Information systems strategy in SMEs: critical factors of strategic planning in logistics

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Abstract

Purpose – The purpose of this paper is to identify the factors that managers have to take into consideration when they implement the strategic information systems planning (SISP) process to develop information systems (IS) in the logistics sector.

Design/methodology/approach – Data were collected using questionnaires to IS executives in Greek small- and medium-sized enterprises (SMEs) of the logistics sector. Factor analysis is performed on the detailed items of the SISP process constructs.

Findings – The results of this paper indicate that IS executives do not focus on defining goals, which will be used to improve the operations of the supply chain for the IS development. Both IS executives and managers from the logistics department of each organization should participate in the process of information technology (IT) strategy formulation and implementation. Executives from the logistics department of each organization should be aware of implementing environmental and organizational analysis with greater meticulousness, to identify IT opportunities and apply IT strategy with greater agility rather than now.

Practical implications – A strategic planning process for IS development in the logistics sector is required to achieve the consistently IS planning objectives. This is an important challenge for executives in SMEs who do not concentrate on implementing a strategic planning process for IS development.

Originality/value – This paper examines the factors that influence the strategic development of IS in the logistics sector and improve the effectiveness of decision-making regarding the supply chain's operation.

Keywords Information systems, Decision making, Management, Strategic information systems planning, Decision support systems, Strategic management, Business strategy, Supply chain, Logistics

Paper type Research paper

1. Introduction

Researchers and academics have punctuated to the strategic role of logistics to increase the value of logistics operations and customer service. Information systems (IS) and new technologies contribute to this effort and increase the effectiveness of the supply chain. Executives in the logistics sector develop IS to improve the efficiency and performance of the supply chain, but they ignore the alignment of IS with business strategy and processes (Korpela and Tuominen, 1996). As the business environment is getting more and more turbulent and uncertain, a timely decision-making process is required. The implementation of IS is becoming meaningful and important for businesses to reduce complexity and improve efficiency. Thus, researchers have paid attention to the efficiency of IS and especially decision support systems (DSSs) in the logistics sector (Alalwan, 2013).

This challenge is fundamental for small- and medium-sized enterprises (SMEs) that are significant components of the national economy because they constitute of a large number of

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businesses in a country. As SMEs have been negatively influenced by the financial crisis, executives are obligated to gather information for their environment to face the environmental complexity and be competitive. Although SMEs try to compete in the current complex environment, managers develop IS that are not aligned with the business strategy (Bourletidis and Triantafyllopoulos, 2014). The most important challenges, which SMEs face and can lead to the failure of the alignment process are the lack of conscious planning, the lack of strategic decision-making and sharing information (Rathnam *et al.*, 2005). Researchers have suggested that more extensive planning would be more effective because it would support planners to understand the impact of the environment and better respond to it. Thus, the strategic development and implementation of IS is necessary for the improvement of SMEs' performance and competitiveness (Kamariotou *et al.*, 2017; Newkirk and Lederer, 2006).

Therefore, the purpose of this paper is to indicate the factors that managers have to take into consideration when they implement the strategic information systems planning (SISP) process to develop IS in the logistics sector. Data were collected using questionnaires to IS executives in Greek SMEs in the logistics sector to identify the factors that are more significant for them and those that need improvement so as to produce effective IS plans.

The structure of this paper is as follows: after a brief introduction to this field, the Section 2 includes the theoretical background regarding the strategic development of IS in the logistics sector to highlight the issues, which are discussed in this paper. Section 3 describes the methodology, while Section 4 shows the results of the survey. Finally, Section 5 discusses the results and concludes the paper.

2. Theoretical background

Strategic decision-making in logistics

Academics and practitioners have recently paid attention on the strategic role of logistics. As logistics is an integrated approach, which combines the management of material and information flows and aims to satisfy customers' demand, managers concentrate on the improvement of this function. Managers aim to achieve sustainable supply chains to increase the effectiveness of supply chains and achieve their goals, so they have to concentrate their efforts on the strategic role of logistics. Logistics strategy determines the selection of products, services and markets and defines the goals of the logistics system of each company, thus, it should be aligned with business strategy (Maharaj and Brown, 2015; Shi *et al.*, 2015).

Strategic decisions should define the design of a distribution/logistics network, which is a complex one because it requires a significant amount of resources over several years. The strategic planning of logistics aims to minimize the inventory-related costs, which are combined with producing and storing products from manufacturers to customers (Moynihan *et al.*, 1995). Managers formulate and implement logistics strategy for long-term competitive advantages in supply chains and especially in a logistics distribution network, which is important for the reduction of transportation and inventory cost (Kengpol, 2008).

Previous studies in this field examined the importance of IS and especially DSSs to support decision-makers to achieve more efficient decisions and to enhance the effectiveness of supply chains. Specifically, previous researchers provided details about the advantages 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). Table I summarizes different DSSs,

DSS	DSS functionalities	Research gaps	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 of the performances of the systems evaluation of the selected parameters, which can improve the performance indices	This system does not focus on the definition of goals, the team planning, the analysis of business environment and the implementation of logistics strategy	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	This system focuses on the technical aspects and on models regarding data analysis The system ignores the definition of goals, the team planning, the analysis of business environment, the implementation and evaluation of logistics strategy	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	This system does not focus on the definition of goals, the team planning, the analysis of business environment and the implementation of logistics strategy	Kengpol (2008)

Table I.
DSS in logistics

their functionalities in logistics and the research gaps of these systems. Then, the similarities among them are discussed in the next paragraphs.

Based on the existing DSSs that were presented in Table I, it is obvious that managers take only costs into consideration and therefore cannot quantify the impact on corporate profitability of various alternative scenarios. An important limitation is that systems are not user-friendly, which is perceived as the most significant criteria for managers who use them. Also, managers focus on the individual components of the overall system during the development process, and thus, ignore the integrated approach. So, DSSs fail to provide the strategic planner with the optimal results and help them to make effective decisions (Moynihan *et al.*, 1995). An important technical component of these systems, which helps managers to make decisions is the optimization of data. The visualization of data using DSSs provides several advantages to the development of logistics function because it reduces the total order cycle time and the transportation cost (Salam and Khan, 2016).

The development of DSSs involves many other basic features such as the data component, which usually contains a database management system (DBMS). Modeling tools and general programming languages are usually involved in the DBMS. Data used can either be internal or external, either cross-sectional data or time series. Organization's internal functions provide internal data as an input in the DBMS that concern resource allocation data, products and service prices, data related to costs such as payroll cost or cost

Subsystems	Activities	References
Strategic awareness subsystem	Determining key planning issues in the supply chain (SAw1) Determining planning objectives of the supply chain (SAw2) Organizing the planning team (SAw3) obtaining top management commitment (SAw4)	Brown (2004); Kamariotou *et al.* (2017); Kitsios and Kamariotou, 2016; Mirchandani and Lederer (2012), Newkirk and Lederer (2006)
Situation analysis subsystem	Analyzing current business systems (SA1) Analyzing current organizational systems (SA2) analyzing current information systems used in the supply chain (SA3) analyzing the current external business environment (SA4) Analyzing the current external IT environment (SA5)	
Strategy conception subsystem	Identifying major objectives for IS that are used in the supply chain (SC1) Identifying opportunities for supply chain improvement (SC2) evaluating opportunities for supply chain improvement (SC3) Identifying high-level IT strategies for IS that are used in the supply chain (SC4)	
Decision support subsystem	Identifying new business processes for supply chain operation (DS1) Identifying new IT architectures for IS that are used in the supply chain (DS2) Identifying specific new projects (DS3) Identifying priorities for new projects in the supply chain (DS4)	
Strategy implementation planning subsystem	Defining change management approaches (SIP1) defining action plans (SIP2) Evaluating action plans (SIP3) Defining follow-up and control procedures (SIP4)	

Table II.
Subsystems and activities

per product and financial data. External data regard on competition market share, government arrangements and anything that comes from external sources such as market research, government agencies and the Web. Optimization processes use these data as input. The DSS information is provided by other data files, which could be business' internal or external files. A simulation model, a mathematical model and optimization algorithms are used in the next module 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 the fuzzy theory (Kondratenko *et al.*, 2014).

To conclude, DSSs support all the stages of the decision-making process, beginning with gathering data from the environment. Then, possible alternatives of action are created, developed and evaluated. Finally, an alternative is selected and it is evaluated (Yoo and Digman, 1987). Despite the importance of DSSs in the functions of supply chain and logistics, limited systems were aligned with the activities of business strategy. Researchers have focused only on the technical aspect of the systems ignoring to follow a formal process into the DSSs planning and development. Thus, one challenge for researchers is how to integrate the logistics

strategy planning with the development of DSSs for logistics functions. Another significant challenge, which has not been mentioned by researchers yet is how to organize the team to develop the system. Managers have to cooperate with employees with technical skills, who will be informed about logistics strategy and they will integrate it in the system's functions (Kamariotou and Kitsios, 2019a; Kamariotou *et al.*, 2017).

Strategic information systems planning in logistics

The significance of SISP and its alignment with business planning has been defined as a major issue to improve business success and IS performance. So, it is a field of interest to IT managers. IS executives deal with the SISP process, which is a significant challenge today, to develop effective IS plans. Effective planning is important to comprehend the role and significance of IS and perceive their strategic impact. This process includes the definition of business's characteristics, the formulation of business's critical success factors, the description of important issues concerning the role and significance of IS, the selection of business goals and the determination of IS goals, the performance of sensitivity analysis and suitable opportunities, the production of preliminary output and the production of a draft for IS strategic plan (Zviran, 1990).

Many researchers have tried to develop a DSS, which would be based on the strategic planning process and it would improve the decision-making process. However, many phases of the strategic planning process are not included in these systems. Moormann and Lochte-Holtgreren (1993) developed a group decision support system for strategic planning based on the main activities of the strategic process; environment analysis, SWOT analysis, culture analysis and evaluation. The main challenge of this system is that it focuses only on the analysis of the business environment and it does not provide information regarding business strategy and business goals.

Another DSS model included six essential elements of the strategic planning process was developed by Hornby *et al.* (1994). These elements refer to the definition of organizational objectives, the development of capabilities to attain objectives, the formulation of comprehensive strategies, the development of specific programs of action, the implementation of organizational policies and finally the alignment of programs of action with objectives. This model does not present the database and the technical aspects of the system. Furthermore, it is based on these six elements, which are essential for strategic planning but they do not include the environmental analysis, which is an equally significant element.

Yoo and Digman (1987) proposed a strategic DSS, which includes four subsystems. In the first subsystem, named "Environmental Analysis Subsystem," decision-makers gather information related to raw materials, inventory, economic conditions, production, industry, human resources, research and development (R and D), culture, marketing, technology, financial resources, market and government. This information is useful to forecast and analyze both the external and internal business environment. The staff, customers, managers, consultants and reports are the main sources of this information. In the second subsystem, named "goal-setting subsystem" a model base, which generates alternatives models is included. One or more of them are selected according to identified goals and objectives, as well as the business's mission and purpose. The goal-setting subsystem produces results that should be used as an input and in the strategy operating subsystem. Additionally, the strategy operating subsystem uses the results of each phase of the strategic management process as an input for reparative actions and future effectiveness. The third subsystem named DSS includes a DSS model base, application programs and a DSS database, which maintain the flow of information within the system. This subsystem uses files on various transactions and files of historical, managerial and environmental data

as an input for the DSS database. The DSS model base includes models, which are useful for finding solutions to strategic problems. In the fourth subsystem named "strategy operating subsystem," the decision-maker identifies, evaluates and selects alternative strategies. Then, the selected strategy is implemented and evaluated based on information provided by the DSS. This subsystem maintains each phase of the strategic management process as it has been previously presented.

Based on these DSSs, the suggested subsystems for IS development in the supply chain are the strategic awareness subsystem, the situation analysis subsystem, the strategy conception subsystem, the DSS and the strategy implementation planning subsystem. Table II presents the tasks and activities of each subsystem. In the first subsystem, IT managers define 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. The suggested subsystems are presented in Figure 1.

The second subsystem includes the identification of the problem, for the business to make the appropriate decisions. Generally, in the situation analysis subsystem, 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. A significant factor for the success of logistics function is the

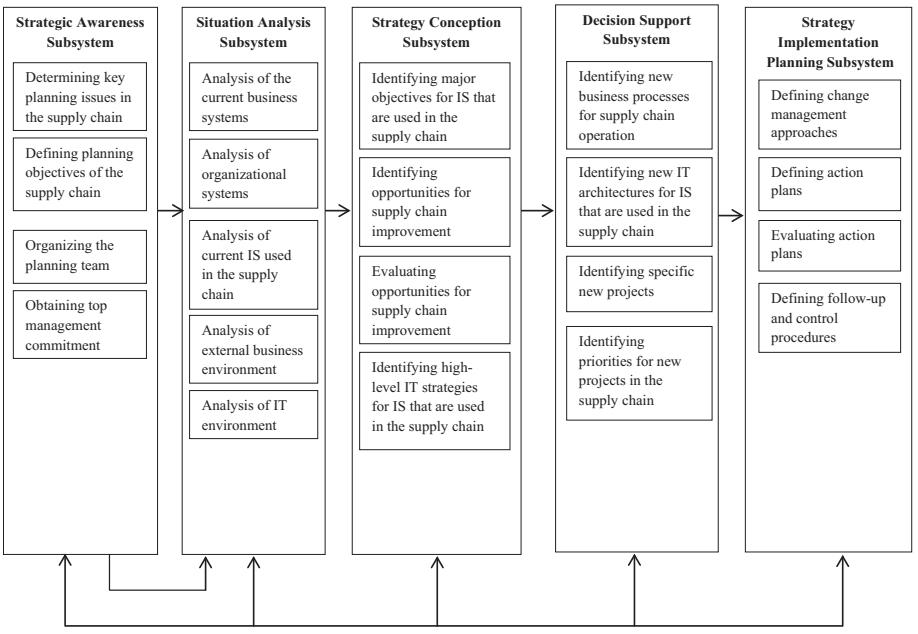

Figure 1.
Suggested subsystems for SISP in the logistics sector

awareness of developments in markets, products, business partners and competitors. The analysis of the information needs a systematic scanning and a linkage with the needs of network companies (Fritz, 2009). Furthermore, managers aim to develop innovative products for customers because innovation contributes to organizational success, performance and survival. Innovation is often driven by pressure from the external environment, and especially from competition, deregulation, isomorphism, resource scarcity and customer demand. So, it is important for managers to be aware of their business environment (Baregheh *et al.*, 2012; Kitsios *et al.*, 2009).

Information about distribution channels, the 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). However, the efficient use of the information sources for competition monitoring in the logistics sector 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).

In strategy conception subsystem, 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 the DSS through which the definition of new IT architectures, processes, projects and the priorities over them are implemented. This subsystem involves the technical components of the developed IS.

The DSS includes the database, data model and application programs. The previous two subsystems provide to the DSS with information. 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 the 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). 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 that support the development of alternate solutions and are based on the problem are implemented. Furthermore, the models are created to analyze 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 DSSs. Examples of these techniques are the intelligent analysis of data and the fuzzy theory.

Finally, strategy implementation planning subsystem involves activities concerning changes in the management process, such as the implementation of the opportunities, the goals, the plans and the new processes, the action plan, its evaluation and control. Results from the strategy implementation planning phase should feedback into the goal determining subsystem and each phase in the strategy information planning subsystem for corrective action and future effectiveness (Yoo and Digman, 1987).

3. Methodology

A field survey was developed for IS executives in the logistics sector. The instrument used five-point Likert-scale to operationalize the constructs of the conceptual model (Figure 2):

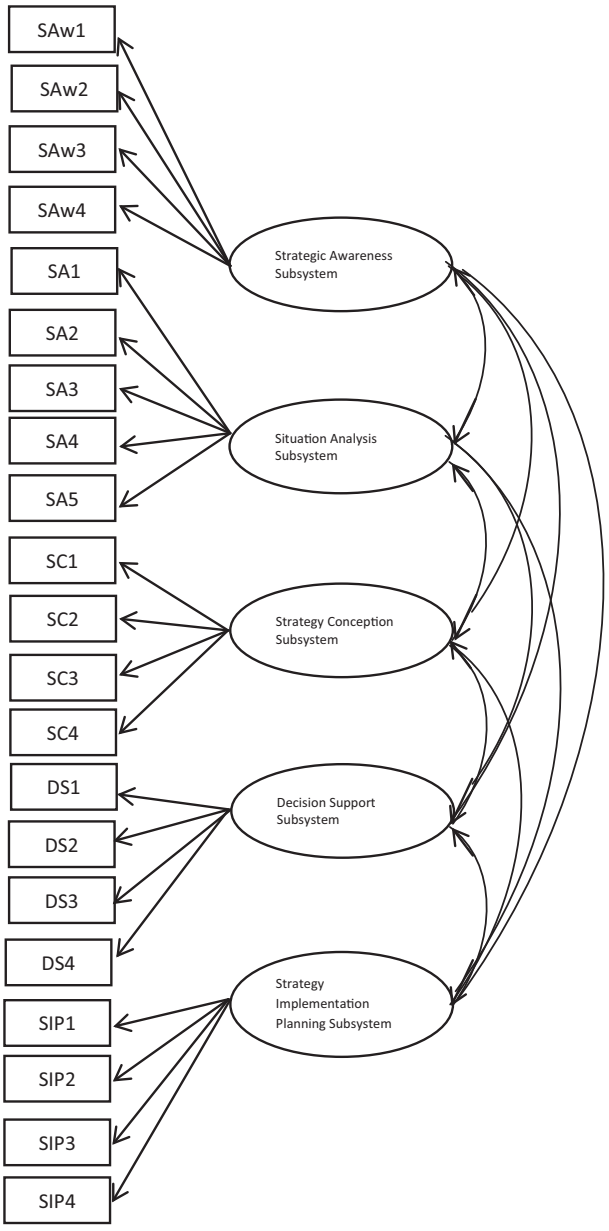

Figure 2.
Conceptual model

strategic awareness subsystem, situation analysis subsystem, strategy conception subsystem, decision support subsystem and strategic information planning subsystem.

The strategic awareness subsystem constructs measured the extent to which managers determine key planning issues and objectives in the supply chain, organize the planning

team and obtain top management commitment. The situation analysis subsystem constructs measured the extent to which managers analyze the current business and organizational systems, as well as the IS that are used for the effectiveness of the supply chain. Furthermore, managers analyze the current external business environment to gather information related to inventory, production, R and D, marketing, industry, costs, raw materials, human resources, financial resources, market, technology, economic conditions, government and culture necessary for forecasting. The strategy conception subsystem constructs measured the extent to which managers identify major IT objectives and opportunities for the supply chain and high-level IT strategies. The decision support subsystem constructs measured the extent to which managers identify new business processes and IT architectures for the supply chain operation. Finally, the strategic implementation planning subsystem constructs measured the extent to which managers define action plans and evaluate them. The questionnaire was based on previous surveys regarding SISP (Mirchandani and Lederer, 2012; Newkirk and Lederer, 2006).

Four executives from the logistics sector were asked to participate in a pilot test. Each one completed the survey and commented on the contents, length and overall appearance of the instrument. Changes were made to the questionnaire before the next subject was interviewed. Logistics significantly influence the economic growth and GDP in Europe (D'Aleo and Sergi, 2017). SMEs constitute of a large number of businesses in a country, thus, they are significant components of the national economy. Nowadays, they have been negatively affected by the financial crisis (Bourletidis and Triantafyllopoulos, 2014). As SMEs have been negatively influenced by the financial crisis, executives are obligated to gather information on their environment to face the environmental complexity and be competitive. Although SMEs try to compete in the current complex environment, managers develop IS that are not aligned with the business strategy (Bourletidis and Triantafyllopoulos, 2014). Despite the fact that family businesses focus on a business's long-term sustainability, they do not develop strategic planning (Kamariotou and Kitsios, 2017; Suh *et al.*, 2013). As a significant challenge for SMEs is the lack of strategic planning and formal processes, IS executives use IS ineffectively because they cannot align business and IT strategy (Ullah and Lai, 2013). Greece is a country where the majority of firms are family businesses and executives face with the challenges of financial crisis, it was emergent to collect data during the economic crisis in Greek SMEs from the logistics sector to identify the factors that managers have to take into consideration when they implement the SISP process and develop IS in the logistics sector (Vassiliadis and Vassiliadis, 2014). The sample constituted of IS executives in the logistics sector in Greek SMEs that selected from the icap list (Newkirk and Lederer, 2006). They should have the title of IS executives in Greek SMEs in the logistics sector and they should be responsible for the development of IS in their company. The questionnaire was sent to 1910 IS executives in the logistics sector through email and a total of 294 completed it. Data analysis was implemented using factor analysis.

4. Results

The IS executive is typically seen as the most suitable person in the organization to provide data regarding the factors that affect the strategic process of IS development in this study (Newkirk and Lederer, 2006). Respondents in this study were used in the logistics sector. 35.2 per cent had some postgraduate studies and 44,7 per cent had a degree. They also had 16-25 years of IS experience. The internal consistency, calculated via Cronbach's alpha, ranged from 0.774 to 0.980, exceeding the minimally required 0.70 level (Newkirk and Lederer, 2006). Factor analysis was implemented on the detailed items of the five subsystems constructs. Table III describes the reliability of subsystems constructs. Tables IV and V present the principal component analysis using the maximum likelihood

Variables	Mean	SD
SAw1	3,820	9,190
SAw2	3,949	9,130
SAw3	3,752	1,0562
SAw4	3,830	1,0540
SA1	3,633	1,0258
SA2	3,721	9,147
SA3	4,207	7,932
SA4	3,888	9,443
SA5	4,082	9,384
SC1	3,946	8,608
SC2	3,823	8,952
SC3	3,714	9,420
SC4	3,963	8,677
DS1	3,748	9,299
DS2	3,748	1,0920
DS3	3,701	9,486
DS4	3,776	9,035
SIP1	3,765	9,252
SIP2	3,704	1,0004
SIP3	3,415	1,0538
SIP4	3,565	9,953

Table III.
Reliability analysis

Factors	Items	Loadings
Strategy implementation planning subsystem	Evaluating action plans (SIP3)	0.929
	Defining action plans (SIP2)	0.890
	Defining change management approaches (SIP1)	0.661
	Defining follow-up and control procedures (SIP4)	0.595
Analysis of business environment subsystem	Analyzing current information systems used in the supply chain (SA3)	0.878
	Analyzing the current external business environment (SA4)	0.728
	Analyzing the current external IT environment (SA5)	0.639
	Organizing the planning team (SAw3)	0.635
	Determining planning objectives of the supply chain (SAw2)	0.472
	Obtaining top management commitment (SAw4)	0.329
Strategy conception subsystem	Identifying opportunities for supply chain improvement (SC2)	0.925
	Identifying major objectives for IS that are used in the supply chain (SC1)	0.846
	Identifying high-level IT strategies for IS that are used in the supply chain (SC4)	0.556
	Evaluating opportunities for supply chain improvement (SC3)	0.504
Decision support subsystem	Identifying new IT architectures for IS that are used in the supply chain (DS2)	0.906
	Identifying new business processes for supply chain operation (DS1)	0.500
	Identifying priorities for new projects in the supply chain (DS4)	0.474
	Identifying specific new projects (DS3)	0.351
Analysis of organizational systems subsystem	Analyzing current business systems (SA1)	0.895
	Analyzing current organizational systems (SA2)	0.711

Table IV.
Factor loadings for subsystems constructs

Variables	Factors: Strategy implementation planning subsystem	Analysis of business environment subsystem	Strategy conception subsystem	Decision support subsystem	Analysis of organizational systems subsystem
SIP3	0.929				
SIP2	0.890				
SIP1	0.661				
SIP4	0.595				
SA3		0.878			
SA4		0.728			
SA5		0.639			
SAw3		0.635			
SAw2		0.472			
SAw4		0.329			
SC2			0.925		
SC1			0.846		
SC4			0.556		
SC3			0.504		
DS2				0.906	
DS1				0.500	
DS4				0.474	
DS3				0.351	
SA1					0.895
SA2					0.711

Table V.
Pattern matrix

estimate and the extraction of factors with Promax with Kaiser normalization method. The factor loadings and cross-loadings provide support for convergent and discriminant validity.

Findings indicate that IS executives do not focus on defining goals for the IS development, which they will try to achieve to improve the operations of the supply chain. This finding is crucial because it confirms the negative consequences that executives in family businesses face due to the lack of strategic planning. Furthermore, the new factor, which was developed regarding to the understanding of the significance of SISP by managers is important. IS executives have to secure the effectiveness if IS plans, by defining priorities, enhance the cooperation among the team members and provide guidelines for each task of the process. Although IS executives concern about new technologies and IT architectures, managers from the logistics department are aware of the business processes, the strategy and the requirements of the supply chain. Their involvement in the SISP process can increase the effectiveness of the strategic IT plans for the operations of the supply chain. Both IS executives and managers from the logistics department of each organization should cooperate and participate in the team, which is responsible for IS development and formulating and implementing IT strategy.

The results of factor analysis indicated two new factors, namely, the analysis of the external business environment and the analysis of organizational systems. Also, the strategic awareness constructs were classified into these new factors. Based on these results, IS executives from the logistics department of each organization have to implement environmental and organizational analysis with greater meticulousness to

identify IT opportunities and apply IT strategy with greater agility rather than now. Managers who participate in the development of IS plans should analyze their current business systems, organizational systems, IS that are used in the supply chain, as well as the business environment and external IT environment. If planners understand the significance of those factors, they can improve the outcomes of the planning process excluding the increased time and cost needed for the process. When executives understand the trends in the business environment, they can determine important IT objectives (0.846) and opportunities for the improvement (0.925) of the supply chain and they can evaluate them to formulate high-level IT strategies for their business' supply chain operations (Mirchandani and Lederer, 2012; Zubovic *et al.*, 2014). Previous studies conclude that IS executives concentrate more on identifying major IT objectives and opportunities for improvement, as well as they formulate and evaluate action plans (0.929). However, they do not invest time on determining key planning issues and objectives (0.472) and on organizing the members of the planning team. Thus, the implemented plans are inefficient, unsuccessful and they do not meet the objectives of the supply chain (Newkirk and Lederer, 2006). Furthermore, when executives concentrate on the implementation of the process, shorter SISP horizons are achieved but the strategic goals cannot be met. As managers invest time on the horizon of the project and on minimizing its cost due to limited IT budget, they do not focus on strategic objectives that really concern them and on how they can increase value to the supply chain (Brown, 2004; Kitsios and Kamariotou, 2018).

Another important finding of this survey is that managers are not committed to the implementation of the strategic planning process for the IS development to improve the efficiency of supply chains (0.329). If executives do not concentrate on the project, the members of the team have difficulties implementing the IS strategy. Furthermore, when managers do not support the project and when they are not committed to the SISP process, many other negative consequences can occur, such as the limited recognition of the IS strategic planning as an important activity for the organization, the consideration that knowledge sharing among stakeholders is not important for the organization, the conflicts among stakeholders and the lack of support of resources that are required for the strategic process. Moreover, executives who do not encourage planners to face difficulties during the implementation of the SISP process because team members cannot realize the significance of the process and identify the appropriate objectives.

5. Conclusion

This paper identified the factors that managers have to take into consideration when they implement the SISP process to develop IS in the logistics sector. The results of this survey indicate that IS executives do not focus on defining goals for the IS development, which they try to achieve to improve the operations of the supply chain. As a result, IS plans might be inefficient and ineffective. IS executives have to secure the effectiveness if IS plans by defining priorities, enhancing the cooperation among the team members and providing guidelines for each task of the process.

Many challenges arise due to IS executives' concentration on SISP implementation subsystem. These problems are related to the lack of managers' education, communication, participation and cooperation, alignment of business goals with IS and the support of the change. These factors have negatively affected the success of the process. Future research should examine how managers could focus more on these phases and how they could limit the negative effects of these factors on SISP process.

This paper has a practical contribution for IS executives. The proposed model does not only focus on the technical aspects on the DSS but also it provides a holistic approach regarding the strategic IS planning taking into consideration organizational and technical factors that affect IS strategy. IT managers should be aware of the strategic use of IS planning to increase the effectiveness of the supply chain. Understanding the factors that contribute to the strategic planning of IS development may help executives concentrate their efforts on the supply chain's objectives and recognize the great value of the planning process in their organization. Second, IT managers should be knowledgeable about the factors that affect the SISP process and they should not ignore the tasks because this might be an obstacle, which presents the organization from achieving its planning goals, and thus, from realizing greater value. Finally, the findings of this survey help IS executives in Greek SMEs not only to focus on technical issues of the SISP process but also to concentrate on strategic issues during the development of IS. As a result, they should understand the significance of the SISP process to formulate and implement IS strategy, which will be aligned with the supply chain's objectives and increase the success of SMEs. Thus, IS projects would be more effective. Managers will not only invest time on the horizon of the project but also on minimizing its cost due to limited IT budget. They will also focus on strategic objectives that really concern them and on how they can increase value to the supply chain.

A limitation of this study stems from the fact that the survey was conducted only in Greece. Nevertheless, the results of an exploratory study will be summarized in an improved conceptual model for further research. Also, this survey is made for family businesses. Future researchers could examine and compare these results with relative ones from larger companies. However, the conceptual model could be applied in other sectors to be tested and to highlight differences in the results with the existing ones. Apparently, future researchers may use different methodologies for data analysis, such as cluster analysis, to compare the differences among organizations in each sector during the implementation of the SISP process.

References

Accorsi, R., Manzini, R. and Maranesi, F. (2014), "A decision-support system for the design and management of warehousing systems", *Computers in Industry*, Vol. 65 No. 1, pp. 175-186.

Alalwan, J.A. (2013), "A taxonomy for decision support capabilities of enterprise content management systems", *The Journal of High Technology Management Research*, Vol. 24 No. 1, pp. 10-17.

Baregheh, A., Rowley, J., Sambrook, S. and Davies, D. (2012), "Innovation in food sector SMEs", *Journal of Small Business and Enterprise Development*, Vol. 19 No. 2, pp. 300-321.

Bourletidis, K. and Triantafyllopoulos, Y. (2014), "SMEs survival in time of crisis: strategies, tactics and commercial success stories", *Procedia-Social and Behavioral Sciences*, Vol. 148 No. 2014, pp. 639-644.

Brown, I.T. (2004), "Testing and extending theory in strategic information systems planning through literature analysis", *Information Resources Management Journal (IRMJ)*, Vol. 17 No. 4, pp. 20-48.

D'Aleo, V. and Sergi, B.S. (2017), "Does logistics influence economic growth?, The European experience", *Management Decision*, Vol. 55 No. 8, pp. 1613-1628.

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*, Vol. 10 No. 2015, pp. 86-96.

Fritz, M. (2009), "Modeling external information needs of food business networks", in Pardalos, P.M., Petraq J. and Papajorgji (Eds), *Advances in Modeling Agricultural Systems*, Springer, Boston, MA, pp. 149-166.

Hornby, R.E., Golder, P.A. and Williams, J. (1994), "SDP: a strategic DSS", *Decision Support Systems*, Vol. 11 No. 1, pp. 45-51.

Kamariotou, M. and Kitsios, F. (2017), "An empirical evaluation of strategic information systems planning phases in SMEs: determinants of effectiveness", *Proceedings of 6th International Symposium and 28th National Conference on Operational Research*, Thessaloniki, Greece, pp. 67-72.

Kamariotou, M. and Kitsios, F. (2019a), "Critical factors of strategic information systems planning phases in SMEs", in Themistocleous, M. and Rupino da Cunha, P. (Eds), *Information Systems, EMCIS 2018*, Springer LNBIP 341, Springer Nature, chapter 39, Springer, Cham, pp. 503-517.

Kamariotou, M., Kitsios, F., Madas, M., Manthou, V. and Vlachopoulou, M. (2017), "Strategic decision support systems for logistics in the agrifood industry", *Proceedings of 8th International Conference on Information and Communication Technologies in Agriculture, Food and Environment*, Chania, Crete, Greece, pp. 781-794.

Kengpol, A. (2008), "Design of a decision support system to evaluate logistics distribution network in greater mekong subregion countries", *International Journal of Production Economics*, Vol. 115 No. 2, pp. 388-399.

Kitsios, F. and Kamariotou, M. (2016), "Decision support systems and business strategy: a conceptual framework for strategic information systems planning", *Proceedings of 6th IEEE International Conference on IT Convergence and Security (ICITCS2016)*, Prague, Czech Republic, pp. 149-153.

Kitsios, F. and Kamariotou, M. (2018), "Decision support systems and strategic planning: information technology and SMEs performance", *International Journal of Decision Support Systems*, Vol. 3 No. 3, pp. 53-70.

Kitsios, F., Doumpos, M., Grigoroudis, E. and Zopounidis, C. (2009), "Evaluation of new service development strategies using multicriteria analysis: predicting the success of innovative hospitality services", *Operational Research*, Vol. 9 No. 1, pp. 17-33.

Kondratenko, Y.P., Klymenko, L.P. and Sidenko, I.V. (2014), "Comparative analysis of evaluation algorithms for decision-making in transport logistics", in Jamshidi M., Kreinovich V. and Kacprzyk J. (Eds), *Advance Trends in Soft Computing. Studies in Fuzziness and Soft Computing*, Vol. 312, Springer, Cham, pp. 203-217.

Korpela, J. and Tuominen, M. (1996), "A decision support system for strategic issues management of logistics", *International Journal of Production Economics*, Vol. 46 No. 1996, pp. 605-620.

Maharaj, S. and Brown, I. (2015), "The impact of shared domain knowledge on strategic information systems planning and alignment", *South African Journal of Information Management*, Vol. 17 No. 1, pp. 1-12.

Manthou, V., Vlachopoulou, M. and Folinas, D. (2004), "Virtual e-Chain (VeC) model for supply chain collaboration", *International Journal of Production Economics*, Vol. 87 No. 3, pp. 241-250.

Mirchandani, D.A. and Lederer, A.L. (2012), "Less is more: information systems planning in an uncertain environment", *Information Systems Management*, Vol. 29 No. 1, pp. 13-25.

Moormann, J. and Lochte-Holtgreven, M. (1993), "An approach for an integrated DSS for strategic planning", *Decision Support Systems*, Vol. 10 No. 1993, pp. 401-411.

Moynihan, G.P., Raj, P.S., Sterling, J.U. and Nichols, W.G. (1995), "Decision support system for strategic logistics planning", *Computers in Industry*, Vol. 26 No. 1, pp. 75-84.

Newkirk, H.E. and Lederer, A.L. (2006), "The effectiveness of strategic information systems planning under environmental uncertainty", *Information and Management*, Vol. 43 No. 4, pp. 481-501.

Rathnam, R.G., Johnsen, J. and Wen, H.J. (2005), "Alignment of business strategy and IT strategy: a case study of a fortune 50 financial services company", *Journal of Computer Information Systems*, Vol. 45 No. 2, pp. 1-8.

Salam, M.A. and Khan, S.A. (2016), "Simulation based decision support system for optimization: a case of thai logistics service provider", *Industrial Management and Data Systems*, Vol. 116 No. 2, pp. 236-254.

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*, Vol. 16 No. 1, pp. 39-49.

Songbai, H., Yajun, W., Dianxiang, Y., Yaqing, A. and Ke, Z. (2010), "The design and realization of vehicle transportation support DSS under contingency logistics", *Proceedings of the 2nd International Conference on Advanced Computer Control*, Shenyang, Liaoning, pp. 463-466.

Suh, H., Van Hillegersberg, J., Choi, J. and Chung, S. (2013), "Effects of strategic alignment on IS success: the mediation role of IS investment in Korea", *Information Technology and Management*, Vol. 14 No. 1, pp. 7-27.

Ullah, A. and Lai, R. (2013), "A systematic review of business and information technology alignment", *ACM Transactions on Management Information Systems (TMIS)*, Vol. 4 No. 2014, pp. 1-30.

Vassiliadis, S. and Vassiliadis, A. (2014), "The Greek family businesses and the succession problem", *Procedia Economics and Finance*, Vol. 9, pp. 242-247.

Yoo, S. and Digman, L.A. (1987), "Decision support system: a new tool for strategic management", *Long Range Planning*, Vol. 20 No. 2, pp. 114-124.

Zubovic, A., Pita, Z. and Khan, S. (2014), "A framework for investigating the impact of information systems capability on strategic information systems planning outcomes", *Proceedings of 18th Pacific Asia Conference on Information Systems*, China, pp. 317-329.

Zviran, M. (1990), "ISSPSS: a decision support system for information systems strategic planning", *Information and Management*, Vol. 19 No. 5, pp. 345-359.

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