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Information systems support for organizational strategy

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MSc in Business Administration

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BUSINESS
SCHOOL

Department of Marketing, Strategy and Operations

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Resumo

Atualmente, dado o avanço tecnológico e a necessidade das empresas de fazer face aos seus concorrentes e às contantes mudanças de mercado, os Sistemas de Informação (SI) têm revelado ser um fator crítico de sucesso e de sobrevivência no contexto organizacional. Informação de qualidade e adequada aos objetivos de uma empresa são atualmente um dos maiores ativos da mesma, pois permite às organizações definir e implementar estratégias apropriadas que levarão, com maior probabilidade, ao sucesso e à vantagem competitiva.

Deste modo, a presente dissertação visa compreender quais os benefícios que poderão ser obtidos através da implementação de SI. Os aspetos em que as empresas devem investir de modo a maximizar esses benefícios e a identificação dos riscos associados ao uso desses sistemas, bem como, a resposta das empresas face a esses riscos, particularmente, numa perspetiva de mitigação de risco. Sendo o principal objetivo do presente estudo perceber, em concreto, se os SI contribuem para a estratégia.

Considerando as variáveis mencionadas no paragrafo anterior, foi realizada uma análise das mesmas através de métodos quantitativos. Os resultados obtidos comprovaram que, de facto, os SI impactam positivamente a estratégia das empresas. Particularmente, através de investimentos em equipamento adequado à implementação dos sistemas, nomeadamente, tecnologia e Recursos humanos com específicos conhecimentos em SI e Tecnologia da Informação. Segundo os resultados alcançados, pode-se ainda constatar, que esses investimentos são, influenciados pelos benefícios e pelos riscos associados ao uso de SI, estando todos eles de um ponto de vista estatístico positivamente relacionados.

Palavras-Chave: Sistema de Informação; Estratégia organizacional; Benefícios de Sistemas de Informação; Riscos de Sistemas de Informação, Investimento em Sistemas de Informação; mitigação de risco

Classificação JEL:

M15 - IT Management

O33 – Technological change: Choices and Consequences • Diffusion Processes

Abstract

Nowadays, due to the technological evolution the necessity of companies to face their competitors and the constant market changes, Information Systems (IS) have revealed as a critical success and survival factor in the organizational context. Information with quality and suitable for the companies' objectives are currently one of the main assets of firms, since enable organizations to choose and implement accurate strategies that will probably lead to success and competitive advantage.

For that matter, the present research aims to understand what are the benefits that can be achieved by companies through the implementation of Information Systems. The aspects in which companies should invest as way to maximize those benefits and identify the risks associated with Information Systems implementation, as well as what are the answers of firms in regards with those risks, particularly, at a risk mitigation approach. Being the principal objective of the present investigation understand the contribute of Information Systems for organizational strategy.

Bearing in mind the variables mentioned in the previous chapter, a data analysis was performed through a combined approach of quantitative methods. The results obtained verify that, in fact, the Information Systems have a positive impact in firms' strategy. Specially, through the investments in suitable equipment for IS implementation, namely, technology and Human Resources with specific IS capabilities. Considering the results achieved, one can affirm that those investments are influenced by the Benefits and Risks associated with the use of IS, revealing, in a statistical perspective, a significantly positive relationship.

Keywords: Information Systems; Organizational strategy; Benefits of Information Systems; Risks of Information Systems; Investments in Information Systems, Risk mitigation

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Abbreviations List

IS	Information Systems
IT	Information Technology
ERM	Enterprise Risk Management
ERP	Enterprise Resource Planning
RBV	Resource Based View
HR	Human Resources
HRI	Human Resources Investment
SCA	Sustainable Competitive Advantage
ISSP	Information Systems Strategic Planning
ESS	Executive Support Systems
EIS	Executive Information Systems
SEM	Structural Equations Modeling
PLS	Partial Least Squares Technique
CR	Composite Reliability
AVE	Average Variance Extracted
HTMT	Heterotrait-Monotrait
VIF	Variance Inflation Factor
SI	Sistemas de Informação

Chapter I - Introduction

Contextualization

Currently, due to the rapid development of technology and the ever-changing markets, Information Systems (IS) have assumed an important role in companies' success (Barua, *et al.* 2004; Wheeler, 2002). Information with quality and suitable for the companies' objectives are extremely important, namely at a strategic level, enabling firms to choose and implement accurate strategies that will probably led to a competitive advantage position (Watson, 2007, p.89).

In that way, when approaching the impact of Information Systems for strategy, is extremely important to analyze other variables that are intrinsically related with the use of Information Systems. The variables that will have an important role on this investigation in regards with Information Systems are the benefits, investments and risks associated with their implementation. The aim of this paper is basically to understand and interpreted the relationship between all of these variables whether direct or indirect.

IS can help companies in improving many crucial areas of their activities, all of which are intrinsically linked to strategic management, namely the management itself, the decision-making process (Davis, 1974; Buckingham, *et al.* 1987; Murphy & Simon, 2002; Wetherbe, 2004 and Laudon, 2009), and the management of their resources (Murphy & Simon, 2002, quoted by Queiroga, 2009, p. 8). It also provides competitive advantage, helps companies grow, improves efficiency and productivity, and enable companies to offer differentiated services and products (Addo-Tenkorang & Helo, World Congress on Engineering and Computer Science, Ao, & International Association of Engineers, 2011, p. 1111). Additionally, organizations can benefit from IS in terms of cost, differentiation, and support in its long-term plan (Gouveia, Borges & Ranito, 2004). Accordingly, the greater the investment made by companies in IS, namely, adequate technology (Kenneth, *et al.* 1998), and human resources, particularly those with specific IT capabilities (Huang *et al.* 2006), the greater the information systems outcomes and the maximization of benefits.

On other hand, among the major risks associated with IS, namely, Technical (hardware or software failures) (Watson, 2007), Cost of implementation and maintenance, Difficulties implementing IS, Infrastructure and Organizational Risk, Functionality Risk, and Lack of User Commitment (Belmiro & Pina, 2001, quoted by Queiroga, 2009 and Mendes & Filho, 2002, p. 287). Investing in proper and suitable technology, in order to mitigate technical risks, becomes more important as the risks increase. Similar to the lack of user commitment and lack of motivation risks, if companies detect that the level

of user commitment is negatively affecting the outcomes of IS, they will invest more, namely in Human Resources, in order to deal with the risks.

Problem Discussion

The evolution of the technological era and the increase on the market's competition forced companies to adapt to that new reality and evolutions. One of the measures taken by firms were the implementation of Information Systems over all its departments in order to have access to a more complex and updated information. Enabling companies to achieve competitive advantage and consequently being well succeed.

However, when approaching IS and its impact on firms, namely on strategy is crucial to analyze all the aspects that affect and are affected by IS. In the current investigation, the principal aspects under analysis are benefits, risks and investments. The individual evaluation of the effect of each variable in the impact of IS in strategy is extremely important, namely, to understand if it brings benefits at a strategic level or to verify if the risks associated with it are a barrier for companies to invest on those systems.

Moreover, IS are affecting most management functions and have become essential to firm's competitive advantage and survival in the "new global digital economy" (Watson, 2007, p.89) and are considered as one of the type of informatic management systems, must relevant and important for organizations and for decisions support (Cricelli *et al.* 2014, p. 164). "Information systems make it possible for firms to manage all their information, make better decisions, and improve the execution of their business processes. These activities are supported by flows of material, information, and knowledge among the participants in business processes" (Laudon, 2009)

Conversely, lack of top management commitment, failure to gain user commitment, misunderstanding requirements, lack of user involvement, failure to manage end user expectations, changing scope and lack of required knowledge are some of the risk factors that the authors consider that can lead to negative outcomes for a company (Keil *et al.* 1998 and Barki *et al.* 2001), are risks that if not identified and mitigated can led companies to failure. One of the solutions used by companies nowadays to face and avoid those risks are the investment in a specific IS of risk mitigation, namely, Enterprise risk management (ERM), other risk mitigation plans and risk control.

As so, the main objective of the present study is to understand the real impact of information systems in companies, in order to understand if is, in fact, a critical factor of firms' success and survival or if, in other hand, its risks avoid companies to adopt those systems. In regards with the companies that already adopted IS the aim of this investigation is to understand its contribute at a strategic level.

Research Objectives

Considering the contextualization done in the previous point, the first objective of this research is to identify the advantages of Information Systems implementation in firms, namely in organizational strategy. In which the current paper aims to understand with the use of information systems enable companies e benefits relevant for its strategic department, as to get competitive advantage, to grow, improve efficiency and productivity.

Additionally, bearing in mind the previous contextualization point, one can assess to the remaining three objectives of this research, being them analyze the impact of the investments performed related with Information Systems (e.g., Technology, Human resource, risk management systems) by companies in its performance. Recognize and analyze the impact of risks as respective strategies used by companies to mitigate those risks associated with Information Systems implementation. And analyze and identify the contribute of Information Systems for an organizational strategy.

In order to obtain the objectives of this investigation a data collection was done through an online questionnaire for people that use or had used Information Systems at an organizational level with the aim of understand the impact of Information Systems for strategy through the following objectives:

- a) Identify the advantages of investing in Information Systems in firms, namely in organizational strategy.
- b) Analyze the impact of the investments performed related with Information Systems (e.g., Technology, Human resource, risk management systems) by companies in its performance.
- c) Recognize and analyze the impact of risks associated with the use of IS on the investments performed by companies in Information systems.
- d) Analyze and identify the contribute of Information Systems for an organizational strategy.

Investigation Structure

The present research is divided into six chapters, the first one is the current chapter – an introductory section – that is composed by a conceptualization of the study, the problematic discussion the main objectives of the present investigation and its structure.

The following chapter is the second one that is composed by the Literature Review with the main concepts of the principal topics under analysis. As Information Systems; Organizational strategy; Benefits of Information Systems; Risks of Information Systems; Investments in Information Systems, Risk mitigation. The research questions that will guide this investigation will be further discussed through the, followed the research hypothesis and respective objectives can be found in chapter 3 “Theoretical approach”. Chapter 4 covers the research methodology used for the present research as well as the analysis of the data. It also describes the sample as well as the results generated by the developed questionnaire.

Lastly, the 5th chapter cover the discussion of the obtained results upon the data collected, with the objective of answering the presented research questions. The 6th and final chapter present the main conclusions of the present investigation, in which the principal challenges and limitations of the present study are discussed, followed by the recommendations for future researches.

Chapter II - Literature review

1. Information Systems

Nowadays Information Systems (IS) are assuming a strategic tool for most organizations, to integrate organizational business procedures, and to share information across functional areas of a company (Ehie & Madsen, 2005). IS are affecting most management functions and have become essential to firm's competitive advantage and survival in the "new global digital economy" (Watson, 2007, p.89). While some organizations have achieved notable benefits from their IS, others have experienced difficulties in gaining the benefits they expected. Thus, it can be said that contextual factors are one of the contributors toward IS success (Barua, *et al.* 2004; Wheeler, 2002).

Besides the importance that IS have assuming in organizations, its definition is still ambiguous in literature, in the way that there is more than one meaning. The lack of agreement regarding the definition of the term, is not related with the lack of studies or information, but rather, because of the different applications that Information Systems can have, in the sense that the same meaning is being used to designate different things.

According to Falkenberg, *et al.* (1998), the most characteristic aspect of a system is the presence, share and exchange of information, that is also characterized as "knowledge-for-decision-making-and-action", that is acquired by one individual through the communication process with another individual. According to Galliers (1987), information can be defined as being the collection of data that is shown in certain way and in a certain moment, it can improve the knowledge of the entity that is receiving the information enabling the respective entity to be capable of perform a purposed action or decision. The quality of information can be measured considering four main characteristics, precision - the accuracy of the information, opportune – the information that exists in the right moment at a certain time, complete – directly related with the accessibility of all details and components of the information and concise – information easy to be perceived and communicate, in order to avoid misunderstandings or manipulated information.

No matter the business activity of a company, is indispensable to have access to a quality information source, in order to ensure the mission of the firm and the achievement of its KPI's and goals. "All the contemporary management aspects strongly depend on information to be successful" (Adeoti-Adekeye, 1997, p. 318). Gouveia, *et al.* (2004), while defining information, considering an organizational and managerial approach, reinforce that the informing process has different importance and priority levels in an organization, being that directly related with the levels of

responsibility. For that reason, the importance of adapting information flow to the level of prioritization is extremely important. Having that in consideration, a company has three levels of priority/ responsibility, the first one is the strategic level, where the information should be elaborate and high-quality, being a tool for making long-term decisions. This level normally is in management positions within organizations; the second e called the tactic level is the intermediate level where information is a tool used for medium-term decisions, that normally has influence in the resources' management of the firms. The operational level is the third level that is the last level of responsibility in the organization, where the information required is not so elaborate and complex as in the other levels, being normally acquired through the information flow present in the corporations and has an impact in the daily activities of the company, namely in the short-run decisions.

In Frisco Framework, Falkenberg, *et al.* (1998), gave a very interesting example that represents how general a term system can be. When describing, in literal and physical terms, system is clear to identify that is something that has a very embracing approach. The authors defend that a system can be, for instance, the "solar system", but also, an organization, which is composed by a set of resources (people, actives, finance, machinery, among many others) or even a computer. These examples clearly shows that the term system is multidisciplinary and transversal to many approaches. Also, the author says that an organization is considered a system given that is composed by a set of resources, that are directly or indirectly interrelated and have interaction among them, being composed by systematic characteristics and taking actions on the basis of information and communication process. According to Skyttner (1996), a complex system most have some autonomy, in order to have self-control and adaptability to the reality and the environment they are in. That autonomy is just possible given that systems are powered by knowledge, enabling the systems to be intelligent and evolutionary. For Walden *et al.* (2016), systems are "an integrated set of elements, subsystems and assemblies that accomplish a defined objective. These (...) include products (hardware, software, firmware), processes, people, information, techniques, facilities, services, and other support elements".

Information System is "an integrated man/machine system for providing; information to support the operations, management and decision-making functions in an organization. The system uses computer hardware, software, system manual procedures, management and decision models and a data base" Davis (1974), or as affirmed by Buckingham, *et al.* (1987 pp.18), "a system which assembles, stores, processes, delivers information relevant to an organization, in such a way that the information is as being part of the accessible and useful to those who wish to use it, system including managers, staff, clients and citizens. An information system is a human activity (social) system which may or may not involve the use of computer systems".

Following Turban, *et al.* (2004) approach, an information system, process, storage, analyze and disseminate information from a specific object of a determined context. The author also says that an information system is just well used if it enables its users to generate knowledge in the organization. According to Stair & Reynolds (2005, p. 4), an information system is a set of components interrelated that collect, manipulate, and disseminate data and information in order to obtain mechanisms of autonomy to achieve the goals. More recent studies such as of the, Cricelli *et al.* (2014, p. 164), consider that information systems are the type of informatics management systems, must relevant and important for organizations and for decisions support. While Mesquita *et al.* (2013, p. 1291), define IS, ERP (Enterprise Resource Planning) in particular, as the integrated management systems that have been implemented by diverse companies, as a way of optimizing its operations.

1.1 Advantages of Information Systems

According to Ross & Vitale (1998), quoted by Mesquita *et al.* (2013, p. 1294), there are technological, operational, and strategical reasons that lead an organization to adopt an information system, more concretely a system of ERP. According to World Congress on Engineering and Computer Science *et al.* (2011), firms have the possibility of obtaining benefits in IS adoption, if the company has the support of the top management departments, a plan adapted to the vision of the business, if invest in the reconfiguration of the business processes and if the firm develop efforts to have effective projects management policy. Besides, the risk associated that is always present in IS adoption. An information system, such as ERP, allows the integration of other organizational processes, enabling the improvement of efficiency and keeping the competitive position of the company in the market. (Addo-Tenkorang & Helo, World Congress on Engineering and Computer Science, Ao, & International Association of Engineers, 2011, p. 1111)

“Information systems make it possible for firms to manage all their information, make better decisions, and improve the execution of their business processes. These activities are supported by flows of material, information, and knowledge among the participants in business processes” (Laudon, 2009). For Mehrjerdi (2010, p. 308), an Information System is capable to control an organization, monitoring materials, orders, inventories, and stocks. In this way, IS allows companies to have access to updated, real and complete information, enabling the companies’ management improvement. As per Murphy & Simon (2002, quoted by Queiroga, 2009, p. 8), the advantages of information systems should be classified by categories, namely, the operational, which includes the cost reduction, reduction of operating cycle time, improvement of productivity, quality improvement and improvement of services provided to the customer. The Managerial that has as advantages the

improvement in resources management, improvement in decision-making, planning, and improvement of performance. The strategic, with the support for business growth, creation of business innovations, promotion of low operational cost strategy (cost leadership), generation of service differentiation and creation of external relationships, e.g., with customers or suppliers. Information technology infrastructure, in this category for the author the advantages are the creation of business flexibility to support current and future changes, reduction of IT costs and incensement of capacity in the IT infrastructure. The last category pointed by the author is the organizational, that supports organizational changes, facilitates the business learning and creation of common perspective and views.

1.2 Risks and Risk mitigation actions of Information Systems implementation

As stated previously the use of Information Systems in an organizational approach can incur in many benefits across all the company. Although, as per studied by Watson (2007), there are some set of categories that can be potential causes of systems failure. The author mentioned as the main threats the human failures, malicious behavior (by organizational insiders and outsiders), natural (e.g. flood, fire, pandemic), environmental, technical (hardware or software failures) and operational. Another authors, associate the IS risk with the complexity related with the IS development. Thus, authors as Belmiro & Pina (2001), quoted by Queiroga (2009) and Mendes & Filho (2002, p. 287) appointed the main risk and difficulties associated with the IS adoption in an organizational approach. Being them, the involvement of top management departments/positions, the cost of implementation and maintenance, the necessity of an adequate plan of implementation, the experience of the team in order to manage the implementation, the internal communication through all the implementation process, continuous adaptation and redefinition of the processes, adaptation of the IS to the organization and regular system actualizations.

According to Loudon and Loudon (1991) risk refers to exposure to such consequences as: failure to obtain some or all anticipated benefits due to implementation difficulties; implementation time much longer and/or costs much higher than expected; technical systems performance significantly below the estimate; incompatibility of system with selected hardware and software. Parker, *et al.* (1988) mentions in its framework five major risks that should be assessed by companies, being them organizational risk, how equipped the organization is to implement the project in terms of personnel, skills and knowledge. Information infrastructure risk, how prepared the company is to support the IS project. Definitional uncertainty, the degree to which the requirements and / or the specifications of the project are known. Competitive responsive, related with the degree of corporate risk associated

with not undertaking the project, and technical uncertainty, evaluates the project's dependence on new or untried technologies.

Many were the studies done regarding the categories of risks that were recognized through the identification of different types of negative outcomes. Authors like Clemons (1991); Clemons (1995); Clemons *et al.* (1995), Straub & Welke (1998), Smith *et al.* 2001, Benaroch (2002) and Viehland (2002), pointed out as risk category project risk (projects that cannot be completed within budget, schedule and/or quality constraints), functionality risk (projects that fail to deliver functionality), political risk (systems that change power relationships with suppliers) and security risk (systems that are insecure).

According to Barki *et al.* (2001), risk factors¹ is the name of are factors whose presence increases the probability of negative outcomes. Risk factors may include individual factors such as size of project, new software, or malicious employees. For Keil *et al.* 1998 and Barki *et al.* (2001), lack of top management commitment, failure to gain user commitment, misunderstanding requirements, lack of user involvement, failure to manage end user expectations, changing scope and lack of required knowledge are some of the risk factors that the authors consider that can lead to negative outcomes for a company. For Sherer & Alter (2004), there are different risk factors and respective negative outcomes in each work system element of a company, that are represented in the table 2.1 below.

¹The term success factor is used in a number of different ways. In the implementation literature, a success factor is a factor whose presence increases the probability of success, just as risk factors do the opposite. A different use of the term that was popularized for IS planning in the 1980s is "critical success factor" (CSF), an aspect of a business or a high-level business goal that is critical for business success and therefore should be addressed by the IS plan. For example, Rockart and Crescenzi [1984] say that the CSFs for one company include improving customer and supplier relationships, making the best use of inventory, and using capital and human resources efficiently and effectively.

Table 2.1 - Risk system elements, respective risk factors, and negative outcome.

Work system element	Typical risk factors and negative outcomes
Participants	<p>RISK FACTORS</p> <ul style="list-style-type: none"> • Inadequate managers and leaders • Inadequate skills and understanding • Lack of motivation and interest • Inability or unwillingness to work together to resolve conflicts • Mismatch between characteristics of participants and requirements of the Process <p>NEGATIVE OUTCOMES</p> <ul style="list-style-type: none"> • Inadequate performance in terms of productivity, consistency, cycle time, activity rate, or other measures • Personnel problems
Information	<p>RISK FACTORS</p> <ul style="list-style-type: none"> • Inadequate information quality • Inadequate information accessibility • Inadequate information presentation • Inadequate information security <p>NEGATIVE OUTCOMES</p> <ul style="list-style-type: none"> • Inadequate business process performance in terms of productivity, consistency, cycle time, activity rate, or other measures • Participant frustration • Information loss or theft
Technologies	<p>RISK FACTORS</p> <ul style="list-style-type: none"> • Technology is difficult and inefficient to use. • Technology performance is inadequate for requirements of business process. • Hardware or software contains serious bugs that could degrade work system efficiency or effectiveness. • Incompatibility of technology with other complementary technologies elsewhere <p>NEGATIVE OUTCOMES</p> <ul style="list-style-type: none"> • Inadequate business process performance in terms of productivity, consistency, cycle time, activity rate, or other measures • Participant frustration
Infrastructure	<p>RISK FACTORS</p> <ul style="list-style-type: none"> • Human infrastructure inadequate to support the work system. • Technical infrastructure inadequate to support the work system. • Information system infrastructure inadequate to support the work system. <p>NEGATIVE OUTCOMES</p> <ul style="list-style-type: none"> • Diminished work system performance due to inadequate support from infrastructure.
Strategies	<p>RISK FACTORS</p> <ul style="list-style-type: none"> • Mismatch of the work system with the organization’s strategy • Inadequate work system strategy for accomplishing its goals. <p>NEGATIVE OUTCOMES</p> <ul style="list-style-type: none"> • Ineffective work system performance

Source: Sherer & Alter (2004)

Associated with the many risks and difficulties stated in the previous point, Watson (2007), gave many approaches in order to mitigate those risks. “Risk mitigation refers to the actions designed to

counter identified threats.” (Watson, 2007, p.272). Risk category is best managed through active prevention: monitoring operational processes and guiding people’s behaviors and decisions toward desired norms (Kaplan & Mikes, 2012). A proper risk mitigation plan will weigh the impact of each risk and prioritize planning around that impact. For organizations is important to have a risk mitigation plan in order to help and prepare firms for the worst, acknowledging that some degree of damage will occur and having systems in place to confront that (Goldsack, 2017). Watson (2007), found a comprehensive and comprehensible framework, that divide mitigation risks control in an organization in three categories. (1) Management control – that intended to ensure that the requirements for system confidentiality are satisfied. (2) Operational controls – include day-to-day processes more directly associated with actual delivery of the information services. (3) Technical control - technical capabilities incorporated into the IT infrastructure specifically to support increased confidentiality, integrity, and availability of information services.

1.3 Information Systems investments

According to Laudan *et al.* (1998), the companies should invest in technology namely in information systems since in today’s global market no industry or business can survive without having latest technology. Technology is the tool through which a business is going to grow Investment is required to buy the technology. Thus, is possible to conclude that there is a direct relationship between technology, investment and business. Fardal (2007), consider that Investments in IS develop a foundation for continuing progression; however, their returns are not accomplished smoothly and promptly. For Mar *et al.* (2012), IT control systems are essential for companies’ data protection and is one of the best options to mitigate and control de risks associated with information systems, such as the vulnerability to potential information attackers.

Investments in information systems can assist different aims. Cox (1990), differentiate several investments categories being them the mandatory investments, investments to improve performance, competitive edge investments, infrastructure investments and research investments. According to many studies, the IS and IT investments have a great impact in companies’ performance. According to Haewon *et al.* (2016), there is a relationship between IT investment and tangible returns such as productivity, IT investment positively affects business performance. Similarly, Lee (2005), agrees that IT investment growth causes economic performance growth in longer periods. A study done by Kwon (2007), reveals a positive relationship between IT investment and several firms performance variables, such as firm growth, market competitiveness, customer relationships, partnerships with suppliers and operational efficiency. A study done by Liao *et al.* (2015), showed that better IT investments indeed

contributes to increasing a firm's service quality and consequently customer satisfaction, market competitive advantage, and profitability.

Many were the scholars that studies the relationship between IT investments and a firm performance, the following table represents some of findings of authors that shows that, in fact, IT investments and a firm performance has a positive relationship in many aspects.

Table 2.2 - Studies on IT investment

Relationship between IT and firm performance	Theory	Findings	Author
Positive	Matched sample comparison RBV theory	This study used 5 years of sample data (IT spending and sales revenue) and found that superior IT capability improves firms' business performance though their IT investment.	Bharadwaj A. (2000)
Positive	Causal mechanism (Granger causality)	IT investment growth causes economic performance growth in longer periods.	Lee S. (2005)
Positive	Production approach Variance approach	This study found a direct positive relationship between IT investment and five firm performance variables (firm growth, market competitiveness, customer relationships, partnerships with providers, operational efficiency) and that the CIO's role has a positive moderating impact on business while IT outsourcing has a negative impact.	Kwon S-O. (2007)
Positive	Strategic alignment	IT investment with business strategic alignment can increase sales revenues and profits.	Terry A, Byrd BR, Lewis R, Bryan W. (2006)
Positive	Knowledge production function framework	IT is vital to intermediate processes such as those that produce intangible output and the use of IT in innovation and knowledge creation processes is the most critical to a firm's long-term success.	Kleis L, Chwelos P, Ramirez RV, Cockburn I. (2012)
Positive	System dynamics process	The amount of IT investment and market entry time influence firm performance.	Liao Liao Y-W, Wang Y-M, Wang Y-S, Tu Y-M. (2015)
Positive	Econometric mode	Firms with the highest IT investment and capability have 45–76% greater market value than firms of the lowest IT investment and capability	Saunders A, Brynjolfsson E. (2016)

Source: Lee *et al.* (2016)

As previously mentioned, the investments done by firms in Technology and Information Systems has a great impact in all the organizational levels, namely regarding the management and mitigation of risks. For Patterson (2015), a specific Information system called Enterprise risk management (ERM) provide many functionalities that can support firms to manage many risk aspects such as identify, define, and establish formal risk appetite and tolerance and measurements and define risk criteria, such risk factors and levels. Enterprise systems and technology tools effectively supports an integrated ERM process, that improve firms' ability to manage and mitigate enterprise risks. That are many threats and bugs associated with the implementation of IS, that negatively affect business processes.

In order to face those threats organizations are investing in risk assessment techniques in order to identify existing and potential risks, decrease their vulnerabilities and providing secure environment for information assets (Eroglu & Çakmak, 2016).

McGaughey *et al.* (1994), indicated that investment in risk management is both vital to identify the treats, assess and control them. Although the use of information technology may cause unexpected risks, for Bahli & Rivard (2005), organizations can control the risks by implementing information technology properly and defining IT policy according to organization goals. For Dikmen *et al.* (2008), risk management has stages of identifying risks, assessing risks, addressing and controlling them, and finally reviewing and reporting risks.

Huang *et al.* (2006), defends that if firms want to use IT investment to improve their performance, their IT skills must be improved first and, if the firm wants to improve its IT skills, it should enhance its human IT capability with a background in resource-based view (RBV) theory. Until a firm's IT capability is ready, IT investment will not impact the firm's performance. Hence, is very important for companies to invest in Human resources (HR). For Becker (1975), HR investment has a positive influence on profitability mediated by labor productivity. According to Oyewunmi *et al.* (2017), Human resource investment (HRI) involves an early cost such as in education and training, that allows firms to be compensated in the future, for instance, increasing the firm's productivity. As defended by Holland (2017) and Roca-Puig *et al.* (2018), that human Resource investment positively influences productivity. Also, to Liao *et al.* (2019), human capital investment aims to get a higher return (profit). Although, for Edmans (2011) and Kwon (2011), HRI cannot give a return in the short-term period, but instead in a long-term period.

2. Strategy

2.1. Definition of strategy

Usually is very difficult to predict how the market and industries will change, and so it is rarely possible to know if a firms' strategy is or not the right strategy to take. The term strategy has been studied and defined by many authors over the years. According to Chander (1998, p.11), "strategy is the definition of the principal long term objective of a company, as well as, the adoption of action lines and allocation of resources in order to achieve the established goals.". Mintzberg *et al.* (2000, p. 16-21), approach defined strategy considering five different perspective, being them, (1) planning, (2) padronization, (3) positioning, (4) perspective and (5) trick. While Andrews (2004, p.58), gave a more

general definition, saying that strategy is the decision pattern of a company that define and reveals its objectives, purposes and goals. It produces the principal policies and plans as a way to achieve the respective objectives and define the business scale in which the company should be involved, and the type of economic and non-economic organisation that the firm want to its shareholders, employees and for the community in general. Another definition was given by Barney & Hesterly (2005), the author defined strategy as the theory about how to gain competitive advantages. For the authors a good strategy is the one that actually generates such advantages. More recently, Webster (2017), defined strategy as being "the art of devising or employing plans or stratagem toward a goal".

The strategic management process, as show on figure 2.1, created by Barney & Hesterly (2005), is a sequential set of analysis and choices that can increase the likelihood that a firm will adopt a good or the right strategy. Which has as a ultimate objective the generation of competitive advantages.

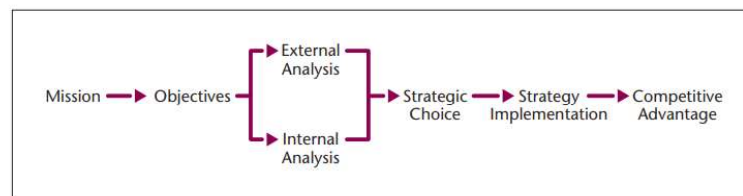


Figure 2.1 – The strategic Management process

Source: Barney & Hesterly (2005)

Most companies use the strategic management process to choose and implement a respective strategy, although, not all strategies arise that way. Some strategies emerge over time, in order to respond to changes in markets competition. Barney & Hesterly (2005), define emergent strategies as being the theories of how to gain competitive advantage² in a ever changing industry. Thus, in order to represent the relationship between an intended and emergent strategy Mintzberg (1985), did an analysis shown on Figure 2.2 below.

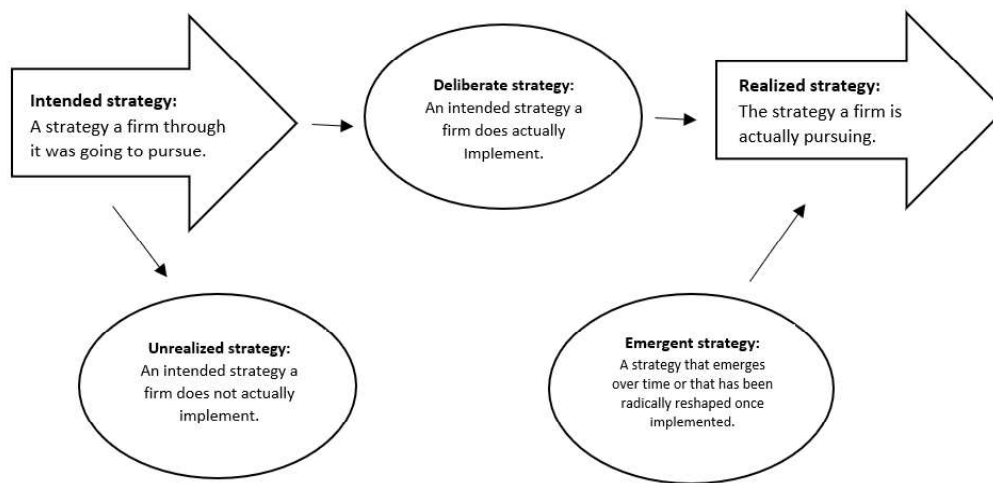


Figure 2.2 - Relationship Between Intended and Realized Strategies

Source: Mintzberg & McHugh (1985)

2.2 Internationalization strategy

As a consequence of globalization, the competition among companies increased and with that also increased the necessity of companies to integrate in its strategies an internationalization process. In 1988, Welch & Luostarinen, defined as internationalization the process by which firms increase their involvement in operations across borders. Many scholars such as, Liesch *et al.* (2007); Meleán &

²A firm has a competitive advantage when it is able to create more economic value than rival firms. Economic value is simply the difference between the perceived benefits gained by a customer that purchases a firm's products or services and the full economic cost of these products or services. Thus, the size of a firm's competitive advantage is the difference between the economic value a firm is able to create and the economic value its rivals are able to create. (Barney & Hesterly, 2005)

Nordman (2009) and Oviatt & McDougall (1994), have investigated this phenomenon through the expression “Born globals” and “international new ventures”.

The internationalization process, according to Prange & Verdier (2011) is the actions that firms take in order to explore worldwide opportunities. This is typically exploratory, testing and probing way though the exploitation of home advantages and transferring them abroad. O’Reilly & Tushman (2007), affirmed that exploitation and exploration are clearly distinct capabilities, that perform roles very distinctive in the internationalization process. For the author exploitation is a capability required for incremental internationalization processes and exploration is the one required for accelerated internationalization processes.

Vermeulen & Barkema (2002) defined exploitation as being mainly based on the application of existing knowledge. As reinforced by Baum *et al.* (2000: 768), “exploitation refers to learning gained via local search, experimental refinement, and reuse of existing routines”. While exploration is based on the development of new capabilities. Baum *et al.* (2000: 768), “exploration refers to learning gained through processes of concerted variation, planned experimentation, and play.”.

Some authors such as, Aulakh & Sarkar (2005) and Ray *et al.* (2007), suggests the adoption of a strategic ambidexterity in companies’ internationalization processes relating the firm’s ability to combine exploration and exploitation strategies across product, market, and resource domains. The following table summarizes existing researches on dynamic capabilities in internationalization. Being the last one related with the strategy previously stated - “ambidexterity”.

Table 2.3 - Dynamic capabilities, internationalization processes and performance.

Focus	Authors	Explications of dynamic capabilities
Complexity of international expansion	Griffith and Harvey (2001) and Luo (2000, 2002)	Resource deployment helps exploiting interdependencies; global dynamic capabilities improve performance and generate competitive advantages; interplay of three types of dynamic capabilities supports international expansion: capability possession (distinctive resources), capability deployment (resource allocation), and capability upgrading (dynamic learning); combinative capabilities.
Capability development in MNCs	Kogut and Zander (1992), Birkinshaw and Hood (1998), Tallman and Fladmore-Lindquist (2002), and Augier and Teece (2007)	Capabilities drive a firm's internationalization strategies and performance levels. Firms engage in capability leveraging or exploitation (enhancing existing capabilities through foreign market presence) and capability building processes (through diversification, subsidiary mandates or headquarter responsibility).
Export strategy	Zou and Cavusgil (1996) and Knudsen and Madsen (2002)	Developing firm's capabilities for effective interaction with the foreign environment, Internationalization as a firm's path-dependent cumulative knowledge development. Firms should strike a balance between the exploitation of current capabilities and the exploration of unknown ventures to uncover future capabilities.
Born globals	Madsen and Servais (1997), Lu and Beamish (2001), King and Tucci (2002), Sapienza et al. (2006), Gassmann and Keupp (2007), Weerawardena et al. (2007), and Jantunen, Puumalainen, Saarenketo, and Kyla"heiko (2005)	Dynamic capabilities enable firms to develop knowledge, paving the way for accelerated foreign market entry. The development process is not necessarily path-dependent but builds on the nurturing and reconfiguring of individual and organizational capabilities in the firm.
Incremental internationalization	Johanson and Vahlne (1977), Johanson and Vahlne (1990), Chang (1995), Chang and Rosenzweig (2001), and Song (2002)	Firms are sequentially approaching foreign markets with learning gained from past entry experience. Learning builds organizational capabilities to operate overseas and enter core and non-core businesses; focus on capability exploitation with reactive view on capability building.
Ambidexterity	Luo (2002), Knudsen and Madsen (2002), and Tallman and Fladmore-Lindquist (2002)	Even if the authors do not specifically mentioned ambidexterity, their arguments are based on the pursuit of both exploration and exploitation towards their capabilities. Emphasis is placed on the need to balance the trade-off between capability exploration and capability exploitation and to investigate resulting performance consequences.

Source: Prange & Verdier (2011)

3. Information Technology and Information Systems Strategy

Today, information technology is used as a base to support the company's business strategy, improve service quality and business processes. According to many studies the use of Information Technology (IT) brings many benefits to companies, for Mata *et al.* (1995), "Only IT management skills are likely to be a source of sustainable competitive advantage (SCA)." Also, "Some firms have gained advantage by using IT to leverage intangibles, complementary human and business resources, such as flexible culture, strategic planning-IT integration, and supplier relationships" (Powell & Dent-Micallef, 1997). Research done by Peppard *et al.* (2000), defined the IT capability as the ability to translate the business strategy into long term information architectures, technology infrastructure and resourcing plans that enable the implementation of the strategy (e.g., the IT strategy). According to Huang (2010), only IT management skills are likely to be a source of sustained competitive advantage since they are gained over long periods through the accumulation of experience in the firm, enabling to deal with complex relations between the IT function and business functions, customers, and suppliers.

Sabherwal & Chan (2001), suggested a distinction between IT strategy and IS strategy: IS strategy focuses on business systems or applications, and its main objective is the alignment with the business needs and its use for strategic benefits; whereas IT strategies focus on technology policies, including such aspects as architecture, technical standards, safety standards, and technological risk attitudes. Information technology strategy has a significant effect on the value creation, the term - Information Systems Strategic Planning (ISSP) was defined by Boynton & Zmud (1987, p. 59), as being the “activities directed toward (1) recognizing organizational opportunities for using information technology, (2) determining the resource requirements to exploit these opportunities, (3) and developing strategies and action plans for realizing these opportunities and for meeting the resource needs”. IT should affect both, the benefits and productivity. Even though, Thatcher & Oliver (2001), considered that productivity does not fully reflect the benefits provided by IT. For Kefi & Kalika (2003), there are some aspects that allow companies to measure the impact of Information Technology and Systems on organizational performance, namely (1) The productivity by the effect of the utilization of systems/IT, (2) cost reduction, the savings obtained based on the utilization of systems/IT, (3) the ability to innovate value added through the use of systems/IT, (4) the ability of the reactivity of the organization in addressing and exploit the opportunities that exist and (5) the level of response to the needs of the service user, and market changes whether the system/IT can ensure their understanding of and compliance with public expectations of service users.

Information Systems strategy has the objective of define what are the applications and functionalities needed to support an operational business of an organization. This strategic plan should be aligned with the strategic objectives of a firm, being susceptible to changes according to the natural changes of the business and the market (Gouveia *et al.* 2004). A firm's strategy has considerable effect on organizational performance. That the better strategy of the company, the company's performance also improves with the support of information technology strategy. Chen *et al.* (2010), consider the IS strategy as the use of IS to support organizational strategy. This conception suggests that the core of an IS strategy should be related to the business strategy previously established. Since IS strategy is derived from the business strategy, this concept can be defined as business-centric (Chen *et al.* 2010).

3.1 Information Systems capabilities

A business strategic thinking is focused on ‘sustainable’ rather than ‘opportunistic’ competitive advantage – the resource-based view (RBV) suggested that the organizational resources and capabilities are the key factors for a corporation long-term success (Wernerfelt, 1984 & 1995; Barney, 1991). Approaching IS capabilities from resource-based view perspective of a corporation, they

represent the cumulative knowledge of the firm that is acquired in the organization's processes (e.g., automation of workforce), procedures (e.g., online technologies that are becoming increasingly available), and systems (e.g., new decision support tools), and is based on an informal networks, and personal relationships (Peppard & Ward, 2004). This collective knowledge allows organizations to initiate or respond to change.

Many researches were already done by many authors identified the antecedents (Huang *et al.* 2009; Yoon, 2011) and consequences (Doherty & Terry, 2009; Duhan, 2007) of Information Systems capabilities. Huang *et al.* (2009) found that IS capability does not directly influence innovativeness. A considerable number of studies (Doherty & Terry, 2009; Duhan, 2007; Fink, 2011; Kim *et al.* 2010), investigated the consequences of IS capabilities to firms. These studies found that many important objectives of an organizational strategy depends strongly on the organization's IS capabilities, those are the ability (1) to leverage and sustain its competitive positioning (Doherty & Terry, 2009), (2) to create strategic value (Fink, 2011), (3) to develop closer relationships between the firm and its customers (Harrigan *et al.* 2010), and (4) to integrate the firm's resources (Kim *et al.* 2010).

3.2 Information Systems used in Strategy

There are many types of information systems that can be divided into, at least, two categories, namely, organizational management and the functional area of a company. Regarding the first category - organizational management, Gouveia *et al.* (2004), defend that there are four systems levels, corresponding to the traditional corporation management levels, being them, the strategic level, management level, level of knowledge and operational level. Related with the second category - functional area of a company, the authors divide the information systems according to the organizational role that are supported by those information systems, for instance, marketing, sales, production, human resources and customer service, finance are accounting are examples of areas that can be supported by IS in functional areas of an organization. Chen *et al.* (2010), made a distinction between two possible options for managers to adopt IS—an innovative IS strategy and a conservative IS strategy—with a third possibility: the lack of strategy regarding IS.

Organizations that frequently search for Information Technology innovations are more probable to develop and exploit unique Information Systems that generate competitive advantages over competitors in cost or in differentiation (Li *et al.* 2006; Lin *et al.* 2014). Even though, an innovative IS strategy has a more probability to provide a competitive advantage for a company, this strategy is more expensive and riskier than a conservative strategy (Chen *et al.* 2010). Whereas the conservative

strategy is the one imposed through the lack of ability to create the knowledge required to meet the demands dictated by the environment. Accordingly, this safe approach makes the organization unable to obtain competitive advantage through IS since it is improbable that it could develop new and unique resources and capabilities. Despite, a conservative IS strategy can also have a good impact on business performance (Chen *et al.* 2010).

There are systems that support activities related with the strategic level, which are aimed to top managers. Those are the systems that allow firms to have support in the organizational long-term plan. The strategic level has a particular importance in an organization since are the strategic options that, in many cases, are responsible for the differentiation and consequently for the firms' competitiveness in the long-term (Gouveia *et al.* 2004). The author defend that successful IS must be flexible, with configurable functionalities, in order to guarantee the continuous adaptation to the business necessities and market changes, without the requirement of replacement or rewriting.

There are many types of Information Systems that can be used to support a business strategy, Executive Support Systems (ESS) is one of them, those kind of systems are flexible tools that provide broad an deep information support and analystic capability for a wide range of executive decisions (Houdeshel & Watson, 1987; Rockart & Long, 1988). ESS are computer-based systems that allow senior managers to easily access information found-inside and outside their organizations that is relevant to strategic decision making and other executive responsibilities. The terms Executive Support System and Executive Information Systems (EIS) are often used interchangeably, though executive support systems usually provide a broader set of capabilities (Horn & Nord, 1996). For (Gouveia *et al.* 2004) ESS or EIS are information systems of strategic level, configured to support the decision-making through the advanced use of graphics and communication, such as, the analysis of sales trends, the long-term operational plan of a firm, the budget plan and the human resources plan, are examples of applications of ESS in a strategic level.

Chapter III - Theoretical approach

Over the previous chapter, Literature Review, many were the theories and perspectives given by many authors regarding the aspects related with Information Systems (IS) in organizational strategy. Considering the diversity of approaches concerning this theme many research questions raised, that will be discussed and approached later on in this chapter.

Along with the Literature Review formulation, many were the benefits identified about IS implementation in companies, namely, integration of other organizational processes, enabling the improvement of efficiency and keeping the competitive position of the company in the market (Addo-Tenkorang & Helo, World Congress on Engineering and Computer Science, Ao, & International Association of Engineers. 2011, p. 1111), manage all their information, make better decisions, and improve the execution of their business processes (Laudon, 2009), IS allows companies to have access to updated, real and complete information, enabling the companies' management improvement (Mehrjerdi, 2010, p. 308). Also, for many authors IS implementation brings many benefits in a strategic level. Information Systems generates competitive advantages over competitors in cost or in differentiation (Li *et al.* 2006; Lin *et al.* 2014), also IS allow firms to have support in the organizational long-term plan (Gouveia *et al.* 2004), the author also mentioned that a correct IS facilitates in companies' adaptation regarding market needs and changes. Was considering those benefits that the first question came up – **Q1: What are the benefits associated with the use of Information Systems namely in strategy?**

Another aspect that should be address when investigating the contribution of information systems in strategy is the investments performed by companies, in order to have the technologies, systems and resources that better fits the organizations' objectives. In this way, is important to understand that there are many categories of investments that impact the companies' performances. The firms should invest in technology / Information technology (IT) namely in information systems since in today's global market no industry or business can survive without having latest technology (Laudan *et al.* 1998; Liao *et al.* 2015; Lee *et al.* 2016), also for Mar *et al.* (2012), IT control systems are essential for companies' data protection. For other authors firms should also invest in a proper risk management and assessment systems / techniques (Patterson, 2015; Eroglu & Çakmak, 2016; McGaughey *et al.* 1994; Bahli & Rivard, 2005). Additionally, many were the studies that revealed that investment in Human Resources is also very important for IS success (Becker, 1975; Falola *et al.* 2017; Holland, 2017; Roca-Puig *et al.* 2018; Liao *et al.* 2019). So, the second question emerged – **Q2: In which aspects should a company invest to increase the IS implementation outcomes and companies' performance?**

Therefore, the third research question arose with the purpose of analyze the actions taken by companies to face the risks associated with IS use. – **Q3: How can firms mitigate Information Systems implementation risks, and do they affect the impact of IS in strategy?** Many are the possible risks associated with IS mentioned by many authors, namely, failure to obtain some or all anticipated benefits due to implementation difficulties; implementation time much longer and/or costs much higher than expected; technical systems performance significantly below the estimate; incompatibility of system with selected hardware and software (Loudon & Loudon, 1991), as well as lack of top management commitment, failure to gain user commitment, misunderstanding requirements, lack of user involvement, failure to manage end user expectations, changing scope and lack of required knowledge are some of the risk factors (Keil *et al.* 1998 and Barki *et al.* 2001). Those risks can have an impact across all company, namely in a strategic level, leading firms to an ineffective work system performance (Sherer and Alter, 2004). Hence, in order to mitigate those risks, according to many authors, companies need to implement risk mitigation actions, being them the creation of control techniques such as, management control, operational controls and technical control (Watson, 2007). For Patterson (2015), for risk mitigation companies should have a specific Information system called Enterprise risk management (ERM) and risk assessment techniques (Eroglu & Çakmak, 2016).

The present investigation aggregates two main topics, “Information Systems” and “Organizational Strategy”. Was from the combination of those two main approaches that arose the fourth research question – **Q4: “What is the contribute of Information Systems for an organizational strategy?”**. Several authors gave multiple concepts to “Information Systems”, although there is not an established singular definition for the term, is possible to define it as being a system that supports operations, management and decision making through the use of computer-based devices, that treats relevant information across all the organizational levels. (Davis, 1974; Buckingham *et al.* 1987 pp.18; Turban *et al.* 2004). The same happened to the definition of strategy that have being adapted according to the society’s evolution. Being defined as the principal long run objective of a firm, and the adoption of actions resources allocation, in order to achieve the established goals (Chander, 1998, p.11), also, strategy is the theory about how to gain competitive advantages (Barney & Hesterly, 2005), and “the art of devising or employing plans or stratagems toward a goal” (Webster, 2017). For many authors both concepts “Information Systems” and “Strategy” has a close relationship in an organizational approach, several were the investigations that revealed that many important objectives of an organizational strategy depends strongly on the organization’s IS capabilities, those are the ability to leverage and sustain its competitive positioning, to create strategic value, to develop closer relationships between the firm and its customers and to integrate the firm’s resources (Doherty & Terry, 2009; Duhan, 2007; Fink, 2011; Kim *et al.* 2010). Related with this research question five hypotheses arose, being them H1: The benefits of Information systems on organizational strategy have

impact on the investments performed by companies on those systems. H2: The benefits associated with the use of Information Systems have a positive effect on Information systems impact in organizational strategy. H3: The investments performed by companies increase the information systems outcomes and companies' performance. H4: The risks associated to Information Systems implementation have impact on the investments performed by companies and affect the impact of IS in strategy. H5: The risks associated with the use of Information systems influence the impact of those systems in organizational strategy. The H1 reveals and indirect relationship between the Benefits and the impact of information systems on organizational strategy, through an intermediary, the investments, it aims to understand if the benefits of IS impacts the investment on those systems, followed by the H2 that seeks to understand if the benefits of IS affects the impact of IS in strategy. The third hypotheses aim to comprehend if the investment in IS by companies increase its outcomes and, accordingly, if improves companies' performance. The H4 also reveals an indirect relationship between Risks and the impact of information systems on organizational strategy, through the intermediation of investments. Thus, this hypothesis shows if the risks of IS impact the investments performed by companies in IS and, consequently, appears the last hypotheses, the fifth one that relates the risks of IS on the impact of IS in strategy.

The table 3.4 below shows the relationship between the bibliographic references and the proposed objectives of the present investigation, as well as the research questions, previously stated in this chapter, and the respective Hypotheses.

Table 3.4 - Relationship between Literature Review, Objectives, Research Questions and Hypotheses.

Objectives	Research questions	Hypotheses	Literature review
<p>OBJ1: Identify the advantages of Information Systems implementation in firms, namely in organizational strategy.</p>	<p>Q1:What are the benefits associated with the use of Information Systems namely in strategy?</p>	<p>H2: The benefits associated with the use of Information Systems have a positive effect on Information systems impact in organizational strategy.</p>	<p>Murphy & Simon (2002, quoted by Queiroga (2009, p. 8)</p> <p>Terry <i>et al.</i> (2006)</p> <p>Mehrjerdi (2010, p. 308)</p> <p>World Congress on Engineering and Computer Science <i>et al.</i> (2011)</p> <p>Laudon (2009)</p> <p>Li <i>et al.</i> (2006)</p>

			<p>Lin et al. (2014)</p> <p>Gouveia et al. (2004)</p>
<p>OBJ2: Analyze the impact of the investments performed related with Information Systems (e.g., Technology, Human resource, risk management systems) by companies in its performance.</p>	<p>Q2) In which aspects should a company invest to increase the Information Systems implementation outcomes and companies' performance?</p>	<p>H1: The benefits of Information systems on organizational strategy have impact on the investments performed by companies on those systems.</p>	<p>Butler Cox (1990)</p> <p>Becker (1975)</p> <p>McGaughey <i>et al.</i> (1994)</p> <p>Laudan <i>et al.</i> (1998)</p> <p>Lee (2005)</p> <p>Fardal (2007)</p> <p>Mar <i>et al.</i> (2012)</p> <p>Liao <i>et al.</i> (2015)</p> <p>Patterson (2015)</p> <p>Lee et al. 2016</p>
		<p>H3: The investments performed by companies increase the information systems outcomes and companies' performance.</p>	<p>Falola <i>et al.</i> (2017)</p> <p>Holland (2017)</p> <p>Roca-Puig <i>et al.</i> (2018)</p> <p>Eroglu & Çakmak (2016)</p> <p>Bahli & Rivard (2005)</p> <p>Liao et al. (2019)</p>

<p>OBJ3: Recognize and analyze the impact of risks as respective strategies used by companies to mitigate those risks associated with Information Systems implementation.</p>	<p>Q3) How can firms mitigate Information Systems implementation risks, and do they affect the impact of IS in strategy?</p>	<p>H4: The risks associated to Information Systems implementation have impact on the investments performed by companies and affect the impact of IS in strategy.</p>	<p>Keil et al. (1998) Barki et al. (2001) Loudon & Loudon (1991) Sherer and Alter (2004) Patterson (2015) Eroglu & Çakmak (2016) Watson (2007) Barney & Hesterly, 2005</p>
<p>OBJ4: Analyze and identify the contribute of Information Systems for an organizational strategy.</p>	<p>Q4) What is the contribute of Information Systems for an organizational strategy?</p>	<p>H1: The benefits of Information systems on organizational strategy have impact on the investments performed by companies on those systems. H2: The benefits associated with the use of Information Systems have a positive effect on Information systems impact in organizational strategy. H3: The investments performed by companies increase the information systems outcomes and companies' performance. H4: The risks associated to Information Systems implementation have impact on the investments performed by companies and affect the impact of IS in strategy. H5: The risks associated with the use of Information systems influence the impact of those systems in organizational strategy.</p>	<p>Davis (1974) Buckingham <i>et al.</i> (1987 pp.18) Turban <i>et al.</i> (2004) Chander (1998, p.11) Webster (2017) Doherty & Terry (2009) Duhan (2007) Fink (2011) Kim <i>et al.</i> (2010) Murphy & Simon (2002, quoted by Queiroga (2009, p. 8) Terry <i>et al.</i> (2006) Mehrjerdi (2010, p. 308) World Congress on Engineering and Computer Science <i>et al.</i> (2011) Laudon (2009) Li et al. (2006) Lin et al. (2014) Gouveia <i>et al.</i> (2004) Butler Cox (1990)</p>

			<p>Becker (1975)</p> <p>McGaughey <i>et al.</i> (1994)</p> <p>Laudan <i>et al.</i> (1998)</p> <p>Lee (2005)</p> <p>Fardal (2007)</p> <p>Mar <i>et al.</i> (2012)</p> <p>Liao <i>et al.</i> (2015)</p> <p>Patterson (2015)</p> <p>Lee <i>et al.</i> 2016</p> <p>Falola <i>et al.</i> (2017)</p> <p>Holland (2017)</p> <p>Roca-Puig <i>et al.</i> (2018)</p> <p>Eroglu & Çakmak (2016)</p> <p>Bahli & Rivard (2005)</p> <p>Liao <i>et al.</i> (2019)</p> <p>Keil <i>et al.</i> (1998)</p> <p>Barki <i>et al.</i> (2001)</p> <p>Loudon & Loudon (1991)</p> <p>Sherer and Alter (2004)</p> <p>Patterson (2015)</p> <p>Eroglu & Çakmak (2016)</p> <p>Watson (2007)</p> <p>Barney & Hesterly (2005)</p>
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Source: Author Elaboration

Chapter IV - Methodology

4.1 Research model

In this section will be described the methodology used in the present investigation in order to answer to the research questions of the present research previous mentioned, throughout the collection data method. For a better understanding the definition of some relevant terms will be done afterwards in regards with some terminologies, namely, the concept of methodology, the existent types of data collection and a description of the data analysis technique that will be used in this investigation.

Firstly, is relevant to state that the research methodology used for any investigation is highly influenced by the aims and objectives of the study. In regards with research methodologies, it can be exploratory or confirmatory in nature. (Jansen & Warren, 2020). According to Sampieri (2014), scientific research can be defined as being the set of systematics and empirical processes that are applied to a specific study. In this particular study a confirmatory research will be done through the collection of data using a quantitative method – questionnaires – and the analyzation of that data through statistical analysis.

Following the Williams (2007), approach, considering the three possible methods of data collection that are, quantitative, qualitative and mixed-method. In order to reach reliable conclusions for the present investigation, through the usage of accurate data and considering the research questions of the present paper a quantitative method was applied, as previous mentioned, by the means of an online questionnaire. According to Jansen & Warren (2020), a quantitative methodology is typically used when the research aims are confirmatory in nature. For instance, a quantitative methodology might be used to measure the relationship between variables or to test a set of hypotheses, as will be done in the current paper.

In order to answer to the research questions mentioned in chapter II, as stated in the previous paragraph a quantitative methodology was used, namely through the modeling of structural equations (Structural Equations Modeling or SEM). SEM is a general statistical modelling technique commonly used in the behavioral sciences, the modelling is based in path analysis, which was created by Sewall Wright, a geneticist, at 1921 (Wright, 1921). SEM is represented by latent variables with structural coefficients estimated based on the correlation of observable variables. In the statistical approach, this model refers to a set of equations with assumptions, in which the factors are determined based on the

statistical observation. Thus, structural equations are related to equations using the factors in the analysis of the observable or latent variables (Joreskog & Sorbom 1993).

According to Tarka (2018), SEM helps researchers to explain, predict and to identify particular development trends and describe the details related to their existential sphere with the behavior of individuals, groups or organizations by recognizing a series of conditions and define and discover the critical factors and relationships which set trends in a given society. Nevertheless, considering that the main goal of the social sciences is in addition to conduct an elementary statistical description and to recognize individual factors and behaviors, also to reveal the cause-and-effect links between the scientific areas and the social reality, complex methods of analysis for statistical purposes are needed, namely SEM (Tarka, 2018).

For many years, several schoolers developed many analytical procedures, thus in the early beginnings of SEM development an indirect reconstruction was needed through Spearman's works (1904, 1927). The author laid the foundations for SEM by constructing the first factor model which later became an important measurement part of the more general SEM analytical strategy. There are two main reasons that explains the frequent use of this methodology, namely due to the ability to provide researchers with a complete approach to quantifying and testing theories and the fact that models of equations structural factors to explicitly consider the measurement error, which is ubiquitous in most situations (Raykov & Marcoulides, 2000). SEM is presented as a tool of excellence when measuring the total effect (direct and indirect) of the explanatory variable on the dependent (Haque *et al.* 2019).

That being said, SEM was used to test the conceptual model, through the Partial Least Squares Technique (PLS), which is a variance-based structural equation modeling technique. For that matter, the SmartPLS software was used (Ringle *et al.* 2015). The analysis and explanation of the obtained results followed a two-step approach, first, the reliability and validity of the measurement model were appraised and after the structural model was assessed.

In order to answer to the Research Questions of the present study, a conceptual model was developed to test the contribute, benefits, risks and investments of Information systems and its impact on Strategy.

The target population of the present investigation were individuals that work or had worked using Information Systems. For the purpose of data collection, an online questionnaire was developed in Google Forms, available through a link. The questionnaire was distributed via social networks, namely, LinkedIn, Facebook, Email, WhatsApp and Instagram. From which resulted a total of 99 valid questionnaires answers. That could lead to a Biased information since it is expected that most of the

users of those apps are in a younger age distribution, leading to a biased sample, being consequently not representative of the population.

In the following figures (Figure 4.3 and Figure 4.4) and table 4.5, shows all the variables and items that integrated the conceptual model of the present investigation. The respective model was developed in order to answer the research questions based on the following hypotheses formulated accordingly.

H1: The benefits of Information systems on organizational strategy have impact on the investments performed by companies on those systems.

H2: The benefits associated with the use of Information Systems have a positive effect on Information systems impact in organizational strategy.

H3: The investments performed by companies increase the information systems outcomes and companies' performance.

H4: The risks associated to Information Systems implementation have impact on the investments performed by companies and affect the impact of IS in strategy.

H5: The risks associated with the use of Information systems influence the impact of those systems in organizational strategy.

The Figure 4.3 below shows the Conceptual model of the present investigation that will be tested through the SmartPLS 2 software. In the same figure are shown the Hypothesis, previous mentioned, as well as their relationship with the dependent variable, namely if are direct and indirect. The boxes of the figure reveal the items that will be individually tested and the respective bibliographic support. Following the Figure 4.3, there is the figure 4.4, which shows the Conceptual model as it appears in SmartPLS 3 software. The figure clearly shows the model variables and respective items and, as mentioned previously, the items were selected considering many authors that were stated in the literature review chapter that are shown in Figure 4.3.

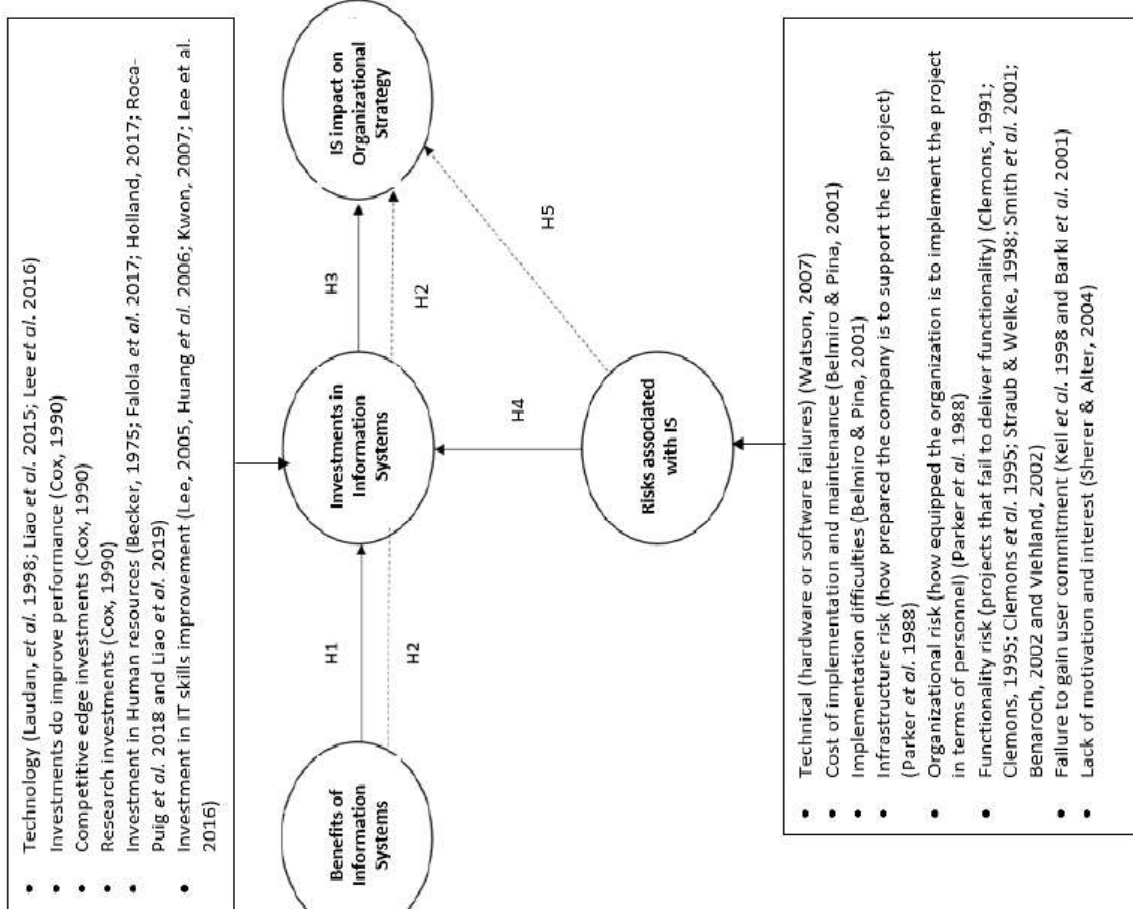


Figure 4.3 - Conceptual model and hypotheses to be tested through SmartPLS 3

Source: Author Elaboration

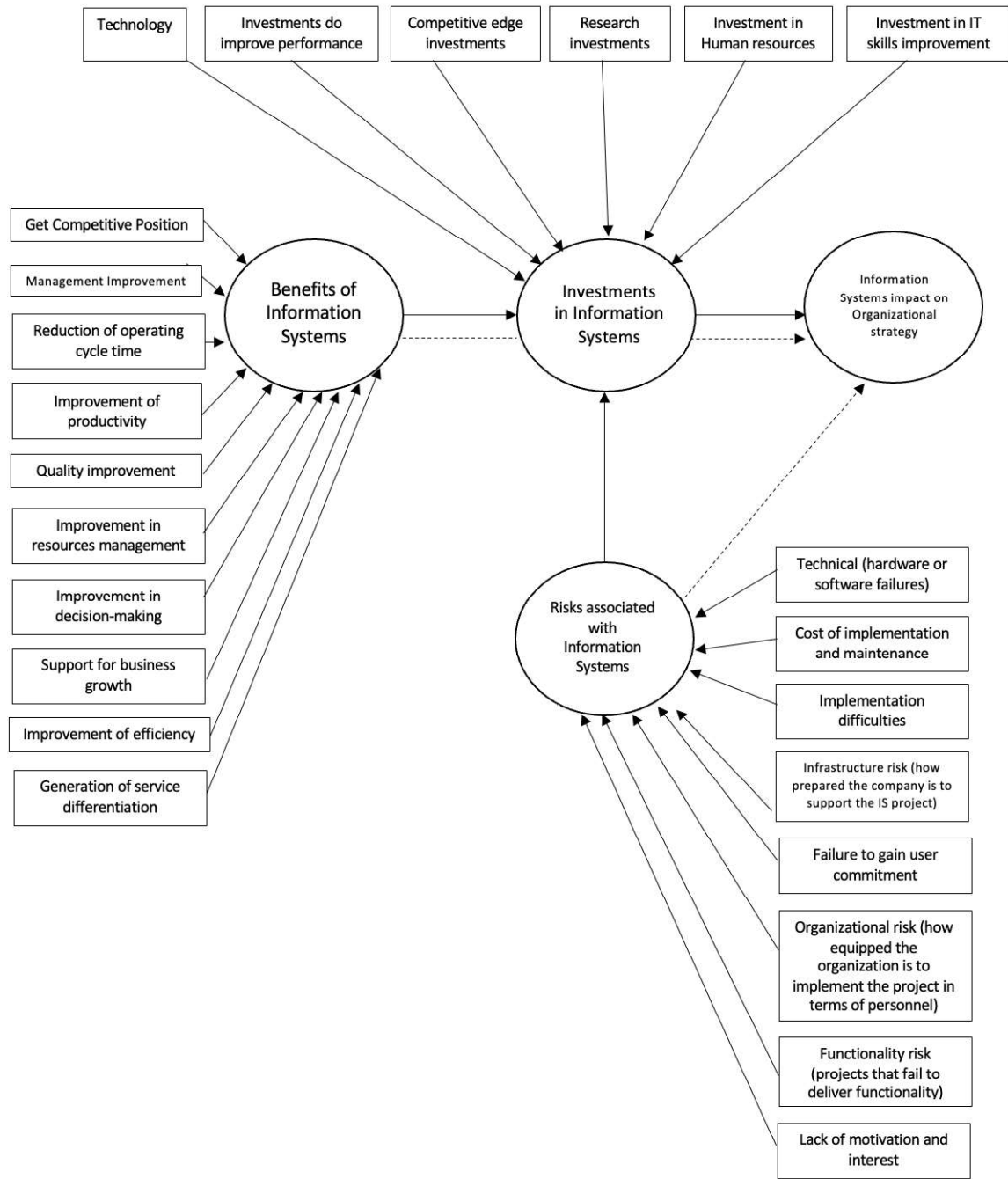


Figure 4.4 - Conceptual model to be tested in SmartPLS 3

Source: Author Elaboration

The following table 4.5 reveals the relationship between the conceptual model variables and respective items with the questionnaire questions. The mentioned questions of the survey were of closed-ended questions with a Likert scale between 1 to 7, being 1 “Fully Disagree” and 7 “Fully Agree”.

Table 4.5 - Relationship between the variables of the conceptual model and the questions in the questionnaire

Variable	Indicator	Questionnaire question (answers from 1 to 7)
Benefits of Information Systems	Improvement of efficiency (Addo-Tenkorang & Helo, 2011)	The principal advantages related with Information Systems are: [Improvement of efficiency]
	Get Competitive Position (Li <i>et al.</i> 2006; Lin <i>et al.</i> 2014)	The principal advantages related with Information Systems are: [Get Competitive Position]
	Management improvement (Davis, 1974; Buckingham <i>et al.</i> 1987; Wetherbe, 2004 and Mehrjerdi, 2010)	The principal advantages related with Information Systems are: [Management improvement]
	Reduction of operating cycle time (Murphy & Simon, 2002)	The principal advantages related with Information Systems are: [Reduction of operating cycle time]
	Improvement of productivity (Murphy & Simon, 2002)	The principal advantages related with Information Systems are: [Improvement of productivity]
	Quality improvement (Murphy & Simon, 2002)	The principal advantages related with Information Systems are: [Quality improvement]
	Generation of service differentiation (Murphy & Simon, 2002)	The principal advantages related with Information Systems are: [Generation of service differentiation]
	Improvement in resources management (Murphy & Simon, 2002)	The principal advantages related with Information Systems are: [Improvement in resources management]
	Improvement in decision-making (Davis, 1974; Buckingham <i>et al.</i> 1987; Murphy & Simon, 2002; Wetherbe, 2004 and Laudon, 2009)	The principal advantages related with Information Systems are: [Improvement in decision-making]

	Support for business growth (Murphy & Simon, 2002)	The principal advantages related with Information Systems are: [Support for business growth]
Investments in Information Systems	Technology (Laudan <i>et al.</i> 1998; Liao <i>et al.</i> 2015; Lee <i>et al.</i> 2016)	The aspects in which companies should invest in order to maximize the benefits associated with Information Systems are: [Technology]
	Investments do improve performance (Cox, 1990)	The aspects in which companies should invest in order to maximize the benefits associated with Information Systems are: [Investments do improve performance]
	Competitive edge investments (Cox, 1990)	The aspects in which companies should invest in order to maximize the benefits associated with Information Systems are: [Competitive edge investments]
	Research investments (Cox, 1990)	The aspects in which companies should invest in order to maximize the benefits associated with Information Systems are: [Research investments]
	Investment in Human resources (Becker, 1975; Falola <i>et al.</i> 2017; Holland, 2017; Roca-Puig <i>et al.</i> 2018 and Liao <i>et al.</i> 2019)	The aspects in which companies should invest in order to maximize the benefits associated with Information Systems are: [Investment in Human resources]
	Investment in IT skills improvement (Lee, 2005, Huang <i>et al.</i> 2006; Kwon, 2007; Lee <i>et al.</i> 2016)	The aspects in which companies should invest in order to maximize the benefits associated with Information Systems are: [Investment in IT skills improvement]
Risks associated with	Technical (hardware or software failures) (Watson, 2007)	The principal risks associated with Information Systems implementation are: [Technical (hardware or software failures)]

Information Systems	Cost of implementation and maintenance (Belmiro & Pina, 2001)	The principal risks associated with Information Systems implementation are: [Cost of implementation and maintenance]
	Implementation difficulties (Belmiro & Pina, 2001)	The principal risks associated with Information Systems implementation are: [Implementation difficulties]
	Infrastructure risk (how prepared the company is to support the IS project) (Parker <i>et al.</i> 1988)	The principal risks associated with Information Systems implementation are: [Infrastructure risk (how prepared the company is to support the IS project)]
	Organizational risk (how equipped the organization is to implement the project in terms of personnel) (Parker <i>et al.</i> 1988)	The principal risks associated with Information Systems implementation are: [Organizational risk (how equipped the organization is to implement the project in terms of personnel)]
	Functionality risk (projects that fail to deliver functionality) (Clemons, 1991; Clemons, 1995; Clemons <i>et al.</i> 1995; Straub & Welke, 1998; Smith <i>et al.</i> 2001; Benaroch, 2002 and Viehland, 2002)	The principal risks associated with Information Systems implementation are: [Functionality risk (projects that fail to deliver functionality)]
	Failure to gain user commitment (Keil <i>et al.</i> 1998 and Barki <i>et al.</i> 2001)	The principal risks associated with Information Systems implementation are: [Failure to gain user commitment]
	Lack of motivation and interest (Sherer & Alter, 2004)	The principal risks associated with Information Systems implementation are: [Lack of motivation and interest]
Information systems impact on Organizational Strategy	The use of Information Systems brings benefits to the companies.	
	Information systems have a positive impact on the implementation and results of organisational strategy.	
	Information Systems can contribute to improve the implementation and results of organisational strategy.	
	The benefits associated with Information Systems have impact on firms' strategies implementation and results.	
	The risks associated with Information Systems have impact on firms' strategies implementation and results.	
	The investments performed by companies have impact on the effect of information systems in firms' strategies implementation and results.	

Source: Author Elaboration

4.2 Sample description

In order to have an accurate sample characterization, the first part of the questionnaire was made by questions regarding sociodemographic data. The present sample have a total of 99 respondents. An analysis was carried out on all variables that could statistically characterize the sample, especially regarding its demographics, job position and activity sector, in order to understand the existing sample with respect to its nature and the dimension of experience and professional knowledge (Freitas, 2013).

Concerning the demographic data, the present sample was mainly composed by female gender, with a total percentage of 65,7% of the total answers. Being the remaining answers responded by male gender 34,3%.

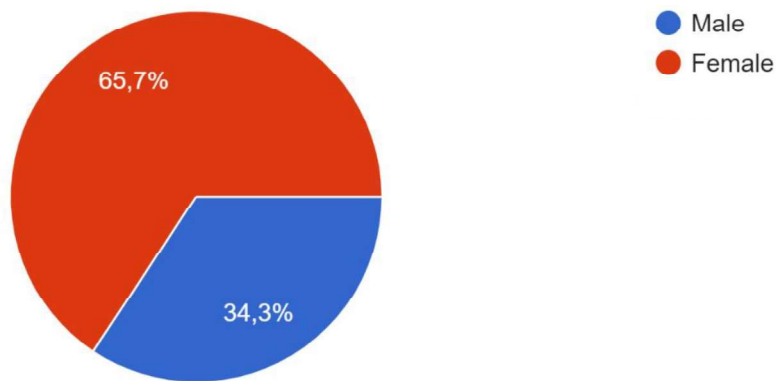


Figure 4.5 - Respondents by gender

Source: Author Elaboration

Moreover, in regard to the age of the respondents of the questionnaire, the most part of the respondents had between 19 and 24 years with the total percentage of 48,5%, followed by 40,4% of the group age between 25 and 34 years. Being the groups less represented in the present sample the ones with the group ages of 35 to 44 years, 45 to 54 years and 55 to 64 years, with percentages of 5,1%, 4% and 2%, respectively.

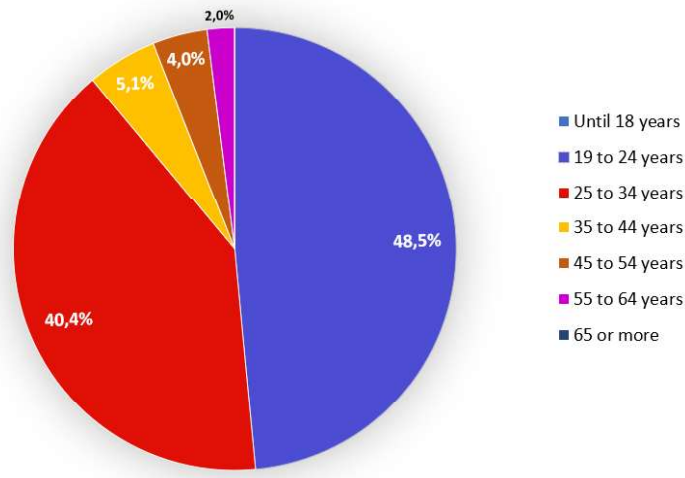


Figure 4.6 - Respondents by age group

Source: Author Elaboration

Regarding the remaining questions of the sample characterization, the respondents were inquired about its nationality, job position and respective sector of activity. Those questions, mainly the last two, were especially relevant for the present investigation in order to understand if information systems are particularly more used in a determined position / sector.

The results obtained about the nationality respondents are shown on the table 4.6 below, in regards with the Job position and respective Activity sector, the tables with the results can be found in Appendix A and Appendix B. Through those three questions one could conclude that the main part of the respondents has Portuguese nationality with 92,9% of the total answers. Also, related with the job position one could obtain a very varied answers being the most common “Specialist Compliance Officer” with 20%. Lastly, considering the answers obtain in this questionnaire about the activity sector of the respondents, is possible to verify that the financial sector is the one with the most responses.

Table 4.6 - Sample details

Category	Class description	Total number	Percentage
Nationality	Portuguese	92	92,9%
	British	2	2,02
	Australian	1	1,01
	Italian	1	1,01
	Mozambican	1	1,01
	Romanian	1	1,01
	Spanish	1	1,01

Source: Author Elaboration

Chapter V—Presentation and discussion analysis

5.1 Data Analysis

The examination and interpretation of the results obtained through the questionnaire was made based on two different methods. The first one related with the evaluation of the reliability and validity of the measurement model and the second approach regarding the evaluation of the structural model. To evaluate the quality of the measurement structural model is required the concentration in specific indicators that predict the model capabilities, being the most important indicators the reliability, convergent validity, and discriminant validity. (Hair *et al.* 2017).

Considering that all the items had the standardized factorial loads above 0.5 and are all significant when $p < 0.001$, reveals the reliability of the individual indicator (Hair *et al.* 2017). Concerning the reliability of the internal consistency, it was confirmed based on the values obtained in Cronbach's alpha and composite reliability (CR) indicators that are all above 0.7 which, as per Hair *et al.* (2017), is the minimum value. All of the previous mentioned results are shown on the table below, Table 5.7

Table 5.7 - CR, AVE, correlations and discriminant validity checks

	Cronbach's Alpha	rho_A	Composite Reliability (CR)	Average Variance Extracted (AVE)	1	2	3	4
1) Benefits of Information Systems	0.933	0.943	0.943	0.624	0.790	0.211	0.636	0.329
2) Information Systems Impact on Strategy	1	1	1	1	0.210	1	0.455	0.193
3) Investments in Information Systems	0.817	0.83	0.871	0.536	0.578	0.391	0.732	0.61
4) Risks associated with Information Systems	0.858	0.864	0.889	0.501	0.316	0.182	0.539	0.708

Note added: Cronbach Alpha; CR -Composite reliability; AVE -Average variance extracted. Bolded numbers are the square roots of AVE. Below the diagonal elements are the correlations between the constructs (Fornel ratios). Above the diagonal elements are the HTMT ratios.

Source: Author Elaboration

Based on the values of the table above (Table 5.7), is possible to conclude that the convergent validity was confirmed namely due to three main aspects. First, all items were positive and significant in their respective constructs as mentioned in the previous paragraph. Second, all constructs had CR values above 0.70. Lastly, all the constructs had the average variance extracted (AVE) values greater than the minimum value of 0.50 (Bagozzi & Yi, 1988).

Regarding the discriminant validity were used to approaches to assess discriminant validity, the criterion of Fornell & Larcker (1981), that were satisfied in all constructs, according to the Table above, for the constructs satisfaction is required that the square root of AVE construct (the diagonally values in bold in the Table 5.7) are bigger than its greatest correlation with any construct. The second approach used was the Heterotrait-Monotrait ratio (HTMT) criterion (Hair *et al.* 2017; Henseler *et al.* 2015). As per the values of table 5.7, all HTMT values are below the threshold of 0.85 (Kline, 2011; Hair *et al.* 2017; Henseler *et al.* 2015), providing further confirmation of discriminant validity.

The appraisal of the structural model was made through the significance of the structural path coefficients; the magnitude of the coefficient of determination R^2 of each variable as way to assess the expected accuracy of the model; and Stone-Geisser's Q^2 values as way to assess the predictive relevance of the model (Hair *et al.* 2017). Nevertheless, according to Hair *et al.* (2017), before the

evaluation of the structural model there was still collinearity to evaluate. The VIF (variance inflation factor) values varied between 1.000 and 3.602, all being below the critical threshold of 5 (Hair *et al.* 2017). Which gives the indication that there is no collinearity. The coefficient of determination R^2 for the two endogenous variables that are the Information Systems Impact on Strategy and Investments in Information Systems (IS) were 15.3% and 47.6%, respectively, surpassing the limit value of 10% imposed by Falk & Miller in 1992. The Q^2 values for the endogenous variables (0.122 and 0.218 respectively) were greater than zero, which shows the predictive relevance of the model (Hair *et al.* 2017).

Table 5.8 - Direct relationships between constructs

	Path coefficients	Standard Deviation	T Statistics	P Values
Benefits of IS -> Investments in IS	0.453	0.075	6.076	0.000
Investments in IS -> Information Systems Impact on Strategy	0.391	0.165	2.376	0.018
Risks associated with IS -> Investments in IS	0.396	0.061	6.496	0.000

Source: Author Elaboration

The values of the table 5.8 shows that the benefits of using Information Systems (IS) have a significantly positive impact on the investments in IS ($\beta = 0.453$, $p < 0.00$). Additionally, since ($\beta = 0.391$, $p < 0.018$) the investments in IS have a significantly positive influence on the effect on the Impact of IS on Strategy, and these results confirm the hypotheses H1 and H3, respectively. Finally, it is possible to observe that the Risks associated with IS implementation have also a significantly positive relationship with the investments in IS ($\beta = 0.396$, $p < 0.000$, respectively), showing that the greater the Risks associated with IS implementation more are the investments done by companies in Information Systems, to mitigate those risks, supporting hypotheses H4.

To test the mediation hypotheses (H2 and H5), as per recommendation of Hair *et al.* (2017; p. 232), a bootstrapping method was used to test the significance of the specific indirect effects through the mediator (Preacher & Hayes, 2008). Table 5.9 shows those indirect effects results.

Table 5.9 - Specific indirect relationships between constructs

	Path coefficients	Standard Deviation	T Statistics	P Values
Benefits of IS -> Investments in IS -> Information Systems Impact on Strategy	0.177	0.072	2.451	0.015
Risks associated with IS -> Investments in IS -> Information Systems Impact on Strategy	0.155	0.069	2.254	0.025

Source: Author Elaboration

The indirect effects of the Benefits of IS in the Information Systems Impact on Strategy through the mediator Investments in IS are significant with ($\beta = 0.177$; $p < 0.015$), corroborating the H2 mediation hypothesis. In the same approach, the indirect effects of the Risks associated with IS in the Information Systems Impact on Strategy through the mediator Investments in IS are significant with ($\beta = 0.155$; $p < 0.025$), corroborating the mediation hypothesis H5. Figure 5.7 shows the testing of the conceptual model with the values obtained. All the previous mentioned values are shown the Table 5.9 above.

The following Figure 5.7 reveals the results obtained in the tests of the conceptual model. The individual values of each item are the result of the individually testing done for each indicator. The results show that all of the items are statistically relevant to the study, since are all above 0.4, since $p < 0.000$, therefore revealing its reliability (Hair et al. 2017). In regards with the value of 0.453; 0.391 and 0.396 are the path coefficients that reveals that all the direct relationships of the model are statistically significant, confirming the hypotheses H1, H3 and H4 respectively. Lastly, regarding the coefficient of determination R^2 adjusted for the two endogenous variables that are the Information Systems Impact on Strategy and Investments in Information Systems (IS), as shown on the Figure 5.7 below, were 14.4% and 46.5%, respectively, surpassing the limit value of 10% imposed by Falk & Miller in 1992. The Q^2 that measure the predictive relevance of the model (Hair et al. 2017), shows that the values for the endogenous variables (0.122 and 0.218 respectively) were greater than zero, which shows the predictive relevance of the model (Hair et al. 2017).

Information systems support for organizational strategy

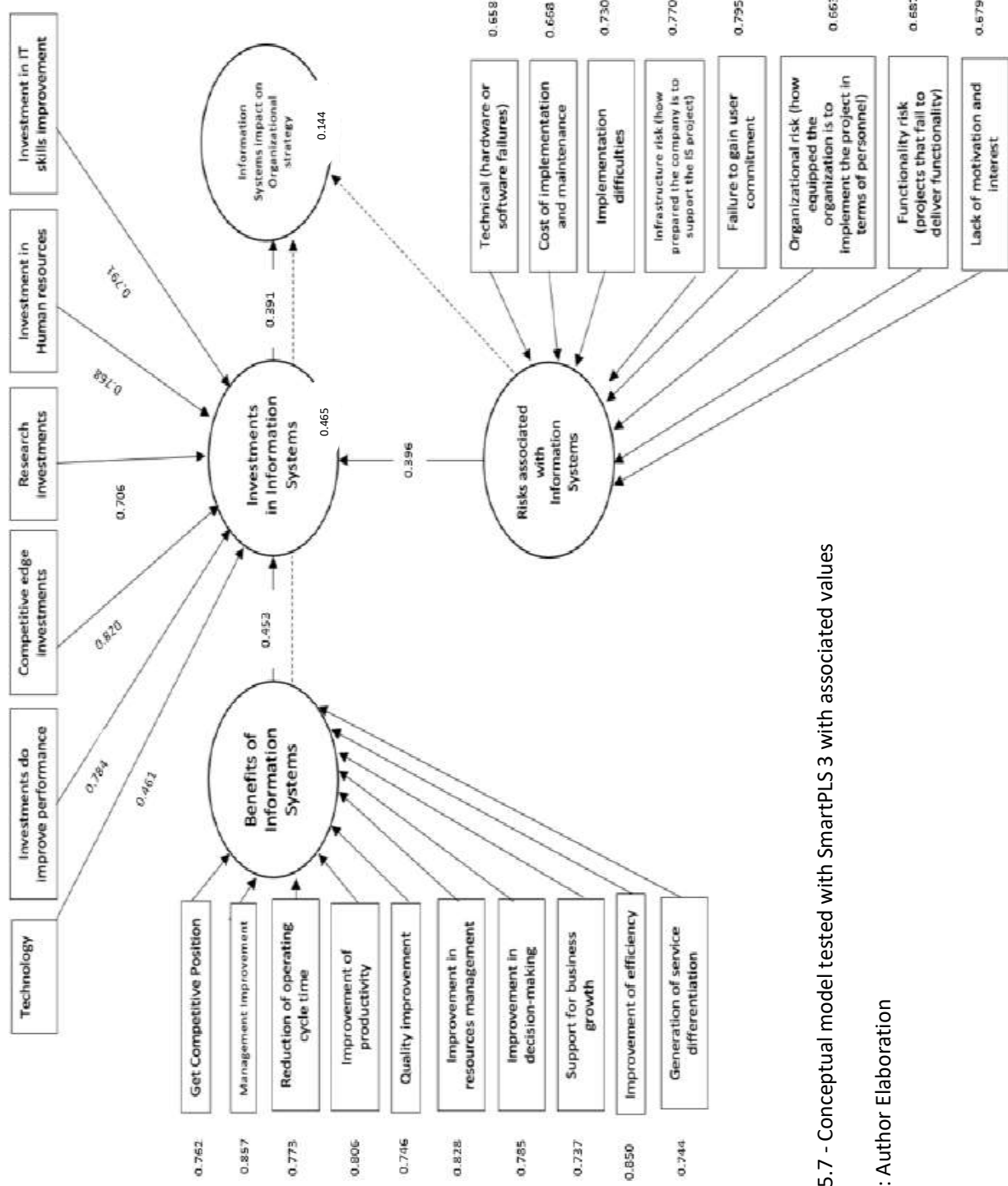


Figure 5.7 - Conceptual model tested with SmartPLS 3 with associated values

Source: Author Elaboration

5.2 Hypothesis testing

Considering all the results analyzed above obtained through the conceptual model, it is possible to affirm in the hypothesis of the present investigation were or not confirmed, considering the value of β and its statistical significance. Hence, as per the values obtain in the present study it was possible to confirm the first hypotheses which revealed that the benefits of using Information Systems (IS) have a significantly positive impact on the investments in IS ($\beta = 0.453$, $p < 0.00$), the same for H3, that was confirmed since ($\beta = 0.391$, $p < 0.018$) showing that the investments in IS have a significantly positive influence on the effect on the Impact of IS on Strategy. The hypotheses H4 was also confirmed showing the significantly positive relationship with the investments in IS and the Risks associated with the use of IS ($\beta = 0.396$, $p < 0.000$). Regarding the remaining two hypotheses, H2 and H5, that are the mediation hypotheses, were also confirmed since ($\beta = 0.177$; $p < 0.015$) and ($\beta = 0.155$; $p < 0.025$) respectively, revealing that indirectly the Benefits of IS have a positive effect in the Information Systems Impact on Strategy through the mediator Investments in IS and that the Risks associated with IS have also a positive effect in the Information Systems Impact on Strategy through the mediator Investments in IS. The table 5.10 below shows, in a succinct way, the hypotheses confirmed with the respective values mentioned in this paragraph.

Table 5.10 - Hypotheses testing

Hypotheses	β	P value	Accepted/Rejected
H1: The benefits of Information systems on organizational strategy have impact on the investments performed by companies on those systems.	0.453	0.000	Accepted
H2: The benefits associated with the use of Information Systems have a positive effect on Information systems impact in organizational strategy.	0.177	0.015	Accepted
H3: The investments performed by companies increase the information systems outcomes and companies' performance.	0.391	0.018	Accepted
H4: The risks associated to Information Systems implementation have impact on the investments performed by companies and affect the impact of IS in strategy.	0.396	0.000	Accepted
H5: The risks associated with the use of Information systems influence the impact of those systems in organizational strategy.	0.155	0.025	Accepted

Source: Author Elaboration

5.3. Discussion of the Results

In the present chapter, the results obtained through the data collection will be compared with the Literature Review. In order to understand if those results answers to the research questions of the current investigation - **Q1) What are the benefits associated with the use of Information Systems namely in strategy?**, **Q2) In which aspects should a company invest to increase the Information Systems implementation outcomes and companies' performance?**, **Q3) How can firms mitigate Information Systems implementation risks, and do they affect the impact of IS in strategy?**, **Q4) What is the contribute of Information Systems for an organizational strategy?** - having been subjected to several tests using SmartPLS 3 (Ringle *et al.* 2015). Three main factors were identified, namely 1) the Benefits of Information Systems (Murphy & Simon, 2002, quoted by Queiroga, 2009, p. 8; Terry *et al.* 2006; Mehrjerdi, 2010, p. 308; World Congress on Engineering and Computer Science *et al.* 2011), 2) the investments in Information Systems (Cox, 1990; Becker, 1975; McGaughey *et al.* 1994; Laudan *et al.* 1998; Lee, 2005; Fardal, 2007; Mar *et al.* 2012; Liao *et al.* 2015; Patterson, 2015; Falola *et al.* 2017; Holland, 2017; Roca-Puig *et al.* 2018) and 3) the risks associated with Information Systems (McGaughey *et al.* 1994; Sherer & Alter, 2004; Bahli & Rivard, 2005; Watson, 2007; Dikmen *et al.* 2008; Kaplan & Mikes, 2012; Patterson, 2015; Eroglu & Çakmak, 2016; Goldsack, 2017). In order to achieve results at these 3 main variables, the items associated with each variable were tested individually, through the applied questionnaire, and all of them confirmed to be statistically relevant to the study, when obtaining scores above 0.4, all of which are significant since $p < 0.000$, therefore revealing its reliability (Hair *et al.* 2017). Below, the findings obtained from each one of the research questions will be analyzed into detail.

Q1:What are the benefits associated with the use of Information Systems namely in strategy?

The present study reveals that, in fact, and as supported by many authors in the Literature review chapter the Benefits that companies have through the use of IS are several. IS bring benefits across all or many areas of an organization, consequently impacting positively companies' strategy.

The usage of IS allows companies to improve in many crucial areas of activity of firms, being all of them intrinsically related with strategy, namely at a management level, significantly improving the management itself, the decision making and management of the companies' resources. As revealed in the results of the individual tests of the conceptual model with values above 0.7 in which $p > 0.000$ as supported by the Literature review. Namely, the Mehrjerdi (2010, p. 308) study, that defends that IS allows companies to have access to updated, real and complete information, enabling the companies'

management improvement, make better decisions (Laudon, 2009) and improve resources management (Gouveia *et al.* 2004). The results of the conceptual model also revealed that the operational area is also positive impacted by information systems, namely, reducing the operation cycle time and consequently improving the quality of the services / products delivered to customers.

Lastly, and answering to this research question, all the benefits directly related with firms' strategy were all statistically significant, all above 0.7 in which $p > 0.000$, revealing that the use of IS have a significant positive relation with strategy. As per the results obtained in the questionnaires, IS enable companies to get competitive advantage, support business growth, improve efficiency and productivity and generate a differentiated offer in the services / products delivered to clients, which is corroborated by the Literature review. Addo-Tenkorang & Helo, World Congress on Engineering and Computer Science, Ao, & International Association of Engineers (2011, p. 1111), defended that the IS implementation enable the improvement of efficiency and keeping the competitive position of the company in the market. As well as, Li *et al.* 2006; Lin *et al.* (2014) and Gouveia *et al.* (2004), that mentioned that IS generates competitive advantages over competitors in cost or in differentiation and support in the organizational long-term plan.

Q2) In which aspects should a company invest to increase the Information Systems implementation outcomes and companies' performance?

Considering the obtained results in the questionnaire's answers, the Benefits of IS are directly related with the Investments performed by companies. As discussed above, most of the Benefits related with the implementation of IS, increase the performance of firms. Therefore, the greater the investment of companies in technology - also supported by the Literature Review reinforced by many authors, that argued that considering today's global market no industry or business can survive without having latest technology, thus is crucial for companies survival to invest in technology / Information technology (IT) (Laudan *et al.* 1998; Liao *et al.* 2015; Lee *et al.* 2016) – in competitive edge, research, and human resources, namely the ones with specific IS / IT capabilities, the greater the information systems outcomes and the better the companies' performance.

Bearing in mind the increasing importance of IS in companies nowadays, more than perform IT investments, firms should be aware of the importance of human IT capability, especially with a background of RBV. That was proven through the result obtained in this particular item (Human Resources) in the conceptual model under analysis, in which, the value obtained was higher than 0.7 considering $p > 0.000$. The human Resource investment positively influences productivity and consequently companies' performance.

Q3) How can firms mitigate Information Systems implementation risks, and do they affect the impact of IS in strategy?

The current investigation unveiled that the Risks associated with IS implementation have a positive relationship with the company investments, which means that more risks of IS implies more investment in IS. That in turn, influence indirectly the impact of IS in strategy as shown on the conceptual model. The principal risks associated with the implementation of IS in the current investigation were Technical (hardware or software failures), Cost of implementation and maintenance, Implementation difficulties, Infrastructure risk, Organizational risk, Functionality risk, Failure to gain user commitment and Lack of motivation and interest.

Associating those risks with the categories of investments mentioned in the previous research question, led to a very interesting comparison that demonstrate the significance of the relationship between these two variables. Namely, considering that as more as the company have technical risks, more important is to invest in proper and suitable technology, in order to mitigate that threat. Similarly, with the failure to gain user commitment and Lack of motivation and interest risks, if companies have detected that the user commitment is negatively influencing the outcomes of IS as well as the lack of motivation and interest by its users. Based on the Literature review and on data collection results, companies will invest more, namely in Human Resources, in order to face those risks.

One can affirm, based on the findings of the current paper, that the principal reason that explains this positive relationship is the necessity of companies to face the risks with risk mitigation plans and actions. As defended by Watson (2007), for risk mitigation, companies should have management control, operational controls and Technical controls, namely, technical capabilities incorporated into the IT infrastructure specifically to support increased confidentiality, integrity, and availability of information services, which explains the importance of IS investments when approaching IS risks.

Reinforcing, IT control systems are critical for companies' data protection and is one of the best options to mitigate and control de risks associated with information systems, such as the vulnerability to potential information attackers (Mar *et al.* 2012). For some scholars the investments performed by companies should not just be related with IS and Technology but also in a specific Information system of Risks management, namely, the Enterprise risk management (ERM) (Patterson, 2015). Investment in risk assessment techniques is particularly important for companies, since enable the identification of existing and potential risks, that consequently, decrease companies' vulnerabilities and provides a secure environment for information assets (Eroglu & Çakmak, 2016).

Q4) What is the contribute of Information Systems for an organizational strategy?

First of all, the present research question can be answered through the association of all of the above. In the beginning of this discussion topic, in regards with the first research question, it was possible to verify that the use of IS brings a wide range of benefits for companies, namely, for strategy. As already stated, some of those benefits are to get competitive advantage in the market over competitors in cost or in differentiation, support in the organizational long-term plan, support business growth, improve efficiency and productivity and generate a differentiated offer in the services / products delivered to clients and improve efficiency. Thus, considering that strategy is the definition of the principal long run objective of a firm, and the adoption of actions resources allocation, in order to achieve the established goals (Chander, 1998, p.11), also, bearing in mind, that strategy is directly related with competitive advantage issues (Barney & Hesterly, 2005). One can confirm that the adoption of Information systems and consequently its benefits impact positively the companies' strategies.

For that matter, "Information Systems" and "Strategy" has a close relationship in an organizational approach, several were the investigations that revealed that many important objectives of an organizational strategy depends strongly on the organization's IS capabilities, those are the ability to leverage and sustain its competitive positioning, to create strategic value, to develop closer relationships between the firm and its customers and to integrate the firm's resources (Doherty & Terry, 2009; Duhan, 2007; Fink, 2011; Kim *et al.* 2010).

On other hand, by analyzing the contribute of Information Systems for an organizational strategy in a risk perspective, is possible to confirm that both variables are significantly related. As stated, is the discussion of the third research question, and considering the obtained results. Companies are aware of the risks related with the adoption of IS and the importance of their mitigation. Therefore, due to that necessity of risk mitigation firms are investing in suitable systems / strategies, namely in Enterprise risk management, human IT capability, especially with a background of RBV, that indirectly impacts positively companies' strategies, enabling companies to be less vulnerable and with less chance to fail. Also, the identification of IS risks as well as the investment on their mitigation, can lead to better decisions according to the company mission, finally, that can increase the likelihood that a firm will adopt the right strategy. Which has as an ultimate objective the generation of competitive advantage.

Conclusion

The main purpose of this study was to understand the real impact of information systems in companies and especially the role they play and the contribute they have at a strategic level. As such, a quantitative method was used to collect data, through questionnaires and analyzed afterwards that data using statistical methods, namely through the modeling of structural equations (Structural Equations Modeling or SEM), the questionnaire was distributed via social networks, namely, LinkedIn, Facebook, Email, WhatsApp and Instagram. This chapter seeks to present and discuss the study's main findings, highlighting its final conclusions.

During the process of understanding the uses of Information Systems for strategy, other variables intrinsically associated with the use of Information Systems were considered. Among those variables that will contribute to this investigation in regards with the impact of information systems in strategy, are benefits, investments, and risks. Considering the variables stated above, the present research was conducted, in order to answer to four main research questions being them “Q1: What are the benefits associated with the use of Information Systems namely in strategy?; Q2) In which aspects should a company invest to increase the Information Systems implementation outcomes and companies’ performance?; Q3) How can firms mitigate Information Systems implementation risks, and do they affect the impact of IS in strategy? and Q4) What is the contribute of Information Systems for an organizational strategy?”

Overall, with the present research it was possible to prove that, considering that strategy can be defined as the main long run objective of an organization is directly related with competitive advantage issues (Barney & Hesterly, 2005). As per the results obtained in the investigation the main benefits that the adoption of Information Systems brings to companies are to get competitive advantage, support in business growth, efficiency and productivity improvement (Addo-Tenkorang & Helo, World Congress on Engineering and Computer Science, Ao, & International Association of Engineers. (2011, p. 1111). And in terms of cost, differentiation, and support in its long-term plan (Gouveia *et al.* 2004). Thus, one could confirm that the adoption of Information systems and consequently its benefits impact positively the companies’ strategies. Revealing the importance and contribute of those systems for firms.

On other hand, in the present investigation was analyzed the impact of the Risks associated with the use of Information Systems on the Investments performed by companies. The major risks that were identified were a technical risk namely, hardware or software failures, (Watson, 2007), Cost of implementation and maintenance, Difficulties implementing IS, Infrastructure and Organizational Risk, Functionality Risk, and Lack of User Commitment (Belmiro & Pina, 2001, quoted by Queiroga, 2009

and Mendes & Filho, 2002, p. 287). Although as per the results obtained in this paper, the investment in proper and suitable technology, can avoid and mitigate technical risks. Similarly, to the lack of user commitment and lack of motivation risks, if companies detect that the level of user commitment is negatively affecting the outcomes of IS, they will invest more, namely in Human Resources, in order to deal with those risks. Additionally, one of the solutions used by companies nowadays to face and avoid the risks of IS are the investment in a specific IS of risk mitigation, namely, Enterprise risk management (ERM), as well as in risk mitigation plans and risk controls. Regarding the risk control Watson (2007), found a comprehensive framework, that divide mitigation risks control in an organization in three categories. (1) Management control – that intended to ensure that the requirements for system confidentiality are satisfied. (2) Operational controls – include day-to-day processes more directly associated with actual delivery of the information services. (3) Technical control - technical capabilities incorporated into the IT infrastructure specifically to support increased confidentiality, integrity, and availability of information services.

As so, the main objective of the present study was achieved, that was to understand the real impact of information systems in companies, in order to understand if is, in fact, a critical factor of firms' success and survival or if, in other hand, its risks avoid companies to adopt those systems. In regards with the companies that already adopted IS the aim of this investigation is to understand it contribute at a strategic level. The results obtained revealed that IS are affecting most management functions and have become essential to firm's competitive advantage and survival (Watson, 2007, p.89) and were also considered as one of the type of informatics management systems, must relevant and important for organizations and for decisions support (Cricelli *et al.* 2014, p. 164 and Laudon, 2009). In regards with the risks, with the present investigation one could verify that, although the implementation of IS have many risks associated was not a reason that led companies to avoid in the investment in those systems. Contrariwise, the risks led companies to invest more, in order to mitigate those risks.

In sum, this research allowed to determine that the Use of information Systems benefit companies in most of the departments of companies, but in particular at a strategic level. In turn, these systems will increase the competitive position of companies, support in business growth, efficiency and productivity improvement.

Hence, the present investigation has allowed to deepen the studies in the field of the impact of IS in strategy and understand the relationship of that with the investments in IS, benefits of using those systems and the risks associated with it. Hence, it is relevant to analyze both limitations and implications of the present study.

Concerning the limitations to the present study, considering the field of Information Systems and the is in constant technological development nowadays, this approach can ultimately limit the ability to form casual relationships between the variables. In addition. Additionally, another limitation of the present study is related to the fact that a convenience sample was used which limits the ability to generalize results, since the sample was not representative of a population neither randomly obtained (Sampieri, 2014). In regard to the second research question, a limit sample was obtained which ultimately compromise the ability to make significant statistical inferences. Thus, in regard to external validity, it is not possible to generalize the results as they are not representative. Even though this investigation was able to reinforce some of the scholars existing theory concerning the impact of SI in firms, particularly in strategy, the present research should be perceived as an exploratory study, which cannot be generalized, or representative.

Finally, it is important to bear in mind that the technological evolution, namely at enterprises level are still in current development. Thus, is expected that in the next few years the use of technology and consequently, the use of IS in organizations become more widely used, which will ultimately influence the companies' strategies as revealed in this study. Hence, regarding the impact of the use of Information systems in organization strategy, would be interesting for a future investigation to understand if the sector of activity has influence the IS impact in strategy. Moreover, another study that could be done in the future in regard of the use of Information systems at a corporate level is to understand what the impact of those systems in the remaining departments of companies are, beyond the strategic department.

To conclude, the impact of information systems on organizational strategy allows further empirical research regarding SI. Due to the significant increase in the use of technology and the use of information systems by companies. Lastly, it is wished that this research could motivate further studies in this field, which is likely to become increasingly important, particularly at an organizational level.

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Appendixes

Appendix A - Sector of Activity of the Survey answers

Category	Class description	Total Number	Percentage
Activity sector	Financial	30	30.3%
	Retail	10	10.1%
	Education	4	4.0%
	Human Resources	4	4.0%
	Telecommunications	3	3.0%
	FMCG	3	3.0%
	IT	3	3.0%
	Communication	2	2.0%
	Tourism	2	2.0%
	Services	2	2.0%
	Financial	2	2.0%
	Pharmaceutical	2	2.0%
	Fitness business	2	2.0%
	Sales	2	2.0%
	Health	2	2.0%
	Technology	2	2.0%
	Marketing	2	2.0%
	Aerospace	2	2.0%
	NA	2	2.0%
	Due Diligence	1	1.0%
	Service	1	1.0%
	Management	1	1.0%
	Agro industry	1	1.0%
	State	1	1.0%
	Maths applied to business and technology	1	1.0%
	Unemployed	1	1.0%
	Architecture	1	1.0%
	Callcenter	1	1.0%
	National security	1	1.0%
	Industry	1	1.0%
	NGO	1	1.0%
	Insurance	1	1.0%
	Operations	1	1.0%
	Advertising	1	1.0%
Engineering	1	1.0%	
Production	1	1.0%	
Hospitality	1	1.0%	
Grand Total	99	100.0%	

Appendix B – Job Position of the Survey answers

Category	Class description	Total Number	Percentage
Job Position	Specialist Compliance Officer	20	20.20%
	Manager	9	9.09%
	Back Office	9	9.09%
	Student	7	7.07%
	Sales Assistant	4	4.04%
	Teacher	3	3.03%
	Consultant	3	3.03%
	Front office	3	3.03%
	HR Technician	3	3.03%
	Marketing assistant	2	2.02%
	Business Development Assistant	2	2.02%
	Engineer	2	2.02%
	Self employed	2	2.02%
	Marketing specialist	2	2.02%
	School coordinator	1	1.01%
	Technical assistant	1	1.01%
	E-commerce assistant	1	1.01%
	IT Recruiter	1	1.01%
	Account	1	1.01%
	Java Trainee	1	1.01%
	Software developer	1	1.01%
	M&E sénior officer	1	1.01%
	Auditor	1	1.01%
	Analyst	1	1.01%
	Tourism Technician	1	1.01%
	Architect	1	1.01%
	Customer service/suport	1	1.01%
	Unemployed	1	1.01%
	Data Scientist	1	1.01%
	Rescuer	1	1.01%
	Software Engineer	1	1.01%
	Operational Risk Analyst	1	1.01%
	Assistant	1	1.01%
Pilot	1	1.01%	
Team Leader	1	1.01%	
Project Manager	1	1.01%	
Technician	1	1.01%	
Project Transformation Leader	1	1.01%	
Travel agent	1	1.01%	
Revenue Management Supervisor	1	1.01%	
Risk manager	1	1.01%	
Motion designer	1	1.01%	

	Grand Total	99	100.00%
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