Strategic Decision Support Systems for Logistics in the Agrifood Industry

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Abstract. In recent years, the agrifood sector has experienced many societal, economic and technological changes. Such transformations significantly influence the entire food processing chain from agricultural production, through food processing to the distribution of food to customers. As Supply Chain Management (SCM) emphasizes on seeing the whole supply chain as one system, Decision Support Systems (DSSs) are used to define the influence of strategic issues on logistics and to identify the most effective processes to be performed because of the strategic issues with the highest either positive or negative impact on the logistics. Managers try to deal with the current complex environment using the Strategic Information Systems Planning (SISP) process. The purpose of this paper is to propose a strategic DSS framework, which combines both the strategic management process and the SISP process to provide a holistic approach to effective decision-making in logistics in the agrifood industry.

Keywords: Decision Support Systems; Strategic Management; Business Strategy; Strategic Information Systems Planning; Logistics; Agrifood

1 Introduction

During the last decade or so, there has been an increasing attention of researchers in the strategic role of logistics. The strategic significance of logistics is conceived in businesses that place special emphasis on customer service as the output of their business (Korpela and Tuominen, 1996).

As the business environment is getting more and more complex and competitive, an effective and timely decision-making is necessary. The implementation of decision support technology is becoming significant and calls for reduced complexity along with improved efficiency. Many researchers have studied the efficiency of Decision Support Systems (DSSs) (Alalwan, 2013). DSSs are used to define the influence of strategic issues on the logistics and to identify the most effective

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processes to be performed because of the strategic issues with the highest either positive or negative impact on the logistics (Korpela and Tuominen, 1996).

Previous studies in this area were focused on the importance of Information Technology (IT) to boost decision makers to make more efficient decisions. Especially, previous researchers highlight the benefits of using computer-based systems to support logistics management, especially in transportation and warehousing (Accorsi et al., 2014; Moynihan et al., 1995).

In recent years, the agrifood sector has experienced many societal, economic and technological changes. Such transformations significantly influence the entire food processing chain from agricultural production, through food processing to the distribution of food to customers. The innovation is a crucial factor for firms in this sector and plays an important role in sustaining and enhancing their competitiveness (Baregheh et al., 2012).

The development of technology and the use of computer networks have changed production processes, access to, transfer and use of information in the agrifood sector. The easiest access to knowledge and the easiest sharing of information can be achieved through the spreading of communication technologies (Sturiale and Scuderi, 2011).

Despite the fact that Small and Medium Enterprises (SMEs) are considered the main pillar of contemporary economies and have a key role to play particularly in rural economies, few studies have focused on examining the innovation practices of the agrifood sector SMEs (Baregheh et al., 2012). This sector is the largest one within the EU and is one of the key drivers of the EU economy, contributing to both economic output and employment (Baregheh et al., 2012; Gold et al., 2017). As Supply Chain Management (SCM) emphasizes on seeing the whole supply chain as one system, current research examines mostly how to improve the position of agrifood actors in developing countries (Gold et al., 2017). Furthermore, the literature focuses on the specific challenges of smallholder farmers in accessing global chains due to market constraints, deficient infrastructures and lack of resources (Gold et al., 2017).

The purpose of this paper is to propose a strategic DSS framework, which combines both the strategic management process and the Strategic Information Systems Planning (SISP) process to provide a holistic approach to effective decision-making in logistics in the agrifood industry.

The structure of this paper is the following: A theoretical framework based on the literature review about strategic planning and DSS, as well as, strategy and DSS models in logistics are initially analyzed in Section 2. In Section 3, the steps for a framework linking the DSS and SISP process in logistics in the agrifood sector are discussed, whereas the final section summarizes the concluding remarks of the paper.

2 Logistics Strategy

Researchers have recently focused on the strategic role of logistics. The strategic significance of logistics is conceived in businesses that are interested in customer

service as the output of their business. Logistics is a holistic approach which includes the management of material and information flows and it is important so as to satisfy customers' demands. Logistics strategy must be aligned with business strategy because it identifies the selection of products, services and markets and determines the goals of the logistics system of the company (Korpela and Tuominen, 1996). The Sustainable Supply Chain Management is significant because it allows businesses to permits supply chains with sustainable goals (Shi et al., 2015).

As managers in strategic planning define the key goals for the company in order to compete businesses in a turbulent environment, the logistics strategic planning process starts with situational analysis which contains the formulation of the vision, strategic goals, objectives, strategies and action plans. The aim of this analysis is to identify the strengths, weaknesses, threats and opportunities by analyzing both the logistic system and the business environment. Moreover, an analysis of strengths and weaknesses provides results in logistical structure and logistical costs, inventory management, transportation, Information Systems (IS), organizational structure, co-operation with other corporate functions and materials handling and transportation. The scanning of both the environment and the resources are significant to identify the long-term direction for the logistics function.

Specifically, the vision, describes a desired future situation identified for the logistics organization. The vision and the strategic objectives present the direction of the implementation of the logistics activities and the logistic vision that must both be aligned with business vision. The goals and strategies support the translation of logistics vision in specific performance measures and operating models such as customer service, transportation, order processing, inventory management, warehousing, IS and organization. The definition of goals and the formulation of strategies are aligned with other business functions such as marketing and production to increase business advantages. Moreover, action plans constitute a detailed description of the operational and short-term activities that are required for the implementation of the strategy.

Organizations use the strategic management process scan the environment, which significantly influences the logistics function. The logistics strategic management process contains three phases. The first phase is the definition of the trends and the evaluation of the impact and urgency of the identified trends, the next phase is the evaluation of priorities and the last one the development of a plan with responses to the issues.

The logistics strategic management can form strategic decision outcomes or environmental forces. Responses to the issues may require changes in the vision, objectives, strategies or action plans, as a result strategic issues management process supports the periodic planning process. The process of strategic management forms aligns the advantages of strategic planning with the flexibility of continuous strategic management. Furthermore, it combines the business's logistics processes with the capability to be strategically oriented and to face the external and internal developments (Korpela and Tuominen, 1996).

The impact of innovation on business success in the agrifood sector seems to be very much comparable to that in other industries. In the past, agrifood businesses tended to pay attention on reducing production costs rather than delivering benefits to the final customers. Recently, pressures arising from globalization, the need to ensure

food safety, nutritional quality and customers' demand for convenience, variety and quality, combined with new opportunities offered by the biotechnology revolution have all led to a changing attitude. Hence, the agrifood sector is increasingly oriented toward developing products that take into consideration customers' demands (Fortuin and Omta, 2009).

3 Strategic DSS Models in Logistics

Strategic decisions imply the design of a distribution/logistics network is complex because it involves significant commitments in resources over several years. Strategic logistics planning, including required customer service levels, aims to minimize the inventory-related costs which are combined with producing and storing products from manufacturers to customers (Moynihan et al., 1995). As a result, the logistics strategy is significant for long-term competitive advantages in business, especially in a logistics distribution network which is important in transportation and inventory cost. Furthermore, it is crucial to customer satisfaction regarding logistics response (Kengpol, 2008).

Previous researchers in this field focused on the importance of IT to support decision makers to achieve more efficient decisions and to enhance their effectiveness. Specifically, previous surveys focused on the benefits of using computer-based systems to support logistics management, especially in transportation and warehousing (Kengpol, 2008; Salam and Khan, 2016; Songbai et al., 2010). Limited surveys have been conducted in the areas of inventory and product forecasting (Accorsi et al., 2014; Moynihan et al., 1995).

A DSS is defined as "*an interactive, flexible and adaptable Computer Based Information System which uses decision rules, models and model base as well as a database and the decision makers apply decisions in solving problems which would not be willing to manage visualization models per se*" (Waxlax, 1993).

Another definition is based on the view that a DSS is "*an interactive and adaptable Computer Based Information System which helps non-organized management problems*" (Alyoubi, 2015; Moormann and Lochte-Holtgreven, 1993).

Table 1 summarizes different DSS and their functionalities in logistics. Then, the similarities among them are discussed in the next paragraphs. These findings are a basis for the suggested DSS model.

Table 1. DSS in logistics.

DSS	DSS Functionalities	Reference
DSS for operational and tactical decisions in logistics	Data used is related with products and services prices, resource and budget allocation, payroll cost, cost per product Simulation events such as demands, departures and arrivals of means of transportation at terminals and acquisitions and releases of resources by vehicles Identification the performances of the systems Evaluation the selected parameters which can improve the performance indices	Fanti et al. (2015)
DSS model for vehicle routing	Demand analysis Analysis of data (number of drivers, strength of vehicle, mileage per vehicle) Decision analysis for the transportation personnel requirements, vehicle demands, path choosing optimization and resource transportation information	Songbai et al. (2010)
Logistics distribution network	Preliminary analysis (information such as GMS locations, transportation costs of listed distribution centers and customers) Evaluation of the alternatives for the logistics distribution network Estimation of the delivery time, quality, unexpected demand Calculation of the transportation cost The implementation and feedback	Kengpol (2008)

The first step in the strategic management process comprises the scanning of the external and internal environment. The second step involves the estimation of the effect and urgency of the issues, the evaluation of priorities for the previous problems and the identification of the type of response for these issues. Finally, the last step contains the planning of the required responses for the strategic issues. DSSs are used to define the impact of strategic issues on the logistics and to identify the most

effective processes to be performed in coordination with the strategic issues with the highest either positive or negative effect on logistics (Korpela and Tuominen, 1996).

Some basic features have to be considered for the development of the systems. DSS involve many basic components as follows. Firstly, the data component usually contains a Database Management System (DBMS). The DBMS involves modeling tools and general programming languages. Data used can either be internal or external, either cross-sectional data or time series. Internal data come from organization's internal functions and concern products and services prices, financial data, resource allocation data, data related to costs such as payroll cost or cost per product. The external concern is about competition market share, government arrangements and anything that comes from external sources such as market research, government agencies, the web. The data stored in the DSS database are used as input to the optimization processes associated with models. The DSS information is provided by other data files, which could be business' internal or external files. The next module is the model component, which includes a simulation model, a mathematical model as well as optimization algorithms to support the analysis of the impact of the selections on the system performances (Fanti et al., 2015; Yoo and Digman, 1987). Precisely, several methods, models, theories, and algorithms are implemented to develop and analyze the alternative decisions in DSS. Examples of these techniques are the intelligent analysis of data, the simulated and fuzzy modeling, the use of genetic algorithms and neural networks, the decision-making theory and fuzzy theory (Kondratenko et al., 2014).

A significant area of DSS in Logistics has been applied to perform an evaluation of supply chain. Current changes in global production had intensified supply chain complication and increased the argument that logistics strategies are significant aspects of business strategy. Recent business environment highlights the need for supplier relationship development to improve businesses sustainable management. The purpose of the supplier selection and assessment process is to limit risk and increase overall value to the customer. As supplier selection is considered to be a multiple criteria decision-making process, this process signifies an even more complicated problem. The decision-maker needs to analyze a large amount of data considering multiple factors to apply a more effective evaluation. Businesses have to pay attention to each factor to reduce the costs and to increase their profit, because of the increased globalization of trade and the expansion of competition. Businesses formulate strategies concerning the supplier selection process paying attention to the sustainability and environmental responsibility requirements, to deal with the higher level of competition. Several researchers argue that sustainability is a significant aspect which has to be considered by managers in supplier selection and performance evaluation.

Thus, the criteria taken into consideration for the supplier selection and assessment can be categorized as follows. The first category concerns quality, the second one is the price, the next category is related to the capability of supply/delivery, and the fourth type involves factors about the service. Another category sought by decision makers take into consideration for the supplier selection and assessment is the Environment Protection. In conclusion, management system, corporate social responsibility, and performance are the last categories (Karthik et al., 2015).

4 Conceptual Model

As the agrifood sector can rely on the principles of innovation management, developed in high-tech sectors (Fortuin and Omta, 2009), the proposed model (Figure 1) is based on previous SDSS and combines the phases of SISP process in order to suggest a completed model for strategic decisions in logistics in the agrifood sector.

More specifically, Yoo and Digman (1987) proposed a DSS model for strategic management. This model involves four subsystems. The first one, named "Environmental Analysis Subsystem", is used for gathering information related with inventory, production, R & D, marketing, industry, raw materials, human resources, financial resources, market, technology, economic conditions, government and culture necessary for forecasting and projecting both the external and internal business environment. This information is gathered by the staff, customers, managers, consultants as well as literature. The second subsystem is the "Goal-setting Subsystem" which involves a model base which generates alternatives models. One or more of them are selected according to identified goals and objectives as well as business's mission and purpose. In the Goal-setting subsystem the results of the control phase should be used as an input as well as in the strategy operating subsystem. Furthermore, the results of each phase of the strategic management process can be used as an input in the strategy operating subsystem for reparative actions and future effectiveness. Moreover, the Decision Support Subsystem includes a DSS database, a DSS model base and application programs which maintain the flow of information within the system. The DSS database contains files of historical, managerial and environmental data as well as files on various transactions. The DSS model base includes models which are useful for the solution of strategic problems. The last subsystem is the "Strategy Operating Subsystem", in which the decision maker identifies, evaluates and selects alternative strategies. Then, he implements the selected strategy, and evaluates based on information provided by the decision support subsystem. This subsystem maintains each phase of strategic management process as it has been previously presented.

The model includes four categories of subsystems, named; Environmental Analysis Subsystem, Goal Determining Subsystem, Decision Support Subsystem and SISP Subsystem (Figure 1).

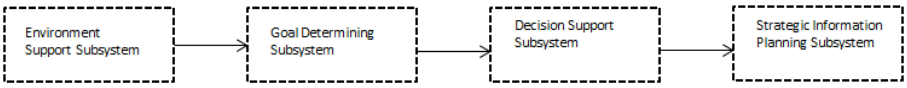

Fig. 1. Proposed SDSS for Logistics in the agrifood sector

The first subsystem includes the identification of the problem, for the business to make the appropriate decisions. The Situation Analysis is the first phase of SISP process and it is contained in this subsystem. Generally, in the current phase, existed

business, organizational and IS are analyzed. Moreover, businesses analyze the current external IT and business environment to determine new trends in IT. Managers analyze strengths and weaknesses concerning economic conditions, logistical structure and logistical costs, inventory management, transportation, warehousing, IS and materials handling.

In times of globalization and increasing competitiveness, the determination of threats and opportunities in the business environment is crucial for the sustainable economic success of every company. It becomes even more important in the agrifood industry because companies are highly interdependent. The awareness of developments in markets, products, business partners and competitors considers as a significant factor in economic success for businesses. The analysis of the information needs a systematic scanning and a linkage with the needs of network companies (Fritz, 2009). Innovation contributes to organizational success, performance and survival. It is often driven by pressure from the external environment, and especially from competition, deregulation, isomorphism, resource scarcity and customer demand. In the agrifood sector it is of particular interest as it aims to support or improve the performance (Baregheh et al., 2012).

Information about distribution channels, economic situation of suppliers, relation demands to product characteristics, market segments where competitors are active and buying power, quality of suppliers are required (Fritz, 2009; Manthou et al., 2004). Other information required includes data such as rural economy, the environment, food production, healthy eating and consumer values (Volpentesta et al., 2013). However, the efficient use of the information sources for competition monitoring in the agrifood businesses requires a focused, systematic and automated analysis of their content. Also, each company aims to integrate this information with the results of the business and the analysis of its environment (Fritz, 2009) (Figure 2).

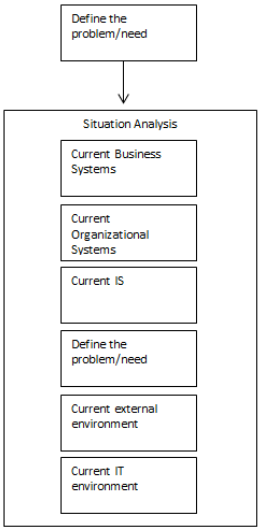

Fig. 2. Environment Support Subsystem

In the second subsystem, the Strategic Awareness phase of SISP is involved. Strategic Awareness includes key planning issues concerning the identification of goals and the development of the team which will participate in the implementation phase of the process. The main objectives which have to be identified are related to customer service, transportation, order processing, inventory management and warehousing (Figure 3).

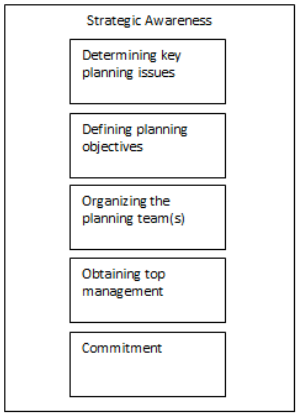

Fig. 3. Goal Determining Subsystem

Next, the Decision Support Subsystem includes the Database, Data Model and Application programs. The previous two subsystems provide information to the Decision Support Subsystem. Next, this subsystem generates an output, which is used as input for the interacting subsystems. Thus, managers can gather, store and reclaim the necessary information about external and internal environment and historical data (e.g. about transportation or supplier selection and evaluation), which will help them to create alternative scenarios. Then, managers will evaluate this information and they will select the best choice, which will be developed in the next subsystem. The output of this subsystem includes alternative decisions about drivers' and vehicle transportation, KPIs, cost rate, cost per unit of material flow (Zviran, 1990). Other indicators which are used are responsiveness and agility, cost and efficiency, food quality and sustainability (Gold et al., 2017). Data can be stored for further working out and sensitivity analysis. They can also be categorized in external files if further processing is required. The user interface helps this process by providing a set of menus and question/ answer dialogues (Zviran, 1990). Once the problem is determined, mathematical models based on the problem are implemented that support the development of alternate solutions. Furthermore, the models are created to analyse the alternatives. Next, the selection of the most suitable alternative follows.

Overall, several methods, models, theories and algorithms are implemented to develop and analyze the alternative decisions in DSS. Examples of these techniques are the intelligent analysis of data and the fuzzy theory (Figure 4).

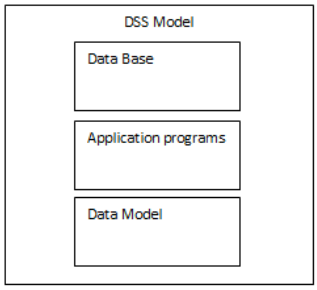

Fig.4. Goal Determining Subsystem

The SISP Subsystem includes the last three phases of SISP process; Strategy Conception, Strategy Formulation and Strategy Implementation Planning. In Strategy Conception the identification of important IT goals and objectives for implementation are applied. The organizing team evaluates them and formulates the technological strategy, which will be applied in the next phase. Then, there is Strategy Formulation through which the definition of new IT architectures, processes, projects and the priorities over them are implemented. Finally, Strategy Implementation Planning involves activities concerning changes in management process, such as the implementation of the opportunities, the goals, the plans and the new processes, the action plan, its evaluation and control (Brown, 2010; 2004; Dooley and O'Sullivan, 1999; Kamariotou and Kitsios, 2017a;b; 2016; Kitsios and Kamariotou, 2016a;b; Maharaj and Brown, 2015; Mentzas, 1997; Mirchandani and Lederer, 2014; Newkirk and Lederer, 2006; Newkirk et al., 2008). Results from the Strategy Implementation Planning phase should feedback into the Goal determining subsystem as well as each phase in the Strategy Information Planning subsystem for corrective action and future effectiveness (Yoo and Digman, 1987) (Figure 5).

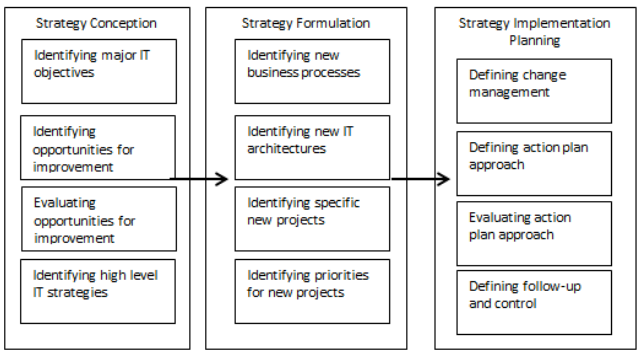

Fig.5. Strategic Information Planning Subsystem

The proposed model has few advantages in comparison with the previous ones, which have been presented in Table 1. Those models have been implemented for specific logistics functions such as distribution, vehicle routing and tactical decisions.

The proposed framework (Figure 1) is based on the strategic process of DSSs and it involves the phases which are based on the formulation of business and IT strategy, which are excluded from the previous models. The identification of objectives, the analysis of business and IT environment, the organization of planning team, the evaluation of opportunities, the improvement of business processes and the assessment of the process, are significant phases when managers formulate IT strategy. So, the proposed framework can be implemented by decision makers in each function of logistics in agrifood sector.

The proposed model gives some benefits to decision makers. First, various strategic decision variables and steps can be considered comprehensively. Second, it can be considered as an effective strategic management system which makes easier the decision making process. Next, the system provides updated information to managers as they can scan the business and IT environment. So, the environmental uncertainty is minimized and company risk under dynamic change. Another benefit is that the evaluation process is implemented in order to examine whether the strategy is being implemented and whether the goals are being achieved. If not, corrective action may be necessary to change the implementation activities or even to change the strategy itself. Finally, system includes various levels of managers, so their participation enhances the increased use of the system and the effectiveness in decision-making.

5 Conclusions

The combination of strategic planning with DSS is a new research area. It can significantly improve the strategic decision making effectiveness. Careful design is critical to obtain the advantages of SDSS. Further expansions in DSS research area and IS will provide new motivations for successful SDSS developments (Moormann and Lochte-Holtgreven, 1993).

DSSs are based on the needs for information of the existing organizational functions. In the future, DSS will try to involve tools based on environmental changes and information needs, which will facilitate decision makers so as to adapt their working practice for future demands (Salmela and Ruohonen, 1992).

A framework which combines SISP process and DSS in logistics is suggested. The suggested framework contributes to the agrifood sector and enhances the communication among producers and consumers, enhancing a redistribution of value for primary producers. Furthermore, if agrifood producers use the DSS, the latter can give customers insight into sourcing and production methods, enable producers to monitor their customer base closely and make supply chain visibility and transparency a sustainable competitive advantage (Volpentesta et al., 2013).

This paper research contribution is two fold. Firstly, it aims to bridge the gap in the literature regarding the connection between SISP processes and DSS. Furthermore, it suggests a new framework for decision making with general applicability to various industries, including the agrifood sector.

By defining the phases that support managers' decision making, implications for future research are presented. Academics and managers should expand, visualize and

test this model, to evaluate the effectiveness of SISP phases in the process of decision making. As the framework has not been tested yet, the results of an exploratory study will be summed up in an expanded conceptual model for future research.

References

1. Accorsi, R., Manzini, R., and Maranesi, F. (2014) A decision-support system for the design and management of warehousing systems. Computers in Industry, 65, p. 175-186.
2. Alalwan, J.A. (2013) A taxonomy for decision support capabilities of enterprise content management systems. The Journal of High Technology Management Research, 24, p. 10-17.
3. Alyoubi, B.A. (2015) Decision Support System and Knowledge-based Strategic Management. Procedia Computer Science, 65, p. 278-284.
4. Baregheh, A., Rowley, J., Sambrook, S., and Davies, D. (2012) Innovation in food sector SMEs. Journal of Small Business and Enterprise Development, 19, p. 300-321.
5. Brown, I. (2010) Strategic Information Systems Planning: Comparing Espoused Beliefs with Practice. In: Proceedings of 18th European Conference on Information Systems. Pretoria, June 2010, p. 1-12.
6. Brown, I.T.J. (2004) Testing and Extending Theory in Strategic Information Systems Planning Through Literature Analysis. Information Resources Management Journal, 17, p. 20-48.
7. Dooley, L., and O'Sullivan, D. (1999) Decision support system for the management of systems change. Technovation, 19, p. 483-493.
8. Fanti, M.P., Iacobellis, G., Ukovich, W., Boschian, V., Georgoulas, G., and Stylios, C. (2015) A simulation based Decision Support System for logistics management. Journal of Computational Science, 10, p. 86-96.
9. Fortuin, F.T., and Omta, S.W.F. (2009). Innovation drivers and barriers in food processing. British food journal, 111, p. 839-851.
10. Fritz, M. (2009). Modeling External Information Needs of Food Business Networks. In Advances in Modeling Agricultural Systems, p. 149-166. Springer US.
11. Gold, S., Kunz, N., and Reiner, G. (2017). Sustainable global agrifood supply chains: exploring the barriers. Journal of Industrial Ecology, 21, p. 249-260.
12. Kamariotou, M., and Kitsios, F. (2016) Strategic Information Systems Planning: SMEs Performance outcomes. In: Proceedings of the 5th International Symposium and 27th National Conference on Operational Research, Athens, June 2016, p. 153-157.
13. Kamariotou, M., and Kitsios, F. (2017a) Information Systems Phases and Firm Performance: A conceptual Framework. In: Kavoura, A. et al, (Eds.), Strategic

Innovative Marketing, Springer Proceedings in Business and Economics, p. 553-560.

14. Kamariotou, M., and Kitsios, F. (2017b) Strategic Information Systems Planning. In: Mehdi Khosrow-Pour (Ed.), Encyclopedia of Information Science and Technology, Fourth Edition, IGI Global Publishing, p. 912-922.
15. Karthik, B., Raut, R.D., Kamble, S.S., Kharat, M.G. and Kamble, S.J. (2015) Decision support system framework for performance based evaluation and ranking system of carry and forward agents. Strategic Outsourcing: An International Journal, 8, p. 23-52.
16. Kengpol, A. (2008) Design of a decision support system to evaluate logistics distribution network in Greater Mekong Subregion Countries. International Journal of Production Economics, 115, p. 388-399.
17. Kitsios, F., and Kamariotou, M. (2016a) Decision Support Systems and Business Strategy: A conceptual framework for Strategic Information Systems Planning. In: Proceedings of the 6th International Conference on IT Convergence and Security, Prague, September 2016, p. 149-153.
18. Kitsios, F., and Kamariotou, M. (2016b) Decision Support Systems and Strategic Information Systems Planning for Strategy Implementation. In: Kavoura, A., Sakas, D. and Tomaras, P. (Eds.), Strategic Innovative Marketing, Springer Proceedings in Business and Economics, p. 327-332.
19. Kondratenko, Y.P., Klymenko, L.P., and Sidenko, I.V. (2014) Comparative Analysis of Evaluation Algorithms for Decision-Making in Transport Logistics. Advance Trends in Soft Computing, p. 203-217.
20. Korpela, J., and Tuominen, M. (1996) A decision support system for strategic issues management of logistics. International journal of production economics, 46, p. 605-620.
21. Maharaj, S., and Brown, I. (2015) The impact of shared domain knowledge on strategic information systems planning and alignment: original research. South African Journal of Information Management, 17, p. 1-12.
22. Manthou, V., Vlachopoulou, M., and Folinas, D. (2004) Virtual e-Chain (VeC) model for supply chain collaboration. International Journal of Production Economics, 87, p. 241-250.
23. Mentzas, G. (1997) Implementing an IS Strategy- A Team Approach. Long Range Planning, 30, p. 84-95.
24. Mirchandani, D.A., and Lederer, A.L. (2014) "Less is More:" Information Systems Planning in an Uncertain Environment. Information Systems Management, 29, p. 13–25.
25. Moormann, J., and Lochte-Holtgreven, M. (1993) An approach for an integrated DSS for strategic planning. Decision Support Systems, 10, p. 401-411.
26. Moynihan, G.P., Raj, P.S., Sterling, J.U., and Nichols, W.G. (1995) Decision support system for strategic logistics planning. Computers in industry, 26, p. 75-84.

27. Moynihan, G.P., Raj, P.S., Sterling, J.U., and Nichols, W.G. (1995) Decision support system for strategic logistics planning. Computers in industry, 26, p. 75-84.
28. Newkirk, H.E., and Lederer, A.L. (2006) The effectiveness of strategic information systems planning under environmental uncertainty. Information & Management, 43, p. 481-501.
29. Newkirk, H.E., Lederer, A.L., and Johnson, A.M. (2008) Rapid business and IT change: drivers for strategic information systems planning?. European Journal of Information Systems, 17, p. 198-218.
30. Salam, M.A., and Khan, S.A. (2016) Simulation based decision support system for optimization: A case of Thai logistics service provider. Industrial Management & Data Systems, 116, p. 236-254.
31. Salmela, H., and Ruohonen, M. (1992) Aligning DSS development with organization development. European Journal of Operational Research, 61, p. 57-71.
32. Shi, P., Yan, B., Shi, S., and Ke, C. (2015) A decision support system to select suppliers for a sustainable supply chain based on a systematic DEA approach. Information Technology and Management, 16, p. 39-49.
33. Songbai, H., Yajun, W., Dianxiang, Y., Yaqing, A., and Ke, Z. (2010) The design and realization of vehicle transportation support DSS under contingency logistics. In: Proceedings of the 2nd International Conference on Advanced Computer Control, Shenyang, Liaoning, March 2010, p. 463-466.
34. Sturiale, L., and Scuderi, A. (2011). Information and Communication Technology (ICT) and Adjustment of the Marketing Strategy. In: Proceedings of the Agrifood System HAICTA 2011, Italy, September 2011, p. 77-87.
35. Volpentesta, A.P., Della Gala, M. (2013) Analyzing Mobile Services in Alternative Agrifood Networks. In: Camarinha-Matos L.M., and Scherer R.J. (eds), Collaborative Systems for Reindustrialization. PRO-VE 2013. IFIP Advances in Information and Communication Technology, vol 408. Springer, Berlin, Heidelberg.
36. Waxlax, J. (1993) An object-oriented DSS for strategic management. Computers & industrial engineering, 25, p. 573-576.
37. Yoo, S., and Digman, L.A. (1987) Decision support system: A new tool for strategic management. Long Range Planning, 20, p. 114-124.
38. Zviran, M. (1990) ISSPSS: a decision support system for information systems strategic planning. Information & management, 19, p. 345-359.