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Evaluating IT alignment and performance in SMEs using multivariate regression analysis
(Full paper)

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ABSTRACT

New competitive challenges have forced Small-Medium Enterprises (SMEs) to re-examine their internal environment in order to improve competitive advantage. IT investments can improve firm performance in a way that it would be in "alignment" with business strategy. The purpose of this paper is to analyze the contemporary impact of IT and business strategy on business performance, incorporating all these constructs into a model that is tested using Multivariate Regression Analysis. Data were collected from IS executives in 160 Greek SMEs. The results of this survey show that Strategy conception and formulation have a significant impact on business performance.

Keywords: Strategic Information Systems Planning, Alignment, IT strategy, Business strategy, Performance, SMEs.

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INTRODUCTION

As businesses are obliged to deal with the environmental uncertainty and complexity, managers have to develop Information Systems (IS) that support business strategy, and accommodate decision making in order to increase competitive advantage (Merali *et al*., 2012; Queiroz, 2017; Zubovic *et al*., 2014). As new competitive challenges and requirements have been raised due to the growth of international business, firms are forced to re-examine their internal business environment in order to increase their performance and achieve a competitive advantage. However, IS could be a source of sustainable competitive advantage only if the IS strategy will be aligned with business strategy. Thus, many companies have spent their resources in order to increase their competitive advantage by looking at their internal processes (Chatzoglou *et al*., 2011; Johnson & Lederer, 2013; Wolf & Floyd, 2017). This is a crucial challenge for businesses and especially for Small-Medium Enterprises (SMEs).

As the current financial crisis has negatively affected plenty of activities of SMEs, they have already acted in a new complex financial environment where uncertainty increases and the market characteristics completely change. Except for difficulties in their financial aspect, their relative lack of technological, managerial and human capabilities may limit their ability to bowl over the financial crisis (Bourletidis & Triantafyllopoulos, 2014; Giannacourou *et al*., 2015; Kitsios & Kamariotou, 2017). Moreover, the lack of strategic planning negatively influences this difficulty. Formal processes in SMEs that are related with strategic management and information handling help managers to focus on strategies, structures and processes that aim to enhance firm performance. Thus, IT investment has been a crucial issue for managers because IT influences business performance and help executives to align business strategy and organizational performance. In complex environments, businesses could develop formal processes using standardized rules and procedures which enhance the minimization of environmental uncertainty and manage economic consistency (Drechsler & Weißschädel, 2018; Queiroz, 2017; Ullah & Lai, 2013).

Traditionally, the concept of alignment is conceptualized as the extent of fit be-tween IT and business strategy. Several studies found that there is a positive relation-ship between alignment and performance (Chatzoglou *et al*., 2011; Queiroz, 2017; Street *et al*., 2017).With regard to the relationship between alignment and performance researchers argue that SMEs can use different paths in order to achieve a great extent of alignment according to their capabilities and market position. Thus, a more extensive planning would be more effective be-cause it would support planners understand the impact of the environment and better respond to it. If managers invest too many efforts, many conflicts among team members can be raised as well as the process could be delayed. On the other hand, if managers avoid investing too much time into the process, IS plans could be inefficient so IS goals could not be achieved. Consequently, the assessment of the process is significant because managers can reduce these unsatisfactory results (Kappelman *et al*., 2019). Unfortunately, IS strategy has been studied as a homogenous topic and limited studies delving into comparing the state of relevance across planning or alignment. Previous researchers have examined the relationship between the strategic planning of IS and the success as well as the obstacles that managers face in large companies (Mirchandani & Lederer, 2014; Newkirk & Lederer, 2006; Newkirk *et al*., 2003).

Despite the fact that studies on strategic alignment in SMEs investigate some of the same topics as research conducted with larger firms, SMEs' uniqueness warrant investigation on their own. Nevertheless, SMEs represent a distinct grouping of firms where firm size and resource constraints have a noticeable influence on alignment factors and outcomes (Kitsios & Kamariotou, 2019a; b; c; Street *et al*., 2017). Management literature has shown that advances in IT are leading to increasing levels of

adoption and use of IT in SMEs and are pushing technology further and further into SMEs processes and operations. Because many competitors and suppliers now use IT in their operations, executives (and researchers) need to be aware of how the alignment of business and IT strategies impacts firms (Spinelli *et al*., 2013; Street *et al*., 2017). Therefore, the purpose of this paper is to analyze the contemporary impact of IT and business strategy on business performance, incorporating all these constructs into a model that is tested using Multivariate Regression Analysis.

The structure of this paper is as following: after a brief introduction to this field, the next section includes the theoretical background regarding the SISP process and business performance. Section 3 describes the methodology, while Section 4 shows the results of the survey. Finally, Section 5 discusses the results and concludes the paper.

THEORETICAL BACKGROUND

As the current financial crisis has negatively affected plenty of activities of the family businesses, they have already acted in a new complex financial environment where uncertainty increases and the market characteristics completely change. Financial barriers, as well as the lack of technological, managerial and human capabilities may limit their ability to deal with the financial crisis (Bourletidis *et al*., 2014; Vassiliadis & Vassiliadis, 2014). Moreover, the lack of strategic planning negatively influences this difficulty. Formal processes in SMEs that are related with strategic management and information handling help managers to focus on strategies, structures and processes that aim to enhance firm performance. In complex environments, businesses should develop formal processes using standardized rules and procedures which enhance the minimization of environmental uncertainty and manage economic consistency. Formalization supports the development of frameworks that require both communication among the individuals and sharing of new information. Moreover, it encourages the transformation of new ideas into real plans using flexible structures. In this way, the level of innovation in the organization is increased (Giannacourou *et al*., 2015; Siakas *et al*., 2014).

There is a lack of strategic planning and formal processes in SMEs and they use IS ineffectively because they cannot align business and IT strategy. Researches have thoroughly implemented in this research area so that managers could understand the relationship between strategic alignment and the business value of using IT. The results of these investigations show that researchers have determined the following types of alignment between business and IS strategy and structure. The first type presents business alignment between business strategy and structure. The second type concerns IS alignment and discusses issues such as alignment between IS strategy and structure. Finally, the third type is a cross-dimension alignment which involves either alignment between business structure and IS strategy or business strategy and IS structure. Researchers claim that the alignment between organizational perspectives such as strategy, structure, management processes, individual roles and skills with technology can help to increase value in businesses, IS effectiveness and business performance (Suh *et al*., 2013).

The accomplishment of a high degree alignment between IT and organizational objectives has been mentioned as one of the important issues for IS managers (Reich & Benbasat, 2000). In this view both the organization and IT are consolidated, developing services with the support of IT so that businesses could effectively achieve their goals. Strategic IT alignment is unique for each business because it includes business and IT knowledge that are unique resources for each business in order to help business to achieve its objectives, (Kearns & Lederer, 2003; Kitsios & Kamariotou, 2016; Mithas *et al*., 2011).

Researchers widely argue that the process of alignment is important for businesses for many reasons. First of all, alignment helps businesses to effectively identify the role of IT which efficiently helps the business to achieve its objectives. Second, another benefit is that alignment encourages businesses to improve both their business scope and their infrastructure by meliorating the relationship be-tween business aspects and IT. Researchers claim that the present alignment models are mostly business-driven rather than IT-driven. As a result, researchers should mostly focus on IT in order to determine the most suitable way in which technology can support the organization. Businesses require to know as well as to make their business strategy clear, so the use of IT can support this effort (Ullah & Lai, 2013).

Although the contribution of alignment methodologies has been mentioned, the following challenges incommode many businesses to align IT with business strategy. First, many decisions about IT are made by business executives who are not aware about IT. This obstacle leads to the organization being misaligned. Another challenge concerns IT executives who are not aware about the business objectives and often cannot realize the needs of business decisions. Finally, business and IT executives are conflicted and they do not trust each other. This influences negatively their relationship and consequently the business competence (Peppard & Ward, 2004; Piccoli & Ives, 2005; Rathman *et al*., 2004; Ullah & Lai, 2013).

The findings of surveys which study the influence of Strategic Information Systems Planning (SISP) phases on success conclude that IS executives focused their efforts on the Strategic Conception phase. Although planners concentrate their efforts on this phase, they cannot determine the suitable alternative strategies. As a result, their efforts do not positively influence SISP success. So, they cannot achieve their objectives. The most common problems which have been affected the SISP process are the lack of involvement and the failure to apply strategic IS plans. Executives cannot be committed to the plan, consequently the members of the team have difficulties to implement the IS strategy. Moreover, results show that executives understand that the Implementation phase is difficult and significant, so they concentrate on this phase (Lederer & Sethi, 1991; Newkirk & Lederer, 2006; Newkirk *et al*., 2003; Premkumar & King, 1994; 1991; Zubovic *et al*., 2014).

Findings from previous surveys indicate that many managers put too much efforts to SISP process while others too little. When managers invest too much efforts, the process could be confused, delayed or its implementation is prevented. When managers avoid investing too much time to the process, the implemented plans could be inefficient so the objectives could not be achieved. Consequently, the assessment of the process is significant because managers can reduce these unsatisfactory results. Findings conclude that managers concentrate more on Strategy Conception and Strategy Implementation and they do not invest time on Strategic Awareness and Situation Analysis and as a result the implemented plans are ineffective and unsuccessful and they do not meet the objectives (Brown, 2010; Newkirk & Lederer, 2006; Newkirk *et al.*, 2003). Moreover, when managers concentrate on the implementation of the process, they may achieve shorter SISP horizons but the strategic goals cannot be met. Executives do not focus on what strategic objectives really concern and how they can increase value to the business because they invest time on the horizon of the project and on minimizing its cost due to limited IT budget (Brown, 2010). Table 1 presents the phases of SISP process and Table 2 the dimensions of SISP success.

Table 1: SISP phases and activities

Phases	Activities	References
Strategic Awareness	Determining key planning issues (SAw1) Determining planning objectives (SAw2) Organizing the planning team (Saw3) Obtaining top management commitment (SAw4)	(Brown, 2004; Maharaj & Brown, 2015; Mentzas, 1997; Mirchandani & Lederer, 2014; Newkirk & Lederer, 2006; Newkirk *et al.*, 2008; 2003)
Situation Analysis	Analyzing current business systems (SA1) Analyzing current organizational systems (SA2) Analyzing current information systems (SA3) Analyzing the current external business environment (SA4) Analyzing the current external IT environment (SA5)	
Strategy Conception	Identifying major IT objectives (SC1) Identifying opportunities for improvement (SC2) Evaluating opportunities for improvement (SC3) Identifying high level IT strategies (SC4)	
Strategy Formulation	Identifying new business processes (SF1) Identifying new IT architectures (SF2) Identifying specific new projects (SF3) Identifying priorities for new projects (SF4)	
Strategy Implementation Planning	Defining change management approaches (SIP1) Defining action plans (SIP2) Evaluating action plans (SIP3) Defining follow-up and control procedures (SIP4)	

Table 2: SISP success dimensions

Dimensions	Items	References
Alignment	Maintaining a mutual understanding with top management on the role of IS in supporting strategy (AL1) Understanding the strategic priorities of top management (AL2) Identifying IT-related opportunities to support the strategic direction of the firm (AL3) Aligning IS strategies with the strategic plan of the organization (AL4) Adapting the goals/objectives of IS to changing goals/objectives of the organization (AL5) Educating top management on the importance of IT (AL6) Adapting technology to strategic change (AL7) Assessing the strategic importance of emerging technologies (AL8)	(Newkirk & Lederer, 2006; Newkirk *et al.*, 2003)

Analysis	Identifying opportunities for internal improvement in business processes through IT (AN1) Maintaining an understanding of changing organizational processes and procedures (AN2) Generating new ideas to reengineer business processes through IT (AN3) Understanding the information needs through subunits (AN4) Understanding the dispersion of data, applications, and other technologies throughout the firm (AN5) Development of a ''blueprint'' which structures organizational processes (AN6) Improved understanding of how the organization actually operates (AN7) Monitoring of internal business needs and the capability of IS to meet those needs (AN8)	
Cooperation	Developing clear guidelines of managerial responsibility for plan implementation (CO1) Identifying and resolving potential sources of resistance to IS plans (CO2) Maintaining open lines of communication with other departments (CO3) Coordinating the development efforts of various organizational subunits (CO4) Establishing a uniform basis for prioritizing projects (CO5) Achieving a general level of agreement regarding the risks/tradeoffs among system projects (CO6) Avoiding the overlapping development of major systems (CO7)	
Capabilities	Ability to identify key problem areas (CA1) Ability to anticipate surprises and crises (CA2) Flexibility to adapt to unanticipated changes (CA3) Ability to gain cooperation among user groups for IS plans (CA4)	

The results indicate that executives should pay attention to implementing Situational Analysis with greater meticulousness, so they can apply Strategy Conception and Strategy Implementation Planning with greater agility rather than now. Planners should analyze their current business systems, organizational systems, IS, as well as business environment and external IT environment. If planners understand those elements they can improve the result of the planning process excluding the increased time and cost which the process is needed. When executives understand the environment, they can determine important IT objectives and opportunities for improvement, they can evaluate them in order to define high level IT strategies in their business' strategy conception (Kamariotou *et al*., 2018; Mirchandani & Lederer, 2014; Zubovic *et al*., 2014).

The productiveness of internal processes is increased by the use of IT supporting the competitiveness of the organization to secure rare resources and to operate as a modulator against changes. An information processing is necessary to high-light limiting coordination costs, increasing inner control, improving the productiveness of internal methods, minimizing both costs of functions and costs of handling data. Finally, the use of IT helps the business to boost the relationship with customers by learning more about their needs. The use of IT help the business to reduce uncertainty as it is able to concentrate more on quickly changing consumer demands and reduce response times, increasing firm performance. As a result, customers are satisfied and conduce to the increase of firm performance. It also allows the business to develop differential products that customers need or to provide more efficient services when business offers their existing products (Fairbank *et al*., 2006).

After the analysis of previous surveys, this study examines the relationship be-tween profitability and the SISP phases, Strategic Awareness, Situation Analysis, Strategy Conception, Strategy Formulation and Strategy Implementation. The aim of this survey is the association of two important topics relationship constitutes a challenge for further research. Based on

previous findings and regarding previous researchers highlighted the effect of SISP on firm performance (Lederer & Sethi, 1996) the following hypotheses were indicated in order to be tested:

Strategic Awareness should concentrate on the planning process and on gaining appropriate knowledge about competitors, resources, customers and regulators. The understanding of that knowledge could be achieved through careful organization of the teams. Top management commitment provides greater organizational confidence and continual financial support for the process. Hence:
H1: Strategic Awareness positively affects firm's profitability.

Situation Analysis which focuses on the analysis of the business, organization and IS, would produce better knowledge about the organization's requirements. The analysis of external business and IT environments would help produce better knowledge about the effect of change and provide a better foundation for the plan, making it more possible to produce better results. Hence:
H2: Situation Analysis positively affects firm's profitability.

Strategy Conception, with recognition and assessment of opportunities, would provide more realistic alternatives. Recognition of IT objectives would enable the organization to align future IT and business objectives. Better alternatives and choices would support the plan produce better results. Hence:
H3: Strategy Conception positively affects firm's profitability.

Strategy Formulation includes the identification of the plan itself as far as processes, architectures, and projects. When the identification of the plan is careful, it would make it more possible to meet planning objectives. Better prioritization would result in greater likelihood of implementation and greater chance of meeting objectives. Hence:
H4: Strategy Formulation positively affects firm's profitability.

Finally, Strategy Implementation Planning, with more attention to change management and a better action plan, would be more possible to achieve good implementation. Better control would result in more of the plan being implemented and as a result better delivery of planning goals. Hence:
H5: Strategy Implementation positively affects firm's profitability.

SISP is a formal process and SMEs can implement it to define IS strategy and apply the most suitable IS for their needs. This process encourages businesses to make decisions on the planning and the implementation of IS, analyzing their re-sources considering both the environmental opportunities and the threats. Moreover, SISP involves all the factors and the activities which are shown above as the benefits of the formalization. Mirchandani and Lederer (2014), investigated SISP phases and they discussed that as the environment becomes more complex, more Situational Analysis is required. The analysis of current business systems, organizational systems and IS, as well as current external, internal business environment and current external IT environment permit the organization to determine problems and diagnose opportunities. So, more research in the implementation of this process will highlight the phases that contribute more in the success of the process. This will enable managers to improve the activities of these phases and to be more effective.

METHODOLOGY

A field survey was developed for IS executives. The instrument used five-point Likert-scales to operationalize two constructs: SISP phases and business performance. The SISP process constructs measured the extent to which the organization conducted the five planning phases and their tasks. The business performance measured using four dimensions named profitability, market share, number of new products to the market, customer satisfaction. The questionnaire was based on previous surveys regarding SISP phases and performance (Andersen, 2001; Brown, 2004; Cao & Schniederjans, 2004; King &Teo, 2000; Kitsios & Grigoroudis, 2014; Kitsios *et al.*, 2015; 2009; Maharaj & Brown, 2015; Mentzas, 1997; Mirchandani & Lederer, 2014; Newkirk & Lederer, 2006; Newkirk *et al.*, 2008; 2003).

Four IS executives 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. Then, the sample of this survey was IS executives in Greece and it was selected from the icap list (Newkirk & Lederer, 2006; Newkirk *et al.*, 2003). SMEs which provided contact details were selected as the appropriate sample of the survey. Thus, the survey was sent to 1246 IS executives and a total of 160 returned the survey. Data analysis was implemented using Multivariate Regression Analysis.

RESULT

The internal consistency, calculated via Cronbach's alpha, ranged from 0.812 to 0.856, exceeding the minimally required 0.70 level (Newkirk *et al.*, 2003; Pai, 2006). Table 3 presents the reliability statistics and Table 4 presents the results of regression analysis.

Table 3: Reliability statistics

Constructs	Scale Mean if Item deleted	Scale Variance if Item deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item deleted
Strategic Awareness	17,425	14,913	,642	,839
Situation Analysis	17,547	14,898	,584	,852
Strategy Conception	17,368	14,978	,733	,822
Strategy Formulation	17,566	15,258	,660	,835
Strategy Implementation	17,660	14,188	,778	,812
Firm Performance	18,000	17,086	,536	,856

Table 4: Coefficients [a]

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.	Hypothesis
	B	Std. Error	Beta			
Constant	1,105	,305		3,620	,000	
Strategic Awareness	,006	,084	,088	,076	,940	H1 (-)
Situation Analysis	,038	,072	,053	,524	,602	H2 (-)
Strategy Conception	,214	,105	,254	2,048	,043	H3 (+)
Strategy Formulation	,265	,088	,324	3,022	,003	H4 (+)
Strategy Implementation	,031	,106	,040	,292	,771	H5 (-)

This study first analyzed the relationship between Strategic Awareness and firm's profitability. H1 found no support. As IS managers do not invest time on Strategic Awareness, they do not identify planning objectives and they are not committed. As a result this phase does not affect firm's profitability. Furthermore, Situation Analysis found no support (H2). Despite the fact that this phase is very important for IS executives in order to gather information about competitors, industry and customers, results show that they did not focus their attention on this phase (Newkirk & Lederer, 2006; Newkirk *et al*., 2003). So, this phase does not increase firm's profitability. As predicted by H3, Strategy Conception indicates a positive relationship with firm's profitability (β=0,214, p<0.005). Consequently, H3 is supported. In contrast, previous findings show that more strategy conception does not, apparently, contribute to a better set of alternatives to managers in order to choose (Newkirk & Lederer, 2006; Newkirk *et al*., 2003). Furthermore, H4 is supported since the Strategy Formulation has an important positive effect on firm's profitability (β=0,265, p<0.005). Finally, H5 found no support. The strategy implementation planning phase is especially interesting, because implementation is generally seen as the most crucial phase to success. Plans may be conceived and formulated but are seldom implemented. Unfortunately, the results of this survey show that managers do not implement their plans.

Results indicate that IS executives are not aware of analyzing the external IT environment and evaluating opportunities for IS development. This finding is crucial because it confirms that senior executives in SMEs do not invest in emergent technologies and cannot fit with the strategic, structural, and environmental dynamics. Furthermore, an important obstacle is that managers do not focus on organizing the planning team. Employees who will participate in the development of IS should have IT skills, motivation to develop effective IS and cooperation skills. This finding is associated with the lack of management support and the lack of clear guidelines about the IS development. IS executives should be able to define priorities, increase the cooperation among the IS team and provide guidelines regarding in order to support the effectiveness of IS plans and align them with business plans.

In response to anticipated changes in business environment, companies are developing IS at an increasing rate. Therefore, IT investment has been a significant issue for managers, as it is crucial budget items in most businesses. However, senior executives do not formulate IT strategies and priorities, so they cannot anticipate risks and crises. As managers cannot identify problem areas, they cannot redesign business processes. Thus, IS that are developed are based on the existing business processes and they cannot be aligned with IS objectives. This finding confirms the negative consequences that SMEs face due to the lack of strategic planning.

Management literature has shown results on the concentration of senior executives on Strategy Conception and Strategy Implementation. IT managers do not invest time on Strategic Awareness and Situation Analysis, as a result the implemented plans are not effective, successful and they do not meet business objectives (Brown, 2004; Kamariotou & Kitsios, 2019; 2017a; 2017b; 2016; Kitsios & Kamariotou, 2019a; b; c; Newkirk & Lederer, 2006; Newkirk *et al*., 2003). Furthermore, managers who only concentrate on the implementation of the process, can achieve shorter SISP horizons but they cannot align strategic goals with IT ones. Senior executives do not pay attention to strategic objectives how IS can increase business value because they focus on the horizon of the project and on decrease of cost due to limited IT budget (Brown, 2004). The results of this survey indicate that managers who pay attention to implementing Situational Analysis with greater meticulousness, they can apply Strategy Conception and Strategy Implementation Planning with greater agility rather than now. Planners could analyze their current business systems, organizational systems, IS, as well as the business environment and external IT environment in order to align IT strategy with business strategy. Thus, the output of the planning process can be significantly improved

excluding the increased time and cost needed for the process. When executives understand the environment, they can determine important IT objectives and opportunities for improvement and they can evaluate them in order to define high-level IT strategies in their business' strategy conception (Arvidsson *et al*., 2014; Burgelman et al., 2018; Chen *et al*., 2010; Kitsios & Kamariotou, 2016; Marabelli & Galliers, 2017).

CONCLUSION

So far, few academic researchers have paid attention to the effect of SISP phases on firm performance. This paper examines the contemporary impact of IT and business strategy on business performance, incorporating all these constructs into a model that is tested using Multivariate Regression Analysis. The results of this survey show that Strategy conception and formulation have a significant impact on business performance.

IT without strategic direction does not increase value to SMEs. SMEs should determine and communicate their vision, mission, business strategy and goals in order to align them with strategy and goals of IS. Managers in SMEs should be aware of IT issues in order to make better decisions for their businesses. This is difficult to be achieved when managers are not young and educated about IT. Frequently, they make decisions without focusing on the objectives of IS department and this can be an obstacle for SMEs profitability and competitiveness. Thus, a culture of innovation and supporting IT is required to increase SMEs benefits through the process of strategic alignment.

In order to develop sustainable performance in the current complex environment, SISP process is significant for businesses as it supports successful development and implementation of their IT projects. Implementing SISP process is a difficult task. It is necessary that businesses have multiple planning aspects by fully understanding their goals and strategies and facing up to their various issues. To conduct SISP process successfully, it is essential be that phases which have a positive impact on the process be taken into consideration.

The results of this study contribute to IS executives' awareness of the strategic use of IS planning in order to increase competitive advantage. Understanding those phases may help IS executives concentrate their efforts on organizations' objectives and recognize the greatest value of the planning process in their business. Second, the results of this survey can increase their awareness of the phases of SISP. IS executives should be knowledgeable about the five phases and they should not ignore the tasks of each one because this might be an obstacle which prevents the organization from achieving its planning goals and thus from realizing greater value.

A limitation of this study stems from the fact that the sample was not adequate. Nevertheless, the results of an exploratory study will be summarized in an improved conceptual model for further research. Also, this survey is made for SMEs. Future researchers could examine and compare these results with relative ones from large companies. Apparently, future researchers may use different methodologies for data analysis such as SEM.

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