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Recommended Citation

Larson, Stephen, "Information Systems and strategic decisions: A literature Review" (2009). *SAIS 2009 Proceedings*. 18.
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INFORMATION SYSTEMS AND STRATEGIC DECISIONS: A LITERATURE REVIEW

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ABSTRACT

This paper looks at information systems and the information they provide specifically for strategic decision-making. The study employs a brief review of the recent research on information systems for strategic decision making and presents a framework for better understanding of such systems. Future research plans are also given.

Keywords and phrases

strategic decision-making, Decision Support Systems (DSS), Executive Information Systems (EIS), expert systems (ES), data mining systems (DMS), executive support systems (ESS), knowledge management systems (KMS).

INTRODUCTION

Because research has found that executives deal mostly with ill-structured decision-making (Lee and Chen 1997), “the main goal for computerized decision support systems is to improve decision quality” (Hedelin and Allwood, 2002). Setzekorn, Sugumaran, and Patnayakuni (2002) propose that decision-making is facilitated not only by decision support systems (DSS), but also executive information systems (EIS), expert systems (ES), executive support systems (ESS), data mining systems (DMS), knowledge management systems (KMS), etc. While there have been studies on the use of information systems to aid in the decision-making process (Hedelin & Allwood, 2002; Fuglseth & Gronhaug, 2003; French & Turoff, 2007), the extent to which information systems help executives make better strategic decisions needs closer examination. Leidner and Elam’s (1993-1994) study “determined that EIS use is related to problem identification speed, decision-making speed, and the extent of analysis in decision making.” This paper will examine whether information systems actually lead executives to make better or more effective strategic decisions.

This study will classify any EIS, DSS, DMS, ES, ESS, KMS, etc. as a strategic decision support system (SDSS) if it directly provides information which supports the strategic decision-making process. Roldan and Leal (2003) state that

[a]mong the main characteristics of such systems the following can be highlighted: (a) focus on the information needs of each executive; (b) extract, filter, organize, compress, and deliver data; (c) provide current status access to performance data; (d) trend analysis; (e) drill down capabilities to examine supporting detail; (f) exception reporting to highlight variances; (g) tracking critical success factors and key performance indicators; (h) integration into other organizational information systems ... and (i) provide access to other software applications the user may need.

Strategic Decision Making

Researchers agree that strategic decision making differs from regular or administrative decision making. “Strategic simply means important, in terms of the actions taken, the resources committed, or the precedents set” (Mintzberg, Raisinghani and Theoret, 1976, quoted in Frishammar, 2003). The term “strategic decision-making process” is “defined as a non-routine decision process, usually with long-term consequences, relating to investment, personnel, and organizational change issues” (Hedelin and Allwood, 2002). In another perspective, “decision-making can be seen as ongoing processes of sense making and action taking” (Fuglseth & Gronhaug 2003). “Decision makers analyze relevant information, determine appropriate courses of action and identify contingency plans” (Daake et al. 2004). “When an executive makes strategic decisions, he or she is involved in two kinds of thinking: looking backward to understand the past and looking forward to predict the future” (Einhorn & Hogarth 1987). Elbanna and Child (2007) illustrated that “the strategic decision making process has a direct influence on strategic decision effectiveness, and that this relationship is moderated by (1) decision-specific characteristics, (2) environmental factors, and (3) firm characteristics.” However, the effects of using an IS in the strategic decision making process were not included in the study.

Success Factors for IS Relating to Strategic Decision Making

Sedera, Gable, and Chan (2004) suggest that one of the validated measures for IS success is decision effectiveness. Petter, DeLone, and McLean (2008) show that net benefits are “the extent to which IS are contributing to the success of individuals, groups, organizations, industries, and nations. For example: improved decision-making, improved productivity, increased sales, cost reductions, improved profits, market efficiency, consumer welfare, creation of jobs, and economic development.” Bharati and Chaudhury (2002) suggest that the dependent variable in DeLone and McLean’s (1992) IS success model is “decision-making satisfaction,” which is “directly and positively influenced by ... system quality, information quality, and information presentation.”

Belcher & Watson (1993) performed an evaluation of executive information systems (EIS) at a single organization using interviews to assess performance and questionnaires to assess system usage. The study found that the benefits of the EIS, increased productivity of workers, improved decision making ability, and better information flow and connectivity among employees, encouraged continued use of the system.

Unfortunately, in a study by Williams, Dennis, Stam, and Aronson (2007), their “experiments did not provide general support that the use of a DSS, such as Expert Choice improves decision quality, and in some cases, “the accidental errors may outweigh the benefits of using a DSS, leading to lower quality decisions.”

REVIEW OF RESEARCH

The methodology used to find research that has been published on IS related to decision-making involved a literature evaluation of IS articles from academic journals and books; full-text searches were performed using multiple keywords in ABI/INFORM and Google Scholar. To focus the search, the start dates were set to the early 1990s. Additionally, a search through the references of key articles was made to ensure that relevant articles were not overlooked. As a result, several variables affecting IS and strategic decision-making were found, classified as shown in Table 1.

Classification / Variable	Author(s)	Summary
Information, Data and the Strategic Decision Making Process	Frishammer 2003	Information or data can be classified into two types: soft and hard. “Soft information consists of images, visions, ideas, and cognitive structures,” while “hard information is or can easily be quantified and processed with the help of analytical methods.” Most companies use a combination of soft and hard data in the decision-making process, the combination of which varies over time.
	Daake et al. (2004)	Data can also be categorized as formal and informal. Most strategic planners use “less formal and more intuitive information than formal data.” Daake further recommends that “formal data should be limited, concise, and structured.”
	Frishammer (2003)	There are also two sources of data – internal and external. Four of the five most important sources of information are internal. Internal data includes hard and soft data from within the company.
	Kumar & Palvia, (2001)	External data includes competitor and industry data, and data about the political, social, economic, and legal environment of countries where a company has operations or might be planning to begin operations.
	Parssian (2006)	Having knowledge about the effect of data errors on aggregate data could lead to more informed decisions.

Classification / Variable	Author(s)	Summary
IS Use and the Strategic Decision Making Process	Yuthas & Young (1998)	The duration of system use is correlated with decision performance.
	Hedelin and Allwood (2002)	Users want to be able store and reuse knowledge in a time-invariant way, and to integrate knowledge from various places.
	Setzekorn, et al. (2002)	“Better business decisions presumably result from the use of [decision making support systems], to the extent that the information on which they’re based is accurate, complete, flexible, relevant, simple, verifiable, accessible, secure, reliable, timely, and economical” (Stair & Reynolds, 2001 quoted in Setzekorn et al 2002).
	Vlahos et al. (2004); Vlahos & Ferratt (1995)	The self-reported hours of use of IS among managers was positively correlated with decision making in a sample of German firms, but not in Greek firms.
	Belcher & Watson, (1993)	Use of executive IS did impact the productivity, decision-making, and internal costs positively.
	Teng & Calhoun (1996)	The intensity of IT usage had a significant impact on job complexity, decision routinization, and decision-making effectiveness.
	Devaraj & Kohli (2003)	Confirmed a positive relationship between system usage, as measured by the number of DSS reports accessed and number of disk accesses, and profitability and quality of care as measured by decreased mortality
User Satisfaction with IS and Strategic Decision Making	Bharati & Chaudhury (2006)	A relationship between decision-making satisfaction and overall user satisfaction was discovered in a study of e-commerce Web sites
	Yuthas & Young (1998)	User satisfaction was only weakly correlated with decision making performance.
	Vlahos et al. (2004)	A later study showed that user satisfaction has been found to have a positive impact to improve decision making.
Information Quality and Quantity and Strategic Decision Making	Makadok & Barney (2001)	The quantity of data needed for strategic decision making is related to the environmental uncertainty the firm faces. The more uncertainty, the more data should be gathered.
	Gatian (1994)	Information quality was related to decision-making efficiency.
	Bharati & Chaudhury (2006)	Information quality has been found to be associated with decision-making satisfaction.
	Wixom & Watson (2001)	Data quality was directly related to perceived decrease in time and effort for decision making.
	Bharati and Chaudhury (2004)	The quality of information being provided is more important than the quality of the system. As compared to system quality, information quality will result in higher decision-making satisfaction.
	Frank (2008)	Provides a general method to assess whether collecting better data improves a decision or not.

Classification / Variable	Author(s)	Summary
System Quality and Strategic Decision Making	Sabherwal, et al. (2006)	For information system success, system quality to be of more importance than user satisfaction.
	McGill & Klobas (2005)	Found no relationship between system quality and individual impact as measured by decision-making quality and productivity.
	Bharati & Chaudhury (2006)	Found a significant relationship between system quality, measured by reliability, flexibility, ease of use, and convenience of access, to decision-making satisfaction in an e-commerce environment.
	Wixom & Watson (2001)	System quality of a data warehouse was associated with decreased time and effort for decision making.

Table 1. Classification of variables

DISCUSSION

The authors are aware that this review has some limitations. It is important to note that the limitation of any literature review is the findings are highly dependent on the literature identified, examined, and analyzed as part of the review. Additionally, limiting the literature search to include only the past 18 years might exclude some related research. However, given that IS use for strategic decision-making has gained popularity in the last two decades, we believe that current and recent research is most desirable for our purposes.

Contribution

We reviewed literature and found an abundance of research on variables related to strategic decision-making (system quality, information quality and quantity, user satisfaction with the IS, etc.) as summarized in Table 1.

Lack of Measurement Tools

Unfortunately, there appears to be a lack of research on whether IS actually leads executives to make better and more effective decisions. This is quite possibly due to a lack of measurement tools for IS-assisted strategic decision making. In order to evaluate whether and to what extent information systems help executives make better strategic decisions, a standard or baseline is needed for comparison. This will require development of qualitative and quantitative methods to measure decision quality.

French and Turoff (2007) suggest that strategic decision support systems must incorporate “a decision transaction system that knows explicitly what roles are being performed and which roles are responsible for reacting to the events taking place.”

In addition to Roldan and Leal’s (2003) characteristics mentioned in the introduction, Hedelin and Allwood’s (2002) work *IT and Strategic Decision Making* has many suggestions for changes to computerized information systems to make them more helpful in the strategic decision-making process, including:

- Possibility to integrate information from various sources or databases
- Increase usability of IS systems
- Better availability of external information
- Better information retrieval and information integration
- Computerized communication
- Computerized analytic tool
- Better simulation facilities
- Ability to receive trustworthy information more easily and more rapidly

However, there is an observable lack of measurement tools and baseline to which to compare to evaluate whether an IS leads to better and more effective strategic decisions. Fuglseth and Gronhaug (2003) determined:

In order to evaluate whether and how the use of DSS can improve decision-making, we need some standard to compare and contrast similar decision task conduct without and with the use of such systems. A prevailing ideal in the Western world is that decisions should be “rational”. A key aspect of rationality is goal-directed actions/behaviors. An extreme for rationality is reflected in the portrayal of the “economic man” in neoclassical economics. This idealized—and never existing—person has clear preferences and perfect information. This implies that he knows

- all the relevant aspects of the current state of the environment,
- how and why the current state transforms into future states of the environment,
- all possible actions and outcomes,

and that he is therefore able to make optimal decisions according to his preferences. The economic man is, however, too unrealistic to serve as a standard of comparison, but he may serve as an ideal, i.e. indicate the direction in which decision-makers would like to move if their cognitive capacity was increased.

We propose the following model to determine whether an IS or an improvement to an IS will positively affect the quality of strategic decisions:

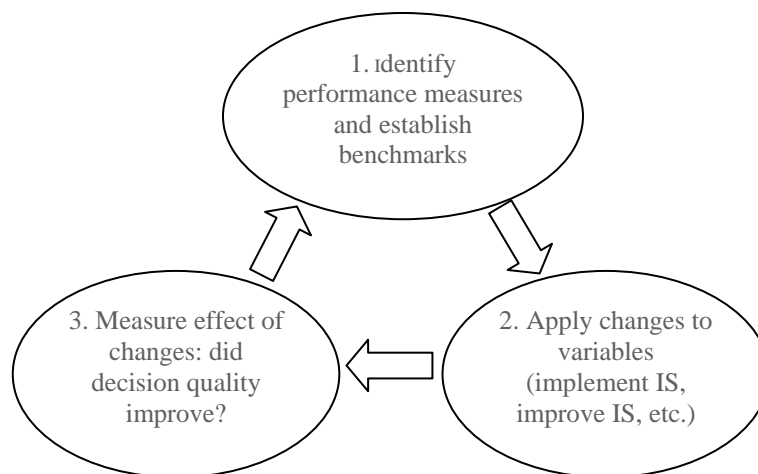


Figure 1. Evaluating whether an IS or an improvement to an IS affects decision quality

Future Research

As indicated above, there is insufficient evidence that shows Information Systems actually lead executives to make better and more effective strategic decisions. Future research will include a broader literature review to include general decision quality, which will provide a firm foundation on which to base the development of strategic decision quality measurement tools. More research is needed on the aforementioned variables and how each of them might also contribute to strategic decision effectiveness and quality.

REFERENCES

1. Belcher L. and Watson H. (1993) Assessing the value of Conoco’s EIS, *MIS Quarterly*, 17, 3, 239–254.
2. Bharati P. and Chaudhury, A. (2002) An empirical investigation of decision-making satisfaction in web-based decision support systems, *Decision Support Systems*, 37, 187-197.

3. Bharati, P. and Chaudhury, A. (2006) Product customization on the web: an empirical study of factors impacting choiceboard user satisfaction, *Information Resources Management Journal*, 19, 2, 69–81.
4. Daake, D., Dawley, D. and Anthony, W. (2004) Formal data use in strategic planning: An organizational field experiment, *Journal of Managerial Issues*, 16, 2, 232-247.
5. DeLone W. and McLean, E. (1992) Information systems success: The quest for the independent variable, *Information Systems Success*, 3, 1, 60-95.
6. Devaraj, S. and Kohli, R. (2003) Performance impacts of information technology: Is actual usage the missing link?, *Management Science*, 49, 3, 273–289.
7. Einhorn, H. and Hogarth, R. (1987) Decision making: Going forward in reverse, *Harvard Business Review*, 65, 66-70.
8. Elbanna, S. and Child J (2007) Influences on strategic decision effectiveness: Development and test of an integrative model, *Strategic Management Journal*, 28, 431–453.
9. Frank, A. (2008) Analysis of dependence of decision quality on data quality, *Journal of Geographical Systems*, 10, 1, 71-89.
10. French, S. and Turoff, M. (2007) Decision support systems, *Communications of the ACM*, 50, 3, 39-40.
11. Frishammar, J. (2003) Information use in strategic decision making, *Management Decision*, 41, 4, 318-326.
12. Fuglseth, A. and Gronhaug, K. (2003) Can computerised market models improve strategic decision-making? An exploratory study, *Journal of Socio-Economics*, 32, 503-520.
13. Gatian, A. (1994) Is user satisfaction a valid measure of system effectiveness?, *Information & Management*, 26, 3, 119–131.
14. Hedelin, L. and Allwood, C. (2002) IT and strategic decision making, *Industrial Management & Data Systems*, 102, 3/4, 125-139.
15. Kumar, A. and Palvia, P. (2001) Key data management issues in a global executive information system, *Industrial Management & Data Systems*, 101, 4, 153-164.
16. Lee, S. and Chen, J. (1997). A conceptual model for executive support systems. *Logistics Information Management*, 10, 4, 154-159.
17. Leidner, D. and Elam, J. (1993-1994) Executive information systems: Their impact on executive decision making, *Journal of Management Information Systems*, 10, 3, 139-146.
18. Makadok, R. and Barney, J. (2001) Strategic factor market intelligence: An application of information economics to strategy formulation and competitor intelligence, *Management Science*, 47, 1621-1638.
19. McGill, T. and Klobas, J. (2005) The role of spreadsheet knowledge in user-developed application success, *Decision Support Systems*, 39, 3, 355–369.
20. Parsanian, A (2006) Managerial decision support with knowledge of accuracy and completeness of the relational aggregate functions, *Decision Support Systems*, 42, 3, 1494-1503.
21. Petter, S., DeLone, W., and McLean, E. (2008) Measuring information systems success: Models, dimensions, measures, and interrelationships, *European Journal of Information Systems*, 17, 236–263.
22. Roldan, J. and Leal, A. (2003) Executive information systems in Spain: A study of current practices and comparative analysis in Decision Making Support Systems: Achievements, Trends, and Challenges for the New Decade. Idea Group Publishing, p288-289.

23. Sabherwal, R., Jeyaraj, A. and Chowa, C. (2006) Information systems success: Individual and organizational determinants, *Management Science*, 52, 12, 1849-1864.
24. Sedera, D., Gable, G. and Chan T. (2004) A factor and structural equation analysis of the enterprise systems success measurement model, in L. Appelgate, R. Galliers and J. DeGross, (Eds) *Proceedings of the Twenty-Fifth International Conference on Information Systems*, 449, Association for Information Systems, Washington, DC, USA.
25. Setzekorn, K. Sugumaran, V., and Patnayakuni, N. (2002) A comparison of implementation resistance factors for DMSS versus other information systems, *Information Resources Management Journal*, 15, 4, 48-63.
26. Teng J. and Calhoun K. (1996) Organizational computing as a facilitator of operational and managerial decision making, *Decision Sciences* 6, 2, 673-710.
27. Vlahos, G. and Ferratt, T. (1995) Information technology use by managers in Greece to support decision making: Amount, perceived value, and satisfaction. *Information & Management*, 29, 6, 305-315.
28. Vlahos, G., Ferratt, T. and Knoepfle, G. (2004) The use of computerbased information systems by German managers to support decision making, *Information & Management*, 41, 6, 763-779.
29. Williams, M., Dennis, A., Stam, A., Aronson, J. (2007) The impact of DSS use and information load on errors and decision quality, *European Journal of Operational Research*, 176, 1, 468-482.
30. Wixom B. and Watson, H. (2001) An empirical investigation of the factors affecting data warehousing success, *MIS Quarterly* 25, 1, 17-41.
31. Yuthas, K. and Young, S. (1998) Material matters: assessing the effectiveness of materials management IS, *Information & Management*, 33, 3, 115-124.