Developing a Path of Influence: Decision Support System (DSS) Capabilities Impact on Firm Performance

1Al-Nakib Noofal Ahmed Mohsen Mohammed, 2Ahmed Abdulatef Mashli Aina,
1, 2School of Management, Wuhan University of Technology, Wuhan, China

Abstract: The study emphasizes the importance of Decision support systems (DSS) for corporate performance. Prior studies have been reviewed to validate theories that explain how Decision support systems (DSS) affect corporate performance. Decision support systems (DSS) provides information that is valuable to take decisions and reflects current economic, and financial state of the company: efficiency, output rates, information on the effect of different events, that relate to the impact that the employees’ decision has on the performance of other departments. Furthermore, greater management information system capability leads to a higher degree of strategic performance. These and many other factors are suggested to be critical features of DSS that have a direct influence on the financial and strategic performance of companies. This paper uses resource based view in order to explain the importance of DSS capabilities and their direct influence on firm performance. In other words, the main idea behind the paper involves the analysis of company performance based on how information system capabilities are used. For this purpose, this paper formulates conceptual framework which explains the link of DSS capabilities to absorptive capacity through the interaction of market access competency, integrated related competency, functionality related competency. Finally, the influence of DSS capabilities is described in terms of their influence on companies market based and operation performance.

Keywords: Decision support systems, DSS, Absorptive capacity, Corporate performance, Information Systems, Resource based view, Market based performance, Operation based performance

INTRODUCTION

Nowadays, due to the increasing usage of IT practices in business practices, the role of IT has become more critical than ever. Precisely, we can see the growing popularity of IT sphere not only in the business field but also in education, engineering, and tourism industry. Most of the company executives in bigger corporations are also implementing advanced IT practices in their current information systems. DSS has an influence on flexibility-based strategic performance and cost-based strategic performance in terms of the decentralization of responsibilities, updating customer knowledge and customer participation in management, the cooperation with other units with the scope of increasing firm budget, and actualization and use of management information (Naranjo-Gil 2009, Slotegraaf and Pauwels, 2008). These benefits consist of more informed decision-making, timely problem solving and better learning. The practices of Decision support systems can be observed in different business spheres including sales trends, to identify actual and planned sales and measuring employee productivity. Focusing on the benefits of DSS, it can be mentioned that due to the reduced time spent on the decision-making process, employee productivity can be significantly improved. Usage of DSS also enhances the quality of decisions made by business managers in tourism sphere. Another great benefit of DSS is that it can serve as a significant competitive advantage for the firm, hotel or travel agency, which cannot be easily copied by competitors due to its complex integration with information system capabilities. Decision support system is also regarded to be useful in maintaining increased organizational control, which provides on-time information (Jorgenson, 1989).
In this research, we postulate a question whether DSS implementation affects corporate performance and how. To answer these questions, we utilize present theories such as Resource-based view of the firm that enable us to connect DSS concept to corporate performance. Moreover, we propose conceptual research framework which explains the influence of DSS capabilities on firm performance through mediating the role of absorptive capacity. We discuss current studies and use existing methods to elaborate this relationship.

THE ROLE OF INFORMATION IN DSS

It is undoubtedly true that information obtained by the help of DSS or MIS is used as a basis for making important decisions and plans (Jorgenson, 1989). To function properly, each company or organization must be able to execute particular operations, "whether it is a wholesaler or car manufacturer or who has to provide water to its area of jurisdiction" (Wu and Lee, 2007). All these operations need to be accompanied by meticulous planning, meaning that the car manufacturer must decide on the type of car and the wholesaler should determine which pumping period to install for the five-year period (Gray, 2000). By the help of such information, managers can see what products are in the stock during and can decide to fulfill the order immediately or postpone it due to the lack of components. It is of high importance to be able to react to all the changes on the market timely; hence, the importance of DSS is increasing. In this regard, it is important to mention that information technology within organizations when utilized in a systematic manner ensures company’s superior performance (Chegei, 2015).

Furthermore, the software allows sparing time for reporting. By using DSS, reports can be automatically generated according to the requirements and requests of managers. Orders can be sent to several departments, as well as the results of the work can be seen by all participants of the project. The study performed by Setia et al., (2013) can serve as a good example. Researchers proposed the theory to reveal the effectiveness of business strategy from a customer side, which is based on localized dynamics. In this regard, customer orientation capability and customer response capability are considered as two antecedents which can explain customer service capabilities across CSU’s of service organizations. The reason for choosing these two capabilities can be explained by their effectiveness in recognizing the customer needs and wants. The findings of the paper indicate that information quality of CSU is a significant determinant of its customer service capabilities.

According to Kim et al. (2016), information can be used as a comparative advantage among peers and competitors. Thus, with the help of reviews obtained through advanced technologies, companies, travel agencies or hotels can be more successful owing to the positive response from their visitors. People tend to trust to other individuals who already tried the product or service. Therefore, online services for travelers have their ranking based on reviews and comments of people. This ranking does not depend on the star ranking of hotels, given this, an ordinary homestay may be even more popular than a five-star hotel with luxury accommodation. Using this tool, companies can reveal their weaknesses in management information systems of a hotel. Referring to Kim et al. (2016), information on online websites and services is more useful in obtaining reviews from clients.

The efficiency of DSS is seen through its impact on results. Many researchers empirically proved that the primary purpose of DSS should be the improvement of company's financial performance. According to Dopuch (1993), systems for decision-making should provide appropriate information to managers for taking right decisions and thus, improving the firm’s financial performance. Corporations’ strategic choices, as well as profits, are impacted by the IT utilization and Information procurement and dissemination (Obrenovic and Obrenovic, 2012). Moreover, referring to Cooper and Kaplan (1992), the primary goal of DSS should be to enhance overall financial performance, but not to obtain more precise costs. Therefore, the importance of putting correct goals is high; managers should emphasize primary and secondary elements during their planning and decision-making.
DECISION SUPPORT SYSTEMS (DSS) CAPABILITIES AND COMPETENCIES IMPACT ON FIRM PERFORMANCE

Judging from Inmyxai & Takahashi (2010), RBV is one of the popular theories helping to understand the resources of the business firms. Due to its importance in management and academic sphere, this study uses the RBV concept to analyze the success of companies. In other words, the RBV is considered to be useful regarding selecting key resources of the firm and formulating the correct strategies to deploy these resources to create competitive advantage. In this regard, it can be mentioned that information technology within organizations, when utilized in a systematic manner, ensures superior performance (Chegei, 2015).

The influence of company’s resources on its performance was widely discussed and analyzed in management literature. The current study proposes the model consisting of DSS capabilities as well a DSS support for core competencies and their influence on firm performance based on the Resource-based view of the company. Precisely, the importance of DSS planning sophistication, DSS development capabilities, DSS support maturity and DSS operations capability is linked to primary DSS competencies related to market access, integrity related and functionality related competencies. The competencies have an impact on operating performance and market-based performance via the mediating the role of absorptive capacity.

Referring to Ryals (2005), company’s performance is based on several components: IT technical infrastructure flexibility, staff abilities. According to DeLone & McLean (1992), most of the dependent variables of information systems were difficult for researchers to identify. Therefore, the authors mentioned above tried to introduce a new taxonomy for which developed six underlying factors of Information Systems.

Ravichandran, T., & Lertwongsatien, C. (2002) provided implications of resource-based view to test the influence of IT on firm performance. Results of the paper presented sufficient evidence to support research model indicating that IT support for core competencies is dependent on the nature of human, technology, relationship resources of IS department. IS has been found to improve firm performance when capabilities of the company are directed to create unique competencies. Precisely, the Ravichandran (2002) proposed that IS functional capabilities play an important role to reach high firm performance since core competencies are directly related to IT development to ensure the development of core competencies. It is crucial to make strategic choices and decisions about IT usage based on the long-term goals of the company. In this regard, DSS planning is found to play a crucial role in identifying business priorities. Development and implementations of right means of
Al-Nakib Noofal Ahmed Mohsen Mohammed, Ahmed Abdulatef Mashli Aina


technology are also important to target suitable IT resources which will enhance core competency of the firm. The capability of developing the high-quality application is regarded as timely and cost efficient process which is likely to influence the deployment of technology. Therefore, DSS support is found to be crucial in determining the company’s ability to utilize IT for making the competency better. Finally, efficient and reliable DSS operation is not of less importance because business operations of a company are relying on it. Therefore, unsecured or ineffective DSS, as well as any breakage or errors within the system, can result in big losses and business disruptions. Moreover, nowadays, the effectiveness of DSS is tightly connected with the reputation of the company. Hence, unreliable DSS operation can negatively impact on the image of the company providing high-quality service or products.

When it comes to absorptive capacity, Liu et al. (2013) investigated the importance of two IT capabilities that influence firm performance. The first one of the two capabilities is IT infrastructure which is carefully planned and developed that has a direct impact on the technological foundation of the firm’s future IT applications. The second one is the assimilation of IT or in other words, it is regarded as the ability to diffuse and routines IT applications in business processes.

Core competencies are an important prerequisite for firms to ensure their sustainability in the market. Market access competencies characterized by their closeness to the customers and they are one of those who help companies identify customer needs and wants and react on time manner based on customer preferences. In the access market examples include the offering capabilities based on the preferences of customers and tailor these needs according to changing needs of clients. Integrity related competencies can be described as offering reliable products at reasonable prices with minimum inconveniences. As to functionality related competencies, they are regarded as competencies that allow the company to provide unique product or service to the market with differentiated customer benefits. This competency is mainly characterized by the innovativeness of product development in companies. In this regard, firm competencies are believed to develop over time. Due to the limited number of IT resources, it is important for companies to make good choices to get maximum efficiency from the each use of resources. Implementing IT practices in the areas of core competencies results in a creation of differentiated products which makes them difficult for competitors to copy. Therefore, it can be stated that firms that integrate IT into core competencies are more likely to provide greater value compared to those which do not. Therefore, this study proposed the following hypothesis.

\[ \text{H1: There is a positive relationship between core competencies and firm's performance} \]

**IS capabilities**

The capability is used to identify the efficiency of turning inputs into outputs in firms. IS capabilities are important in ensuring the delivery of IT services into the organization. The current research is mainly related to core functional areas of IS capabilities which include IS support, IS operations, systems development, and planning. Therefore, this study defines IS capabilities regarding its sophistication and quality. It can be stated that the IS functional capabilities are an important part of ensuring core competencies through IT support. Using IT in companies core competencies allows the company to make decisions about how technology resources are used based on organizational goals of the company. In this regard, IS planning is considered as important that helps companies to identify their business priorities. Technology deployment is influenced by the ability to develop high-quality applications in a timely and cost effective manner. As firms are unable to collect information about the benefits of IT regarding its effective usage, IS support can be used to help them determine how firms become successful in using it to improve their core competencies. Sustainability and successful operations of many businesses are dependent on efficient and reliable IS activities. Furthermore, ineffective IS operations are the main culprits of decreasing reputation regarding quality and reliability of product and services of many businesses such as Charles Schwab’s online trading system. To conclude, it can be mentioned that organizations without IS functional capabilities find it difficult to

start and sustain innovative projects that are tailored to improve firm’s core competencies. Therefore, we proposed the following:

H2: There is a positive relationship between IS functional capabilities and firm performance

IS resources

Resources are regarded as the raw materials in the process of capability development. This relationship has been understood in the definition of capabilities which involves organizations ability to arrange and make efficient use of resources. The relationship between resources and capabilities can be clearly seen in active capabilities viewpoint, positions of the asset are found to have an influence on the development of capability. IS literature provides three important categories of resources including human, technological and relationship resources. This study focuses on the intangible characteristics of these resources. In other words, the current research model provides the picture of the relationship of IS human capital, IT infrastructure flexibility and IS relationship quality and their direct influence on IS functional capabilities. The role of IS human capital is considered as important input in the development of IS capabilities. Two key elements of human capital including skills and specificity were focused. Skills represent the ability of IS personnel to have firm-specific knowledge such as understanding of the culture and goals of the organization. IS activities are described as being knowledge intensive and requires specific technical skills. Furthermore, appropriate business and interpersonal skills are necessary to deliver IS services to end users. Therefore, organizations with better IS personnel have greater value compared to those without skilled IS personnel. General technical and business skills and firm-specific knowledge is important in formulating functional capabilities. Organizational routines are considered to be crucial in reflecting the role capabilities. Therefore, firm-specific knowledge is considered to be important in developing appropriate functional capabilities: Thus, following hypothesis can be proposed:

H3: There is a positive relationship between IS human capital and functional capabilities.

Moderating or mediating effect

The study by Hao & Song (2016), investigated the impact of strategic capabilities on company performance. As a result of technology driven technology, a positive relationship has been discovered between the influences of IT on firm performance. In other words, the information technology can indeed impact firm performance. Based on previous literature review, the conceptual framework has been formulated which investigates the influence of technology is driven strategy on firm performance using strategic capabilities. Four important strategic capabilities have been defined including marketing, marketing linking, technology and information technology. Strategic capabilities, describing the complex set of skills, are important to guide the firm regarding making efficient use of all its available resources. Previous literature has identified these four important capabilities as the main drivers of competitive advantage. In this regard, the resource-based view can be mentioned with the focus on firm’s resources which are considered as the main driver of competitive advantage. According to this view, firm’s organizational resources are believed to lead to achieving competitive advantage which is crucial to maintaining performance of the firm. With the strong focus on technological capabilities, this study revealed that technological capacities are a crucial aspect of every business in reacting to the ongoing technological environment. To conclude, it can be stated that all dimension of strategic capabilities has been found have a positive relationship with firm performance.

H4: There is a positive relationship between strategic capabilities and firm performance

DISCUSSION

The elements include boundaries of the domain, construct, and link among constructs. In this regard, the main elements of DSS construct including surroundings, duty, execution strategy, DSS potential, DSS pattern, user, user behavior, and performance should be mentioned. The influence of DSS capabilities on user behavior, the effect of user behavior on performance and the impact of DSS capabilities on firm performance are one of the most frequently discussed relationships in the theoretical framework (Eierman et al., 1995).
Al-Nakib Noofal Ahmed Mohsen Mohammed, Ahmed Abdulatef Mashli Aina


Based on the results of the research it can be concluded that there has been some progress regarding understanding DSS according to the accumulation of research to date, due to the few number of the research conducted in past, there are a different number of new possible future research areas that should be studied. The proposed hypotheses were in the line with findings of other authors (Brdesee et al. (2013), Eierman et al. (1995), Ravichandran et al. (2005), supporting the theory that DSS capabilities are considered as the system capacities that are used to maintain the individual or group work productivity. Capabilities can be considered as the activities of the DSS that supports the requirements of information processing of one or several tasks. Based on the proposed purpose of DSS, capabilities of the firm become different. For instance, DSS capabilities can vary from the capability of electronic investigation of a database for standards greater to ability to the application of particular decision models in specific situations. DSS configuration is regarded as the particular software that provides specific capability. In other words, DSS configuration is used to identify one of the possible ways that hardware or software can provide a specific capability. For instance, to calculate loan programs two different configurations can be used. One configuration can provide calculation using spreadsheet tool whereas the other configuration can be used to bring the identical potential with the help of software.

The resource-based view was utilized to analyze the relationship between DSS capabilities and firm performance. Following the path of research done by Inmyxai & Takahashi (2010), we found out that company’s ability to use DSS to improve the core competencies is mainly related to the functional software capabilities. Meanwhile, the last is depending on the nature of people (employees and managers), technology and relationship resources of the DSS department. The conclusions of analysis provide empirical support for the notion that DSS can impact on firm performance positively if its capabilities are developed based on the channels of competencies. For instance, McDonald’s ability to do better than its rivals in the fast-food industry can be explained by the integration of business practices and IT usage. Therefore, most of the retail outlets could not succeed in copying business model of McDonald’s since they did not understand the complexity of it IS system. Additionally, the case of Dell Company can be appropriate example to observe the importance of IT support in core competencies. Dell is known to offer reliable products and services with lower cost to its customers that can be considered as integrity related competency. To develop and improve integrity related competency. Precisely, Dell has made a huge investment into IT system to provide and maintain efficient direct selling model and integrated supply chain. Another example can be Wal-Mart, a famous retail store that has positioned itself as the provider of low-cost products to customers. For the last years, giant retailer has targeted it IS capabilities to improve its inventory management, procurement, logistics, and providing product assortments based on the needs of customers. Therefore, it is believed that one of the reasons for a sustainable competitive advantage of Wal-Mart is related to its business model and IT support. The examples provided above can be considered as a good illustration how companies can benefit from the IT support in their core competencies, which later result in a competitive advantage. Achieving competitive advantage is an important cornerstone for firm performance.

Organizational routines are considered to be crucial in reflecting the role capabilities. Therefore, firm-specific knowledge is considered to be important in developing appropriate functional capabilities. The external legitimacy of inter-firm relationships of the staying power is indicated by organizational age, which can influence current performance. From another side, the young firm can be subject to the liability of newness, which can be used to explain the performance. The future payoff from using IT could be various across industry, which can provide the reflection in the extent of IT use in the industry. Using cross-industry sample, controlling for the effect of information intensity of industry is necessary.

Most of the organization was able to gain the competitive advantage since they were able to use IT successfully in their operations. IS capabilities are developed over time by the process of development evaluation and routines within IS department. It is believed that it takes on average 4 to 6 years to
The strategic value of IS functional capabilities should also be paid a considerable amount of attention. Most of the researchers like Ravichandran (2002) propose that main IS activities should be done with the focus on cost reduction. In this regard, organizations using IT mainly believed to succeed in IT development in building these capabilities. Recent data mentions that companies with strong IS functions have been successful in using the Internet to enhance their competitive position strengthens the claim made here that IS functional capabilities have significant strategic value. For example, Charles Schwab relates its victory in promising as a leader in online stock trading mainly to its in-house IS capabilities that have been progressed for more than two decades. Likewise, Taobao mentioned that its Web development and systems operations capabilities related to business value creation and has forcefully required obtaining technological and personnel resources to establish these capabilities. These prove that our empirical results propose that companies can better use DSS when they recognize the tactical value of its functional capabilities and choose to systematically invest resources. It has been found that IS resources including human, technology and relationship resources and functional capabilities are critical factors of the firm. Therefore, most companies are likely to get better returns from IT investment, and they are succeeding in obtaining technological resources. Our research outcomes showed that they are likely to be using their investments in the development of functional capabilities and utilizing these capabilities synergistically with firm resources.

In addition to it, it is necessary to determine the character of the relationship between Management information system and firm performance. Analysis of the previous literature provides evidence that most companies were able to increase their performance in marketing, production, product distribution, customer service due to a significant amount of money invested in improving IS. Therefore, Kivijärvi & Saarinen (1995) put much emphasis into the identification of IS investment on the performance of the firm. They revealed that investment in IS was not directly related to firms financial performance in the short term. However, firm’s financial performance is more likely to increase mainly in the long terms due to the long learning and development period. Moreover, the size, type and financial strategies of the firm are crucial in determining the success of the financial performance. Summarizing, analyzing the relationship between Management information system and firm performance it is essential to determine whether their interaction has short-term or long-term character.

Many authors empirically proved the importance of information system. However, there are few who investigated the business value of information technology. Sabherwal & Jeyaraj (2015), did not find any influence of consideration of IT assets on BVIT. Nonetheless, there is a significant relationship between IT investment and BVIT. Profitability based measures are found to have a negative effect on BVIT. Sabherwal and Jeyaraj (2015) proposed some implication for IT managers by encouraging them to build internal support for IT due to the progressing role of BVIT. Also, findings of the paper provide useful insights onto how IT investments can be transformed into performance gains, which is a critical piece of information for IT executives. Moreover, the findings of the study imply that firms’ performance and capabilities should be considered rather than financial performance while measuring the influence of IT on firms.

CONCLUSION

The efficient practice of decision support systems is crucial for the successful operations of companies. These benefits can be obtained if the company is using DSS. The software allows not only analyze data within the company but also make a comparison with the competitors and provide required information for taking decisions. Therefore, the software can collect data from the internal and external sources. Because DSS contains much valuable information, the it is necessary that the software is reliable and secure. DeLone and McLean (2003) suggested that “the success of information systems will enhance the performance of enterprises.” This is the reason numerous companies have invested considerably in IS and DSS as a method to gain an advantage over peers. All business crave improved operational efficiency and flexibility. Also, in the long run, a good and most of all

Also, a way to increase company operations and improve their overall effectiveness, companies adopts new management techniques with the goal of enhancing overall decision-making processes, improve results and finally reduce costs. (Henry, 2001; AlMaryani and Sadik, 2012). Although there are many benefits of integrating information technology in businesses, there some drawbacks when it comes to DSS (Liang et al., 2007) To install and implement such a system is quite costly for companies, as it usually requires integration with the existing technology. There is also a question of Maintenance of Management information systems. A well-trained workforce who can deal with DSS maintenance is also expensive. Management information systems may also become ineffective (Gray, 2000) as insignificant or non-essential information is supplied which in turn may slow the business decision-making process down. An implementation may also cause the elimination of jobs when people that were performing the tasks DSS performs now become obsolete (Pfeffer and Sutton, 2000). Information technology systems also become vulnerable to security breaches, especially via the Internet (Gray, 2000).

Future studies may focus on drawback research as well as on the empirical study of DSS benefits, which have a huge influence and role on providing efficiency, and effectiveness of strategic decision making and analyzing an organized way to the investigation of an organization’s management properly and its role in making strategic decisions. By comparing similarities and differences between multiple variances of management information systems, the abovementioned conducted studies and prior research extract several patterns that explain how management information systems play a core role in achieving a high level of agility and competitive performance.

It is undeniable, that advantages of DSS strengthen their attractiveness for implementation, especially their ability positively impact on company’s performance. Nonetheless, there are both external and internal obstacles to DSS implementation. Human resources capabilities can be related to the most obvious one (Cohen & Olsen, 2013). Companies needs knowledgeable staff that can handle and manage DSS. The review provided in this study provides necessary policy implication for business people. For example, most business executives and managers can benefit from the information provided in the paper given the significant influence of information technologies in improving their firms performance through utilization of main Information System capabilities.

REFERENCES


