GSSs)	Jae-Nam Lee, Ron Chi-Wai Kwok	2000	The paper proposes a fuzzy GSS framework for acquiring workgroup knowledge from individual memory and aggregating workgroup knowledge into organizational knowledge. This study also proposes architecture to support the fuzzy GSS framework. The architecture consists of user agents, information management agents, and a fuzzy model manager.
	Jasbir S. Dhaliwal, Lai Lai Tung	2000	In this study, a manual iterative Delphi approach was initially used to acquire knowledge from five experts to build the explanation facility of a financial analysis expert system.
	E Davenport, B Travica	1995	This paper describe a novel application of Group Systems V, an electronic meeting system designed for structured corporate decision making, in the context of ad hoc, intermittent groups who use the facilities of the Institute for the Study for Developmental Disability at Indiana University.
Decision support system (DSSs)	Alton Chua	2004	The objective of this paper is to develop a knowledge management systems architecture that seeks to bridge the gap between consultants and technologists.
	G Mentzas	1994	This paper attempts to provide the basic framework for such a functional taxonomy by classifying CBIS on three distinct process elements: information process support; decision process support; and communication process support.
	R.M. Lee.	1985	This paper examines what an 'ideal' knowledge-based management information system could and could not do. The arguments are based on considerations of formal semantics.
Web Based Decision Support System (WDSSs)	Mihir Parikha, Sameer Verma	2002	This paper proposes and evaluates a unifying framework that utilizes two Internet technologies, Web-based pull technology and push technology, in supporting classroom-based learning.
	Naveen Gudigantala, Jaeki Song, Donald Jones	2011	This paper develop a conceptual model for investigating cognitive antecedents to Web users' satisfaction in the context of Web-based DSS.
Technology Acceptance Model and computer Support Systems (TAM and	H.P. Lu and D.H. Gustafson.	1994	This paper first introduces a medical CSS for AIDS/HIV+ consisting of communication, model and database services, and then an empirical study on the relationships between individual perceptions and voluntary computer use over time is discussed.

CSSs)	K.E. Ghorab.	1997	This paper investigates the relationships between managers' perceptions towards their individual information system usefulness, ease of use, strengths, weaknesses, actual usage and adopted level of technological sophistication
Adaptive Decision Support Systems (ADSSs)	Ta-Tao Chuang, Surya B. Yadav	1998	In this paper an integrated conceptual model of an adaptive decision support system ADSS is proposed.
	Bijan Fazlollahi, Mihir A. Parikh, Sameer Verma	1997	This paper defines the DSS as adaptive decision support systems (ADSS) and proposes its architecture. In an ADSS, the decision maker controls the decision process. However, the system monitors the process to match support to the needs. The proposed architecture evolves from the traditional DSS models and includes an additional intelligent 'Adaptation' component.

3. Portals

Portals enable e-business by providing a unified application access, information management and knowledge management, both within enterprises, between enterprises, trading partners, channel partner and customers (Gartner Group, 1998). There are two types of corporate portals: "the first is with the useful benefits for e-commerce and B2B 'Extranet Portals' give depth of content rather breadth of content so that they can provide something closer to a solution; in other hand "Enterprise intranet portals, which support knowledge management and internal communications and they are emerging as home bases for employees.

A portal, a single point of access to Internet resources and an integration platform, give an attention on unification oriented towards the business processes of the company. Therefore, portals enable to synchronize knowledge and applications for creating a single view into the enterprises intellectual capital.

Corporate Portals: These portals basically aim at providing employees with in-time relevant information they need to perform their duties and make efficient business decisions. The Early adopters of the corporate portal have always taken the advantage of decision making. Basically this tool consists mainly in synchronizing and supporting knowledge processes (Benbya, Passiante, Belbaly, 2004).

Another type of the portals, "Enterprise Information Portals (EIP)" used for the business integration activities. These kinds of the portal mainly explore the integration phenomenon of internal and external business activities and collaboration between the teams. It is also known as the BPI (Business Process Integration) tools (Chang, Wang, 2011).

Davenport and Travica, 1995, proposed a novel application of Group Systems V. It is an electronic meeting system designed for structured corporate decision making processes. They took the context of ad hoc, sporadic groups, who use the facilities of the Institute for the Study of Developmental Disability at Indiana University.

4. Decision support system (DSSs)

Computerize Decision Support Systems are a type of consultation systems that use the concept of artificial intelligent (AI) techniques to encode organizational knowledge and make this knowledge available for decision making systems. There are mainly two types of the decision making systems i.e. Rule Based System and Experts Systems.

Rule Based Systems: Rule-based systems are similar in fashion to large flow charts. Decisions are made by applying a set of rules usually representing the consensus views of experts in the field. Rule-based systems are "data-directed", because the decision is entirely dependent upon the data entered. An alternative is "goal-directed" reasoning, where rules are selected for consideration because of what they might conclude and therefore are relevant to a diagnostic or management problem (Shortliffe, 1986).

Experts Systems: These kinds of the systems are basically human interaction system and used for modeling the thought processes of the human mind. They take the hypothesis and then select the additional rules for consideration based

upon the set of active hypotheses.

These systems generate the concept like human experts, employing symbolic and experience based heuristic reasoning. They store knowledge from inference procedures, and able to provide explanations for reasoning (Buchanan & Smith, 1988). There are two types of the decision making methods belong to the Experts Systems viz. Probability model and Simulation model. The probability models predict the future event by comparing the given data. These systems are in the early age in the development, and limited by the complexity of the possible outcomes and lack of information on likely outcomes. The simulation models actually show the real world in the series of different possible states occurring over time. The changes of states are known as event.

Organizations have a lot of information and knowledge. The effective use of this knowledge can help organizations to take strategic decisions. The process of Knowledge management can play a very important role in strategic decision process for the organizations. Enterprises have strong need for the effective architecture of the Knowledge Management. Alton Chua, 2004, presented architecture for the Knowledge Management that can bridge between the consultant and technologies. Computer Based Information Systems (CBIS) supports the enterprises to build the effective decision processes. A framework given by Mentzas, 1994, classifies CBIS on three distinct process elements: information process support; decision process support; and communication process support.

5. Group Decision Support Systems (GDSSs)

Group Decision Support Systems (GSSs) are a type of interactive, computer-based decision systems that facilitates solution of unstructured problems by a set of decision makers working together as a group (De Sanctis & Gallupe, 1985). A GSSs can support multi-user problem solving and decision making in the same or different geographical areas: either in the same location (face-to-face in a conference room) or dispersed throughout a building or across continents (distributed not face-to-face) (Gallupe, Bell & Yates, 1990). In addition, group members can work synchronously (at the same time) or asynchronously ("logging on" to the group "meetings" at different times) irrespective of the geographical orientation.

Most GSS consists of a set of tools to be used during the group process. These tools can be customized to suit different meeting settings and group tasks. A typical GSS consists of a set of tools that help to generate ideas, to analyze these ideas, and to reach a decision. A fuzzy GSS is a framework for acquiring workgroup knowledge from individual memory and aggregating workgroup knowledge into organizational knowledge. Lee, and K wok 2000, proposed a fuzzy architecture which consists three things user agents, information management agents and a fuzzy model managers.

A kind of Group Process Approach is known as Delphi approach which is given by Dhaliwal and Tung, 2000. The manual Delphi approach is a methodology for gathering opinions from multiple participants without the use of computer technology or requiring the members to meet each other. In some variations of the Delphi approach, the members do not know who the other members are and only interact with a single common coordinator or facilitator.

6. Web Based Decision Support System (WBDSSs)

The Internet has enabled retailers to exploit opportunities provided by the World Wide Web; such as rapid dissemination of up-to-date information to customers, and it has given retailers control over the formatting and aggregation of information the customers receive (Shim et al., 2002). In the rush to establish an online presence, many e-commerce Web sites are developed with little attention to the features that would enhance consumers' satisfaction with their Web-informed decision making process.

Web based DSS helps the enterprises to take decisions for their customers. Online shopping, e-commerce etc. are the perfect examples of the WDSS. Companies track their customers' information, and take decisions for their product features, quality, and profitability. With the growth of competitive Web retailing, however, understanding how to satisfy customers who obtain their information from web sites is critical for establishing long-term client relationships, which consequently increases profitability (McKinney, Yoon, & Zahedi, 2002). Therefore, understanding how Web users formulate satisfaction when obtaining information is of great importance to Internet business. However, there are

very few studies that systematically examined cognitive antecedents to satisfaction of users obtaining their information from Web-based DSS. Web based technologies are very helpful tool for learning and Knowledge Management.

Web based pull and push technologies is developed by Parikha, Sameer, 2002, which helps in class room learning. This is internet based technology that helps students to gather information and online learning. A conceptual model is developed by Gudigantala, Song and Jones, 2011, for investigating cognitive antecedents to Web users' satisfaction in the context of Web-based DSS.

7: Technology Acceptance Model (TAM) and Computer Support Systems (CSSs)

Although computer based decision support systems plays a very important role for the organizations strategic decision making process, but the acceptance of these technologies by the people seems a crucial issue, which is addressed in the literature. TAM model was developed by Devis in 1989, which identified the factors that have affect people to accept technology. A number of papers have addressed this issue in computerize decision support systems.

Lu and Gustafson.1994, gave the relationships between individual perceptions and voluntary computer use over time. Ghorab.1997, gave a relationships between managers' perceptions towards their individual information systems usefulness, ease of use, actual usage, adopted level of technological sophistication including their strengths and weaknesses. These factors are the strong predictors of the acceptance of these decision support systems. Devis, 1989 predicted factors (Table 1) which would help to predict Perceived Usefulness and Ease of Use.

8. Adaptive Decision Support System (ADSSs)

ADSSs as DSSs are the support systems that help human decision making by adapting support to the high-level cognitive needs of users, their task characteristics, and decision contexts. ADSSs are enhanced DSSs with an objective to improve the effectiveness of the decision maker in performing tasks requiring high degree of human judgment such as framing problems, developing alternatives, creating tradeoffs, and managing equivocality and ambiguity. ADSS, owing to its emphasis on high-level cognitive support, also improves user learning and understanding of the decision-making process and the domain knowledge. ADSSs, unlike traditional DSSs that are adaptive systems only through evolution (Keen., 1998), are adaptive through adjustments to the skill level and changing needs of the decision maker during the decision-making process. The decision maker learns through interaction with the ADSSs (Keen, Morton., 1978). The learning leads to changes in problem-solving expertise and support needs. ADSSs offer supports that provide the user's current needs. Also, the progress through the intelligent, design and choice phases in a dynamic decision environment leads to changing problem-solving task. ADSSs adapt to the changing problem-solving model and offer support for the suitable tasks.

Furthermore, ADSSs adapt to the decision contexts such as organizational structure. For example, a decision in a matrix structure would require more coordination with other decision makers than in a hierarchical structure. In such situations, support must offer mechanism for coordination of decisions making support to decision maker, decision problems, and decision contexts, significantly helps to the decision maker to make effective decisions (Keen, Morton., 1978). Adaptation is achieved by matching support needs with the system support. The support needs of the user are determined by monitoring the user performance and support history. Fazlollahi, Parikh, Sameer., 1997, described Decision Support System (DSSs) as an Adaptive Decision Support System (ADSSs) and proposed an architecture that include, the traditional DSSs models and an additional intelligent 'Adaptation' component.

9. Conclusion

This paper describes the perspective of Decision Support Systems and Knowledge Management in an organizational decision making. This paper lists some of the decision support systems and their underlying concepts. This literature survey aims to explain the various decision support systems which help managers to take appropriate decision for their organization. Decision making process in organizations is done by the group of people that sometimes become complicated. Papers also focus on some of the psychological factors that can affect individuals to adopt such type of support systems. Paper enlists different kind of support systems for different kind of applications. These applications

can be analytical, conceptual, explicit (case studies etc.), and implicit or the combination of these. Effective knowledge management in organizations is necessary for appropriate decision making. This review helps researcher to find gaps for further research.

References

Benbya, H., Passiante, G., & Belbaly, N. (2004). Corporate portal: a tool for knowledge management synchronization. *International Journal of Information Management,* 24(3): 201-220.

Buchanan, B. G., & Smith, R. G. (1988). Fundamentals of expert systems. *Annual Review of Computer Science,* 3(1): 23-58.

Chang, H., & Wang, I. (2011). Enterprise Information Portals in support of business process, design teams and collaborative commerce performance. *International Journal of Information Management,* 31(2): 171-182.

Chuang, T., & Yadav, S. (1998). The development of an adaptive decision support system. *Decision Support Systems,* 24(2): 73-87.

Chua, A. (2004). Knowledge management system architecture: A bridge between KM consultants and technologists. *International Journal of Information Management,* 24(1): 87-98.

Dhaliwal, J., & Tung, L. (2000). Using group support systems for developing a knowledge-based explanation facility. *International Journal of Information Management,* 20(2): 131-49.

Davenport, E., & Travica, B., 1995, "Soft Decision Support Systems: GDSS in Loosely Affiliated and *ad hoc* Groups" *International Journal of Information Management,* 15(1): 57-65.

Devis, F. D., 1989, "Perceived Usefulness, Perceived Ease of Use, and User acceptance of Information Technology *". MIS Quarterly.*

Eom, H., Lee. S., & Suh, E., 1990, "Group Decision Support Systems: An Essential Tool for Resolving Organizational Conflicts" *International Journal of Information Management,* 10(3): 215-227.

Fazlollahi, F., Parikh, M., Verma, S. (1997). Adaptive decision support systems. *Decision Support Systems,* 20(4): 297-315.

Gartner Group. (1998). Knowledge Management Scenario. Conference   presentation.

Gallupe, R. B., Bell, B. T., & Yates, B. R. (1990). Enhancing the productivity of managerial meetings: Can Real-Time Computer Support Help? *Canadian Information Processing Review,* 13(6): 13-16.

Ghorab, K. E. (1997). The Impact of Technology Acceptance Considerations on System Usage, and Adopted Level of Technological Sophistication: An Empirical Investigation. *International Journal of Information Management,* 17(4): 249-259.

Gudigantalaa, N., Song, J., & Jones, D. (2011). User satisfaction with Web-based DSS: The role of cognitive antecedents. *International Journal of Information Management,* 31(4): 327-338.

Keen, P., & Morton, M. (1978). Decision Support Systems: An Organizational Perspective, Addison-*Wesley, Reading, MA*.

Lee, J., & Kwok, R. (2000). A fuzzy GSS framework for organizational knowledge acquisition.   *International Journal of Information Management,* 20(5): 383-398.

Lee, R. M. (1985). On Information System Semantics: Expert versus Decision Support System. *Social Sciences Information Studies,* 5(1): 3-10.

Lu, H., & Gustafson, D. (1994). An Empirical Study of Perceived Usefulness and Perceived Ease of Use on Computerized Support System Use Over Time. *International Journal of Information Management,* 14(5): 317-329.

McKinney, V., Yoon, K., & Zahedi, F. M. (2002). The measurement of Web-customer satisfaction: An expectation

and disconfirmation approach. *Information Systems Research,* 13(3): 296-315.

Mentzas, G. (1994). A Functional Taxonomy of Computer-based Information Systems. *International Journal of Information Management,* 14(6): 397-410.

Shim, J. P., Warkentin M., Courtney J. F., & Power D. J. (2002). Past, present, and future of decision support technology. *Decision Support Systems,* 33(2): 111-126.

Shortlife, E. (1986). Medical expert systems knowledge tools for physicians. *Western Journal of Medicine,* 145: 830-839.

Thornett, A. (2001). Computer decision support systems in general practice. *International Journal of Information Management,* 21(1): 39-47.

Turban, E. (1990). Decision Support and Expert Systems. *2nd edn., Macmillan.*

Wang, S. (2001). Toward a general model for web-based information systems. *International Journal of Information Management,* 21(5): 385-396.

Zopounidis, C., Doumpos, M., & Matsatsinis, N. (1997). On the use of knowledge-based decision support systems in financial management: A survey. *Decision Support Systems,* 20(3): 259-277.
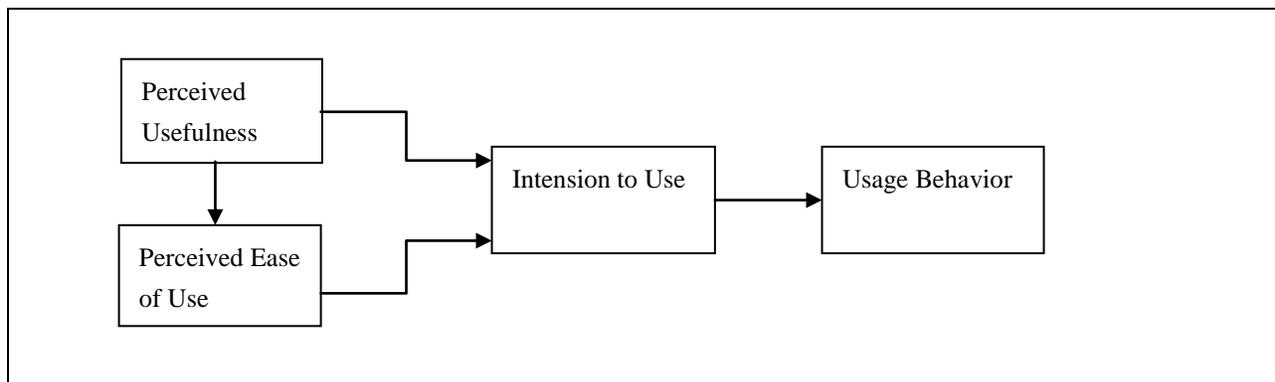
Fig 1: Technology Acceptance Model Given by Devis, 1989

S/N	Perceived Usefulness	Ease of Use
1	Work more quickly	Easy to learn
2	Job Performance	Controllable
3	Increase Productivity	Clear and understandable
4	Effectiveness	Flexible
5	Makes job easier	Easy to become skillful
6	Useful	Easy to use

Table 1: Factors of Perceived Usefulness and Ease of Use (Devis, 1989)