HOW FINANCIAL PERFORMANCE CAN BE IMPROVED BY DECISION SUPPORT SYSTEMS; THE ROLE OF KNOWLEDGE MANAGEMENT CAPACITY

Gholamreza Amini Khiabani, Semnan University
Fatemeh Mahmoudian, Islamic Azad University

ABSTRACT

Amongst several success factors, prosperity in the market not only depends on the ability of an organization to the collection of information for decision-making but also on the direction and allocation of knowledge capacity. This is due to the dynamic business environment in which information changes repeatedly and structured decision-making becomes important. Thus, the main purpose of this research is to develop a model to help organizations in achieving financial performance using a decision support system. We also investigate the mediating role of knowledge management capacity in this relationship. A survey was conducted among 282 specialists in the dairy industry in Iran. Structural equation modelling with the partial least square method was used in order to analyze data. Findings revealed that organizations can create and exploit a decision support system using data-driven knowledge, key performance indicator and critical success factor. Results further revealed that knowledge management capacity could facilitate the proposed model and help organizations improve their financial performance.

Keywords: Decision-making, Decision Support System, Financial Performance, Key Performance Indicator, Knowledge Management Capacity.

INTRODUCTION

In today's rapidly changing environment, Decision Support Systems (DSS) is supposed to effectively influence on quality performance outcomes by cognition and integration of an organization sensing abilities (Yigitbasioglu & Velcu, 2012). Although Decision Support Systems may be used as data driven sensing device in a specific and integrated framework for performance outcomes (O'Donnell & David, 2000), we will also use knowledge management capacity to manage inward and outward flows of knowledge exploiting and exploring external opportunities in this relationship (Santoro et al., 2018). Background of Decision Support System dates back to executive information systems era. At that time DSSs were used by few organizations to maintain and modify data (Eckerson, 2011). Today, advanced DSSs are mainly used to collect, analyze and disseminate data to estimate current status and future trends while accessing to key marketing elements (Krauss, 2005). Business intelligence has recently presented a set of modern approaches, concepts, methods, and processes for business flourishing (Amini & Hamdi, 2018; Maria, 2005) to support performance outcomes (Power, 2013). DSSs act as a multiple information system (Watson, 2011) by getting data from the environment and converting information to managerial reports; hereinafter the firms will be able to smartly work in the market through cooperation of technological systems (Davis, 2002; Van-Hau, 2017). This research aims at designing a DSS towards performance outcomes. This study also responds to Krush who have called for identifying an information system that influences organizational performance, analyzed through a quantitative method. This study seeks to address a main question: "*how and under what circumestances does DSS influence performance outcomes?*" This paper contributes to the literature by identifying and using the key elements of DSS toward performance outcomes. To this end, existing literature will be described in the next section to clarify what contribution this study is looking for and also to explain the theoretical support to design model and develop hypothesizes. Then methodology of the research will be explained. Then, findings will be presented. Finally, conclusion and limitations as well as managerial and theoretical implications will be discussed.

REVIEW OF THE LITERATURE

Performance Outcomes

Performance outcomes refer to the last outcomes that is accomplished with objectives of buyers and suppliers for when implementing different actions to meet each other. Therefore, performance outcomes of an organization are the increase in the net shareholder value that is in turn a result of improving market performance (Yawar & Seuring, 2017). Performance outcomes are the cultural and behavioral routines that define how we use the performance measurement system to manage the performance of the organization (Smith & Bititci, 2017). Performance outcomes are defined as actual results of using measurement information for supporting managers in decision making processes aiming to link strategy to operations (Amini, 2018; Bititci et al., 2012). Performance outcomes can be supported by DSSs used by either higher-level managers to evaluate performance of lower managers; or to provide information beforehand, so as to support managers when resolving uncertainties; consequently, performance outcomes are used to manage and improve organizational performance through continuous adaptation to the changing operating environment (Moreira & Tjahjono, 2015).

Performance outcomes in a dynamic business environment are a challenge faced by many organizations today. Performance outcomes can be effectively supported by a computer or knowledge based information system supporting organizational automatic, manual or hybrid activities associated with management, operations and planning levels of an organization (usually middle and higher management), usually called decision support systems (Taticchi et al., 2014). DSSs can have various advantages on sense making, exploration, problem solving, communication of complex ideas and other performance measures; for example, by changing the presentation of information, they can have different implications for both performance processes and outcomes (Bettman & Kakkar, 1977). Any type of decision support systems are typically interactive computerized systems that provide data, documents, knowledge and models to solve problems and make decisions. Whereas some systems are directed toward managers, others help all employees across the supply chain. They are designed to ease performance outcomes and allow for quick response to continual changing demand, but have been known to demotivate and restrict performance outcomes (Amini & Hamdi, 2016; Bongsug, 2009). They can also be used to assist firms in improving the quality of their performance; in using existing resources more efficiently; in focusing on core capabilities; and enhancing their overall competitiveness (Chuang et al., 2018).

Decision Support System and Performance Outcomes

DDS provides an infrastructure to collect, analyze and disseminate information, as center of sense making capability (Neil et al., 2007) and enable the organization to manage its performance (Day, 2002). Nature of this informational system accelerates organizational learning (Clark et al., 2006). Since DSSs are basically designed on metrics, they must present solutions, accurate information and unbiased examination provided by an information system with unbiased nature to stimulate creative thinking and lateral thinking, and enable sensing capabilities (Day, 2002). DSSs are generally considered, as a means of performance management (PM) to provoke sense making (Morgan et al., 2003). Reconfiguring of an integrated vital process by firms should be secured by an information system in good situation to work on problems (Teece, 2007). It is important to notice that one special aspect which differs but also offers an interrelated nature between DSS and performance outcomes is devoted to provide capacity for managing performance outcomes.

This study takes Data Driven Knowledge (DDK), Key Performance Indicators (KPI) and Critical Success Factors (CSF) into consideration to measure the Decision Support Systems (DSS): DDK is the first element; defined as the main source of knowledge formation to improve organizational performance (Morgan et al., 2003). DDK outlines the information to integrate information system of a firm (Amini 2018; Eisenhardt & Santos, 2002) and contends that integrated mechanisms serve as the vehicle that use market knowledge for performance outcomes (Grant, 1996) because they provide a structure to transfer to and learn from information systems (Mone et al., 2013). KPI is the second element; defined as ability of a firm to collect data from the market, analyze and disseminate into an information system (Almansoori & Shah, 2012). An organization determines standard procedures and reasonable parameters by using KPIs as quantifiable metrics to measure critical success factors (Eckerson, 2011). For example, an exploratory survey was conducted to gain the KPIs from six different areas including sales, costs, quality, production, workers, and environment (Takola et al., 2016). As such, KPIs can be subsumed to compress the collected requirements. CSF is the third elements; the concept of CSF was first introduced in 1976 as those factors as necessary to reach an organization goals (Wai et al., 2012). Critical success factors (even called key success factors) are used to determine such future and current success reasons of an organization performance. CSFs, can be quantified and measured to integrate an information system and accomplish mission as key areas of essential performance outcomes (Amini, 2018; Caralli et al., 2004). Hence, we hypothesized:

H_{1a}**:** *Data driven knowledges positively influence on performance outcomes.*

H_{1b}**:** *Key performance indicators positively influence on performance outcomes.*

H_{1c}**:** *Critical success factors positively influence on performance outcomes.*

Mediating Role of Knowledge Management Capacity

In the current dynamic environment, firms intensively try to heighten their knowledge management capacity to manage inward and outward flows of knowledge exploring and exploiting opportunities (Santoro et al., 2018). Knowledge management capacity refers to ability of a firm to explore both external and internal knowledge as well as to retain knowledge over time within the firm (Chen & Huang, 2009).

Knowledge management has already been recognized as a key managerial process necessary for improving performance outcomes (Carayannis, 1999; Argote & Ingram, 2000; Dias & Bresciani, 2006). It is contended in the literature that characteristics of knowledge may exhibit a significant effect on performance outcomes (Hernaus & Mikulić, 2014).

In this regard, two main dimensions are essential in knowledge management, namely enablers and processes. Enablers are the mechanisms that can facilitate knowledge management capacity, such as codifying, sharing and decoding of information among individuals and teams (Ichijo et al., 1998). Moreover, enablers increase knowledge management capacity by sharing and protection as well as providing the infrastructure necessary to improve the knowledge processes (Yeh et al., 2006). On the other hand, processes refer to the structured coordination of effectively managing knowledge such as knowledge creation, sharing, storage and application (Lee & Choi, 2003). In this paper, we focus on the role of technology, which is seen as crucial in removing the boundaries to communication and knowledge flows and therefore can be considered an enabler of knowledge management (Amini & Feiz, 2020; Allameh & Zare, 2011).

Consequently, a firm with high knowledge management capacity is likely to address and manage complexity (Tamer Cavusgil et al., 2003) and to be more innovative (Massey et al., 2002). This is because, in order to be more innovative, firms should ensure that knowledge is efficiently and effectively used through the development of informational mechanism (Santoro et al., 2018).

Quality of knowledge is an instrument to solve the firm's problems and improve the performance outcomes (Kotler & Keller, 2005). Informational systems provide necessary knowledge from dispersed data for performance outcomes, while aligning with mission of a firm to compete in external environments. For example, by configuring of knowledge to provide special support for performance outcomes from internal, sectorial (external, but correlated by internal organizational configurations) and external sources.

Symbols of an information system should provide solutions for performance management to do rapid action but this symbols as processed information must be collected from a measurement or analyzed by an automated system, among many other signals and origins devoted to detailed answers and performance management of a firm.

H_2: *knowledge management capacity fully mediates the relationship between decision support system and performance outcomes.*

In this part of the paper, conceptual framework is presented. Main constructs of the model as well as hypothetical relationships between the main constructs will be elaborated, based on existing researches. Conceptual framework (see Figure 1) shows relationships between decision support system as latent variables influencing on marketing information system as mediator towards performance management.

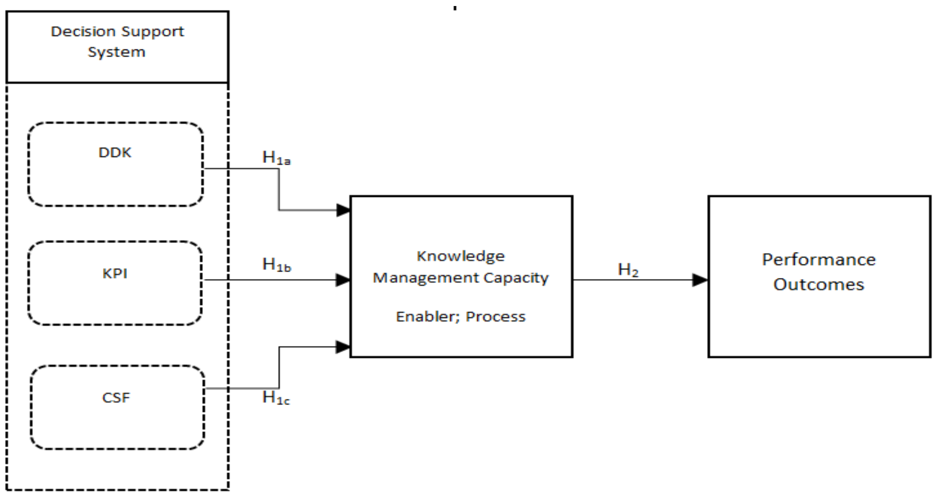

Figure 1
CONCEPTUAL FRAMEWORK

Method

This study draws on survey data from in dairy products manufactures in Iran. This group was aimed due to the fact that their performance outcomes strongly effects on consumer's satisfaction. Since they are located in a very uncertain environment in which the awareness of customers is incrementally increased, dairy products should consider a wide range of healthy in human life. To collect data, two key informants of each firm including chief executive officer with strategic role and chief marketing officer with operational responsibility have been chosen as the main respondents because they would be the most familiar with technical and conceptual aspects of the survey. Process of data collecting was started via sending an invitation email containing an initial explanation about the survey to the informants who were selected by using the convenience and purposive sampling method to get their agreement to participate in survey. In the beginning only 144 informants responded to 230 invitation emails but the whole number of informants who accepted to participate in the survey was increased to 217 after doing the second inquiry. It was pursued for the third time and the number of respondents was increased to 282 high enough to meet the minimum requirements for sampling size, according to (Hair et al., 2013).

Questionnaire was used to collect quantitative data with drop and pick up method. To do that, all the parameters of conceptual model were initially divided into two specific items (including perceptual and operational items). At the beginning, we tried to focus on some informants by doing the pre-test of questionnaires to control variance of initial entities and face validity of model.

Although, selecting statistical method to analyze data is remained as a challenging and sometimes ambiguous decision for business and marketing scholars (Ramayah et al., 2014a; Ramayah et al., 2014b), Structural Equation Modeling which is a famous and practical variance based technique is used in this research to analyze data and to provide tremendous advantages in marketing research (Hair et al., 2013) to better understand the relationship between constructs (Hair et al, 2013; Rigdon et al., 2010). The items of questionnaire, the source of measures and descriptive statistical analysis are presented in Table 1. Results explain that kurtosis and skewness measures of all items are embedded in range, meaning data is normality distributed (Ringle et al., 2012).

Table 1
DESCRIPTIVE STATISTICS

No	Constructs and indicators (N = 123)	Questionnaire Items	Mean	Standard deviation	Skew / SEskewb	Kurtosis / SEkurtc
	DDK	Jiang et al. (2002); Saayman et al. (2008)				
1	DDK-1	We develop knowledge on the basis if infrastructure of data	1.71	0.83	1.10	0.73
2	DDK -2	We evaluate the reliability of our sources of data (e.g. persons, publications, internet, etc.)	1.81	0.79	0.35	-1.35
3	DDK -3	We have a formal knowledge management system	2.24	0.87	0.84	0.13
4	DDK -4	We conduct an internal knowledge audit (e.g. identify and catalogue what people know, what reports they have, publications, etc.)	1.90	0.68	0.13	-0.84
5	DDK -5	We believe these data based units are dependable	2.17	0.80	0.22	-0.46
	KPI	Yuan et al. (2012)				
6	KPI-1	We want to achieve the desired profit level	2.29	0.83	0.45	-0.21
7	KPI-2	We want to achieve the desired sales level	2.18	0.90	0.41	-0.56
8	KPI-3	We want to achieve the desired market share	2.13	0.77	0.38	-0.12
9	KPI-4	We want to evaluate the overall performance	2.33	0.99	0.47	-0.81

10	KPI-5	We want to evaluate the market capacity	1.90	0.42	-0.58	2.14
	CFS	O'Sullivan and Abela (2007); Jaworski and Kohli (1993); Vorhies and Morgan (2003)				
11	CSF-1	We want to achieve a high level decision support system with key marketing performance indicators	1.85	0.35	-2.02	2.09
12	CSF-2	We want to achieve an automated reporting of performance from a full range of marketing activities	2.08	0.81	0.36	-0.40
13	CSF-3	We want to evaluate performance information to individual marketing programs	1.76	0.61	0.20	-0.56
14	CSF-4	We want to achieve decentralized decision making authority	2.58	0.95	-0.04	-0.91
15	CSF-5	We want to achieve each person as whole for decision making in the business unit	2.04	0.78	0.51	0.05
	KMC	Jiang et al. (2002); Saayman et al. (2008)				
16	KMC-1	We want to achieve the up-to-date hardware and software	1.90	0.30	-2.76	5.69
17	KMC-2	We believe this unit will insist on error-free records	2.04	0.78	0.51	0.03
18	KMC-3	We believe this unit checks all information for accuracy and validity	1.66	0.64	0.45	-0.67
19	KMC-4	We believe this is a central co-ordination point for disseminating knowledge	2.28	0.70	0.38	0.17
20	KMC-5	We believe this is an incubator central record of reliable sources of knowledge	2.13	0.71	0.59	0.67
21	KMC-6	We want to achieve a long-term knowledge	2.19	0.96	0.27	-0.95
	PO	Chari et al. 2014				
22	PO-1	We have feedback measures in place to ensure ongoing revision of the performance outcomes	2.19	0.51	0.31	0.88
23	PO-2	We have mechanisms in place to control ongoing revision of the performance outcomes	1.72	0.65	0.57	0.44
24	PO-3	We have a system in place that allows for adjustments of plans when required	1.79	0.80	0.87	0.68
25	PO-4	In our market the number of products/ brands sold is very high	2.06	0.44	0.62	0.60
26	PO-5	In our market the number of different customer segments is very high	2.33	0.36	0.56	0.41
27	PO-6	In our market customer requirements are very much across different customer segments	1.45	0.69	0.46	0.46

Findings

Measurement model

To test reliability of proposed model, goodness of fit index should be estimated through covariance matrix assessment; 3 or 4 goodness of fit indices are sufficient to estimate the model fitness provided that at least one absolute fit index and one incremental fit index are included, while reporting chi square and degree of freedom (Hair et al., 2011). Results, tested by Lisrel (shown in Table 2) indicate that the measurement model is fit and relationship between each indicator and latent variable is meaningfully confirmed.

Table 2
GOODNESS OF FIT INDICES

	Chi-square/ df	RMSEA	CFI	TLI	NFI
Acceptable Range	3>	0.085>	0.9<	0.9<	0.9<
Result	2.780	0.003	0.981	0.914	0.933

In this part of paper, latent variables were tested and analyzed for reliability, convergent validity, and discriminant validity. The threshold of indicators for Composite Reliability (CR) and Cronbach Alpha (CA) were good enough assessed. Convergent validity would be satisfactorily if AVE was over lower limit of 0.50 (Fornell & Larker, 1981). Here, the lowest level of AVE is related to performance outcomes which greatly exceeds threshold. In this study to assess discriminant validity, outer loading of each construct was assessed. Results are illustrated in Table 3 to support suitability of measurement model and goodness of all items (Ruiz et al., 2008).

Table 3
MEASUREMENT MODEL (RELIABILITY, CONVERGENT VALIDITY AND, DISCRIMINANT VALIDITY)

Construct	Item	Outer loading	AVEa	Composite reliability (CR)	Cronbach's alpha	Outer T-statistic
Data Driven Knowledge (DDK)	DDK -1	0.72	0.63	0.96	0.96	14.37
	DDK -2	0.86				41.46
	DDK -3	0.62				9.31
	DDK -4	0.90				46.82
	DDK -5	0.80				24.80
Key Performance Indicator (KPI)	KPI-1	0.58				12.27
	KPI-2	0.48				46.51
	KPI-3	0.55				14.93
	KPI-4	0.64				44.12
	KPI-5	0.72				22.90
Critical Success Factor (CFS)	CSF-1	0.72				17.73
	CSF-2	0.87				43.23
	CSF-3	0.62				15.33
	CSF-4	0.90				39.70
	CSF-5	0.80				20.52
Knowledge Management Capacity (KMC)	KMC-1	0.53	0.61	0.90	0.86	6.86
	KMC-2	0.92				62.38
	KMC-3	0.91				23.30
	KMC-4	0.61				8.13
	KMC-5	0.71				16.59
	KMC-6	0.91				44.24
Performance outcomes (PO)	PO-1	0.71	0.57	0.89	0.85	16.21
	PO-2	0.84				28.42
	PO-3	0.65				8.78
	PO-1	0.89				45.73
	PO-2	0.80				23.63
	PO-3	0.60				5.89

Structural Model

To interpret the structural model, as shown in Table 4, structural equation modeling was used; there is clear support for relationship between variables and significance of relationships in this model hence the analysis proceeds.

The path coefficients should be ranged from -1 to +1 to interpret. This means strong positive relationships are recognized for all hypothesized, shown in Table 4 because they tend to +1. T-statistics can be empirically estimated for the samples with more than 30 entities. When empirical T-statistic exceeds the critical values, coefficients will be significant. According to two tailed analysis, all hypothesizes (shown in Table 4) are strongly significant in 1% significance level because they are ranged more than 2.58.

Table 4
RESULTS OF STRUCTURAL RELATIONSHIP AND HYPOTHESIZES

Hypothesis	Path	Path coefficient	Standard error	t-statistic	Decision
H_{1a}	Data Driven Knowledge → Knowledge Management Capacity	0.48	0.08	6.22	***
H_{1b}	Key Performance Indicator → Knowledge Management Capacity	0.51	0.08	5.70	***
H_{1c}	Critical Success Factor → Knowledge Management Capacity	0.35	0.06	6.00	***
H_2	Knowledge Management Capacity → Performance Outcomes	0.88	0.06	14.37	***

[a] t-values for 2 tailed test: * 1.65 (significance level = 10%); ** 1.96 (significance level = 5%); *** T-value 2.58 (significance level = 1%) (Hair et al., 2011).

The coefficient of determination (R^2) measures the prediction accuracy of the model which is the basic and central criterion for judging the quality of PLS. Hence, R^2 assesses the value of endogenous constructs for prediction accuracy through the algorithm of partial least square. On the other hand, Q^2 measures predictive validity of a large complex model through blindfolding procedure. According to Hair et al. (2011), in structural equation models, Q^2 assesses the predictive relevance of endogenous constructs appropriately enough with those values more than zero (it is recommended to calculate through cross-validated redundancy). For example the prediction accuracy and predictive validity of performance outcomes, as an exogenous latent construct with R^2 = 0. 9906 and Q^2 = 0. 3969 is relatively high interpreted (see Table 5).

Table 5
COEFFICIENT OF DETERMINATION FOR MODEL'S PREDICTION ACCURACY AND VALIDITY

Endogenous Latent Constructs	R^2	Q^2
Data Driven Knowledge	0.00	0.56
Key Performance Indicator	0.00	0.43
Critical Success Factor	0.00	0.43
Knowledge Management Capacity	0.77	0.35
Performance Outcomes	0.99	0.40

When theorized, correlation between constructs of the theory should be estimated. Table 6 shows that the results have met the theoretical expectations and there are strong correlation between proposed constructs.

Table 6
LATENT VARIABLE CORRELATION

	Data Driven Knowledge	Key Performance Indicator	Critical Success Factor	Knowledge Management Capacity	Performance Outcomes
Data Driven Knowledge	1.00				
Key Performance Indicator	0.91	1.00			
Critical Success Factor	0.97	0.91	1.00		
Knowledge Management Capacity	0.88	0.94	0.94	1.00	
Performance Outcomes	0.99	0.94	0.99	0.92	1.00

CONCLUSION

Present study was designed to investigate the effect of decision support system on performance outcomes in dairy products industry in Iran. In order to clarify the relationship, this research sought to establish 3 components of decision support system including data driven knowledge, key performance indicator and critical success factor.

Hypothesis 1_a suggests that data driven knowledge is used to collect a wide range of data from the internal and external environment of the organization to synthesize; to do this, decision support system acts as boundary spanner to identify the performance indicators. Decision support system collects data in relation to such indicators from the environment while managers playing a key role to control and interpret the current status and future trends of the environment.

Hypothesis 1_b contends that key performance indicators may be easily understood by marketing specialists but they are too complex to perceive by normal marketers. It is suggested to transform and simplify the technical elements. Some capabilities of decision support systems are used to mitigate the complexity of analytical reports.

Hypothesis 1_c asserts that critical success factors which are organized in a decision support system help a firm to manage its performance outcomes. Decision support system is a capability in the organizations equipped by critical success factors. There may be other capabilities requisite for the organizations to develop their informational systems. These likely capabilities are proposed to study in future research in the following.

Hypothesis 2 affirms that knowledge management capacity is used to improve the quality of performance outcomes. Knowledge management capacity integrates the impact of data driven knowledge, key performance indicators and critical success factors; then knowledge management capacity utilize this effects to manage the performance outcomes. It is of high importance to manage the appropriate performance because it influences on some marketing foundation issues such as product classification, pricing, advertisements, market segmentation, targeting, positioning and sometimes re-positioning. Consequently, decision support system provides an infrastructure to maintain, monitor and control data by which a firm is able to manage its performance outcomes whereby the achievement of the firm's objectives can be guaranteed.

Theoretical Implications

There is a wide range of discussion on decision support system in the marketing literature but this research contributes to the literature first to show how combination of 3 components of decision support systems enhances the capacity of knowledge management of the firm and second to explain how knowledge management capacity helps the firms to improve the quality of performance outcomes. This analysis confirms knowledge management capacity fully mediates the relationship between decision support system and performance outcomes. Hence, the worth role of knowledge management capacity has been identified to improve the quality of performance outcomes. This findings are important because contribute to the literature by focusing on the concepts and the benefits of decision support systems.

Managerial Implication

Survey was directed across the dairy products industry in Iran. Executive chief officers and marketing chief officers of each company were aimed to collect data because they were the most familiar with the target of this research. On the other hand, dairy products industry is one of the important fields directly related to nourish and health of human bodies.

This research provides 3 guidance for the managers. First, results provides the empirical support for the organizations that are equipped by high capacity of knowledge management toward better performance. Second, the value of decision support system lies on its ability to improve performance; this means why knowledge management capacity stands out decision support system from other informational systems. Third, this study recommends the managers to find decision support system more valuable when the market is competitive and information is insufficient.

Limitation and Future Research

Although in order to control common-method bias, a number of prior and post hoc tests have been conducted, a limitation of this research comes from the use of self-reported data from marketing professionals who were educated and were engaged in managerial positions in their organizations. This study reaffirmed the fact that decision support system is a critical facilitator of performance management and performance improvement. Notwithstanding, the study suggests that future research must focus on organizational capabilities to show how competitive intelligence cam moderates the capacity of knowledge management. Innovation of the organization should also be included in future researches as well as when testing other integrated mechanisms of decision support system. While looking at mediating role of knowledge management capacity that influences on the relationships between decision support system and performance outcomes, the model does not cover the contingent effects of strategic orientations on decision support system. Furthermore, future researches should contribute to the literature and show the mediating factors such as strategic orientation or risk orientation of the firm on the model and to provide supplement meaningful insights for managers and scholars. Similarly, a number of strategic performance should be listed in line with the studies to provide a more assumptions between decision support system and organizational processes and other capabilities to improve the quality of performance.

REFERENCES

Allameh, S.M., & Zare, S.M. 2011. Examining the impact of KM enablers on knowledge management processes. Procedia Computer Science, 1211–1223.

Almansoori, A., & Shah, N. (2012). Design and operation of a stochastic hydrogen supply chain network under demand uncertainty. *International Journal of Hydrogen Energy, 37*(5), 3965–3977.

Amini, K.G., & Feiz, D. (2020). Designing a competitiveness model using strategic cognitive complexity; investigating the mediating effect of market intelligence. *Journal of Innovation and Entrepreneurship, 8* (17), 29-43.

Amini, K.G., Zarei, A.A., & Feiz, D. (2020). Designing a sustainable value chain using packaging innovation; the role of ambidexterity. *Public Management Researches, 13*(49), 189-215.

Amini, K.G. (2018). Explaining the role of strategic capabilities of environmental sensing and entrepreneurship on organizational performance. *Journal of Police Organizational Development, 64*(2), 1-29.

Amini, K.G., & Hamdi, K. (2018). Examining the relationship between development of Islamic Financial Systems and Foreign Direct Investment. *Journal of Investment Knowledge, 7*(28), 141-158.

Amini, K.G. (2018). Articulating of 2 strategic capabilities including environment sensation and entrepreneurial orientation on organization performance based on qualification and creativity; examining social intelligence as mediator. *Police Organizational Development, 15*(64), 11-38.

Amini, K.G., & Hamdi, K. (2018). The Relationship between Market-orientation Culture and Human Resource Productivity: Business Organizations in the Focus. *The Journal of Productivity Management, 12*(1(44), 157-179.

Amini, K.G., & Hamdi, K. (2017). Market orientation culture and human resource productivity interfaces; an articulating of market orientation in business organizations. *Quarterly Journal of Productivity Management, 11*(44), 157-179.

Amini, K.G., & Hamdi, K. (2016). The Effect of Volume Discounts in the Economic Order Quantity Model Using Fuzzy Approach. *Journal of Industrial Management, 11*(36), 91-102.

Argote, L., & Ingram, P. (2000). Knowledge transfer: a basis for competitive advantage in firms. *Organizational*

Behavior and Human Decision Processes, *82*(1), 150-169.

Bettman, J.R., & Kakkar, P. (1977). Effects of information presentation format on consumer information acquisition strategies. *Journal of Consumer Research*, 233-240.

Bititci, U., Garengo, P., Dörfler, V., & Nudurupati, S. (2012). Performance measurement: challenges for tomorrow: performance measurement. *International Journal of Management Reviews, 14*(3), 305–327.

Bongsug, C. (2009). Developing key performance indicators for supply chain: an industry perspective. *Supply Chain Management: An International Journal, 14*(6), 422-428.

Caralli, R.A., Stevens, J.F., Wilke, B.J., & Wilson, W.R. (2004). The critical success factor method: establishing a foundation for enterprise security management. CMU/SEI-2004-TR-010 Software Engineering Institute. Carnegie Mellon University.

Carayannis, E.G. (1999). Fostering synergies between information technology and managerial and organizational cognition: the role of knowledge management. *Technovation*, *19*(4), 219-231.

Chari, S., Katsikeas, C.S., Balabanis, G., & Robson, M.J. (2012). Emergent Marketing Strategies and Performance: The Effects of Market Uncertainty and Strategic Feedback Systems. *British Journal of Management, 25*(2), 145-165.

Chen, C.J., & Huang, J.W. (2009). Strategic human resource practices and innovation performance—the mediating role of knowledge management capacity. *Journal of Business Research, 62*(1), 104-114.

Chuang, Y.C., Hu, S.K., Liou, J.J.H., & Lo, H.W. (2018). Building a decision dashboard for improving green supply chain management. *International Journal of Information Technology & Decision Making*, 1–37.

Clark, B.H., Abela, A.V., & Ambler, T. (2006). Behind the wheel. *Marketing Management, 15*, 18-23.

Davis, M. (2002). Using business intelligence for competitive advantage. CRM Today.

Day, G.S. (2002). Managing the market learning process. *The Journal of Business and Industrial Marketing, 17(*4), 240-252.

Dias, R.T., & Bresciani, S. (2006). R&D and knowledge: a theoretical assessment of the internationalization strategies. *International Journal of Technology, Policy and Management, 6*(1), 1-32.

Eckerson, W. (2011). Performance dashboards: measuring, monitoring, and managing your business. 2nd edition, Books 24x7: John, Wiley & Sons, Hoboken.

Eisenhardt, K.M., & Santos, F.M. (2002). Knowledge-based view: A new theory of strategy. *Handbook of Strategy and Management*. *1*, 139-164.

Fornell, C., & Larker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39-50.

Grant, R.M. (1996). Prospering in dynamically-competitive environment: organizational capability as knowledge integration. *Journal of organization science, 7*(4), 287-304.

Hair, J.F., Ringle, C., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory & Practice, 19*, 139-151.

Hair, J.F., Hult, G.T.M., Ringle, C., & Sarstedt, M. (2013). A primer on partial least squares structural equation modeling. (PLS-SEM). SAGE Publications. Thousand Oaks.

Hernaus, T., & Mikulić, J. (2014). Work characteristics and work performance of knowledge workers. *EuroMed Journal of Business, 9*(3), 268-292.

Ichijo, K., Von Krogh, G., & Nonaka, I. (1998). Knowledge enablers. Knowing in Firms: Understanding, *Managing and Measuring Knowledge*, 173-203.

Jaworski, B.J., & Kohli, A.K. (1993). Market orientation: Antecedents and consequences, *Journal of Marketing, 57*(3), 53-70.

Jiang, J.J., Klein, G., & Carr C.L. (2002). Measuring information system service quality: SERVQUAL from the other Side. *MIS Quarterly, 26*(2), 145-166.

Kotler, P., & Keller, K. (2005). Marketing management. 12th edition. Prentice Hall.

Krauss, M. (2005). Marketing dashboards drive better decisions. Marketing news.

Lee, H., & Choi, B. (2003). Knowledge management enablers, processes, and organizational performance: an integrative view and empirical examination. *Journal of Management Information Systems, 20*(1), 179-228.

Maria, F. (2005). Improving the utilization of external strategic information. Tamper University of Technology. Master of Science Thesis.

Massey, A.P., Montoya-Weiss, M.M., & O'Driscoll, T.M. (2002). Knowledge management in pursuit of performance: insights from Nortel networks. *MIS Quarterly*, 269-289.

Moreira, M., & Tjahjono, B. (2015). Applying performance measures to support decision-making in supply chain operations: a case of beverage industry, *International Journal of Production Research*.

Mone, S.D., Pop, M.D., & Racolta-Paina, N.D. (2013). The “what” and “how” of marketing performance management. *Management & Marketing, 8*(1) 129-146.

Morgan, N.A., Zou, S., Vorhies, D.W., & Katsikeas, C.S. (2003). Experiential and informational knowledge, architectural marketing capabilities, and the adaptive performance of export ventures: A cross-national study. *Decision Sciences*, *34*(2) 287-321.

Neil, S., McKee, D., & Rose, G.M. (2007). Developing the organization's sense making capability: precursor to an adaptive strategic marketing response. *Industrial marketing Management, 36*(6), 731-744.

O'Donnell, E., & David, J.S. (2000). How information systems influence user decisions: a research framework and literature review. *International Journal of Accounting Information System, 1*(3), 178-203.

O'Sullivan, D., & Abela, A.V. (2007). Marketing performance measurement ability and firm performance. *Journal of Marketing*, *71*(2), 79-93.

Power, D.J. (2013). A brief history of decision support systems. Available at: http://DSS Resources.COM/history/dsshistory.html.

Ramayah, T., Ignatius, J., Leen, J.Y.A., & Chiun, L.M. (2014a). Discriminant Analysis.

Ramayah, T., Soto-Acosta, P., Colomo-Palacios, R., Gopi, M., & Popa, S. (2014). Explaining the adaption of Internet stock trading in Malaysia: comparing models. *Asian Journal of Technology and Innovation, 22*(1), 131-151.

Rigdon, E.E., Ringle, C.M., & Sarstedt, M. (2010). Structural modeling of heterogeneous data with partial least squares. In: Malhotra N.K. (ED.), *Review of Marketing Research Sharpe, Armonk, 7*, 255-296.

Ringle, C.M., Sarsted, M., & Straub, D.W. (2012). Editor's comments: a critical look at the use of PLS-SEM in MIS quarterly. *MIS Quarterly*, *36*(1) 1-12.

Ruiz, D.M., Gremler, D.D., Washburn, J.H., & Carrion, G.C. (2008). Service value revisited: specifying a higher order, formative measure. *Journal of Business Research*, *61*(12), 1278-1291.

Saayman, A., Pienaar, J., Pelsmacker, P.D., Viviers, W., Cuyvers, L., Muller, M.L. & Jegers, M. (2008). Competitive intelligence: construct exploration, validation and equivalence. *Aslib Proceedings*, *60*(4), 383-411.

Santoro, G., Vrontis, D., Thrassou, A., & Dezi, L. (2018). The Internet of Things: Building a knowledge management system for open innovation and knowledge management capacity. *Technological Forecasting & Social Change*, *136*, 347-354.

Smith, M., & Bititci, U.S. (2017). Interplay between performance measurement and management, employee engagement and performance. *International Journal of Operations & Production Management, 37*(9), 1207–1228.

Takola, H., Gröger, C., Järvenpää, E., & Niemi, E. (2016). Designing manufacturing dashboards on the basis of a Key Performance Indicator survey. 49th CIRP Conference on Manufacturing Systems, *Procedia CIRP, 57*, 619-624.

Tamer Cavusgil, S., Calantone, R.J., & Zhao, Y. (2003). Tacit knowledge transfer and firm innovation capability. *Journal of Business and Industrial Marketing, 18*(1), 6-21.

Taticchi, P., Garengo, P., Nudurupati, S.S., Tonelli, F., Pasqualino, R. 2014. A review of decision-support tools and performance measurement and sustainable supply chain management, *International Journal of Production Research*.

Teece, D.J. (2007). Explicating dynamic capabilities: the nature and micro foundations of (sustainable) enterprise performance. *Strategic Management Journal*, *28*(13), 1319-1350.

Van-Hau, T. (2017). Getting value from business intelligence systems: A review and research agenda. *Journal of Decision Support System, 93*(1), 111-124.

Vorhies, D.W., & Morgan, N.A. (2003). A configuration theory assessment of marketing organization fit with business strategy and its relationship with marketing performance. *Journal of Marketing, 67*(1), 100-115.

Wai, S.H., Md Yusof, A., Ismail, S., & Tey, H.K. (2012). Critical success factors for sustainable building. Retrieved from: http://www.ipedr.com/vol45/025-ICMTS2012-M00025.pdf.

Watson, H.J. (2011). Business analytics insight: hype or here to stay? *Business Intelligence Journal, 16*(14), 4-8.

Yawar, S.A., & Seuring, S. (2017). Management of social issues in supply chains: a literature review exploring social issues, actions and performance outcomes. *Journal of Business Ethics*, *141*, 621-643.

Yeh, Y.J., Lai, S.Q., & Ho, C.T. (2006). Knowledge management enablers: a case study. *Industrial Management & Data Systems, 106*(6), 793-810.

Yigitbasioglu, O.M., & Velcu, O. (2012). A review of dashboards in performance management: implications for design and research. *International Journal of Accounting Information Systems, 13*(1) 41-59.

Yuan, J., Wang, C., Skibniewski, M.J., & Li, Q. (2012). Developing key performance indicators for public-private partnership projects: questionnaire survey and analysis. *Journal of Management in Engineering. 28*(3), 252-264.