



**NOVA**

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# DOCTORAL PROGRAMME

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## Information Management

Specialization in Information and Decision  
Systems

**Software-as-a-service enterprise applications  
impact in firm performance**

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for the degree of Doctor in Information Management

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**NOVA Information Management School**  
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**Software-as-a-service enterprise applications impact in firm performance**

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## **ABSTRACT**

Software-as-a-service has grown exponentially in the last decade, even in the enterprise applications area where usually the implementations are more customized in order to support the business processes implemented in the organizations. However, in the information systems research, there are few pieces of evidence of work in the IT-based business value stream, regarding the intermediate-process level and strategic performance generated, and about the contribution or influence of other cross-discipline factors such as business strategy, organizational and human resources. The work performed in this dissertation intended to answer questions like:

- a. what is the impact on firm performance, of the capabilities of an organization that uses software-as-a-service enterprise applications? and
- b. how does business strategy, strategic alignment and human talent influence the level of firm performance created, in the context of organizations using software-as-a-service enterprise applications?

Since the beginning and along the way, the literature review revealed very scarce work in the area of IT-based business value of software-as-a-service enterprise applications, if any of relevance till 2018.

In the early stages of our research, we did qualitative work to compare the points of view of specialists from a software vendor, and of organizations managers that had already adopted and used an ERP in cloud computing for some time. So, considering a lifecycle that goes from the intention to adopt and use, till the value extracted, it emerged that financial benefits are the main factor for adoption and usage, confirming that this is an essential subject to study.

In the following steps of the research, we made quantitative work creating dual-theory frameworks which were operationalized through questionnaires, answered by a majority of decision-makers in the target organizations.

The first quantitative model was based on resource-based-view and competitive strategy theories, and the results of 257 companies in Portugal allowed to assess that the impact of firm capabilities supported by software-as-a-service enterprise applications is felt indirectly on the creation of firm performance, through the impact of intermediate-process level performance, which we name business value. Both business value and business strategy proved to be important mediators in the creation of the firm performance.

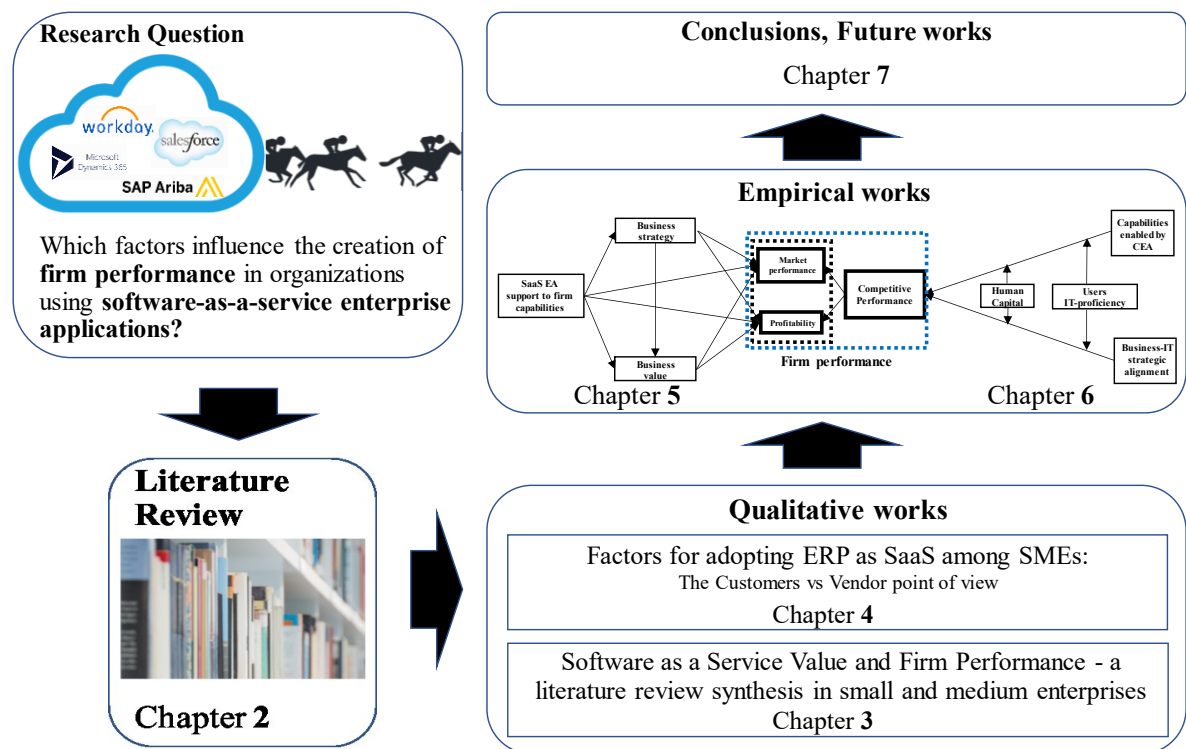
The following work exploited the relevance of human talent, namely human capital and users IT-proficiency, with a model based on dynamic capabilities and human capital theories, and the results of 256 North American companies revealed that capabilities supported by software-as-a-service enterprise applications are more impactful in firm performance than business-IT strategic alignment, and in cases that this alignment is low it will be important to have high users IT-proficiency.

In conclusion, this research confirmed that organizations that adopt and use software-as-a-service enterprise applications can expect an impact both in their business value and firm performance but should make their choices according to the business strategy chosen and aligned with the IT management. Furthermore, organizations that invest in their human capital and IT-proficiency skills can also expect a higher level of impact from the usage of those applications in software-as-a-service.

**Keywords:** business-IT strategic alignment, business strategy, business value, cloud enterprise applications, dynamic capabilities, enterprise applications, enterprise resource

planning, firm capabilities, firm performance, human capital, software-as-a-service enterprise applications, human capital, users IT-proficiency

**Graphical Abstract**



## **RESUMO**

O software como um serviço cresceu exponencialmente na última década, mesmo na área de aplicações empresariais, onde geralmente as implementações são mais personalizadas para dar suporte aos processos de negócios implementados nas organizações. No entanto, na pesquisa no campo dos sistemas de informação, existem poucas evidências de trabalhos sobre o valor das tecnologias para o negócio, no que diz respeito ao nível dos processos intermédios, ao desempenho estratégico gerado, e à contribuição ou influência de outros fatores interdisciplinares, como estratégia de negócio, recursos organizacionais e humanos. O trabalho realizado na dissertação teve como objetivo responder às seguintes perguntas:

- a. qual é o impacto no desempenho empresarial dos recursos de uma organização que usa aplicações empresariais como serviço? e
- b. como a estratégia de negócios, o alinhamento estratégico e o talento humano influenciam o nível de desempenho empresarial criado, no contexto das organizações que usam aplicações empresariais como serviço?

Nas fases iniciais da nossa pesquisa, fizemos um trabalho qualitativo para comparar os pontos de vista de especialistas de um fornecedor de software e de gestores de organizações que já haviam adotado e utilizado um ERP na computação em nuvem há algum tempo. Assim, considerando um ciclo de vida que vai da intenção de adotar e usar, até ao valor extraído, emergiu que os benefícios financeiros são o principal fator de adoção e uso, confirmando que este é um assunto essencial para o estudo.

Nas etapas seguintes da pesquisa, fizemos um trabalho quantitativo criando modelos com mais de uma teoria que foram operacionalizados por meio de questionários, respondidos na maioria por decisores de negócio das organizações-alvo.

O primeiro modelo quantitativo baseou-se nas teorias de “resource-based-view” e estratégia competitiva, e os resultados de 257 empresas em Portugal permitiram avaliar que o impacto das capacidades da empresa suportadas por aplicações empresariais como serviço, é sentido indiretamente na criação de desempenho empresarial, por meio do impacto no desempenho ao nível dos processos intermédios, que denominamos valor para o negócio.

Tanto o valor como a estratégia de negócio provaram ser importantes mediadores na criação do desempenho empresarial.

O trabalho a seguir explorou a relevância do talento humano, ou seja, capital humano e proficiência em tecnologias de informação (TI) por parte dos utilizadores, com um modelo baseado em teorias dos recursos dinâmicos e de capital humano, e os resultados de 256 grandes empresas norte-americanas revelaram que os recursos suportados pelas aplicações empresariais como serviço são mais impactantes no desempenho da empresa do que o alinhamento estratégico de negócios e TI, e nos casos em que esse alinhamento seja baixo, será importante ter elevados níveis de proficiência em TI por parte dos utilizadores.

Em conclusão, esta pesquisa confirmou que as organizações que adotam e usam aplicações empresariais como serviço podem esperar um impacto tanto no valor para o negócio quanto no desempenho empresarial, mas devem fazer as suas escolhas tecnológicas de acordo com a estratégia de negócios escolhida e alinhada com a gestão das TI. Além disso, as organizações que investem no seu capital humano e nas capacidades de proficiência em TI também podem esperar um nível mais alto de impacto do uso dessas aplicações empresariais como serviço.

**Palavras-chave:** alinhamento estratégico negócios-TI, estratégia de negócios, valor para o negócio, aplicações empresariais na nuvem, recursos dinâmicos, aplicações empresariais,

“enterprise resource planning”, recursos empresariais, desempenho empresarial, capital humano, aplicações empresariais como serviço, capital humano, proficiência dos utilizadores em TI

## **PUBLICATIONS**

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Rodrigues, J., Ruivo, P., & Oliveira, T. (2020). Does human talent play a role in the performance of an enterprise using cloud enterprise applications?

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## **LIST OF ABBREVIATIONS AND ACRONYMS**

<b>ABS</b>	Association of Business Schools
<b>AC</b>	Absorptive Capacity theory
<b>ASP</b>	Application Service Provider
<b>AVE</b>	Average Variance Extracted
<b>B2B</b>	Business to business
<b>B2C</b>	Business to consumer
<b>BPO</b>	Business Process Outsourcing
<b>Capex</b>	Capital Expenses
<b>CEA</b>	Cloud Enterprise Applications
<b>CENTERIS</b>	Conference on ENTERprise Information Systems
<b>CEO</b>	Chief Executive Officer
<b>CIO</b>	Chief Information Officer
<b>CFO</b>	Chief Financial Officer
<b>COO</b>	Chief Operations Officer
<b>CP</b>	Competitive Performance
<b>CRBV</b>	Contingent Resource-Based-View theory
<b>CR</b>	Composite Reliability
<b>CRM</b>	Customer Relationship Management
<b>CT</b>	Contingency Theory
<b>CXO</b>	Chief “any role” Officer
<b>DC</b>	Dynamic Capabilities
<b>EA</b>	Enterprise Application

<b>ERP</b>	Enterprise Resource Planning
<b>FP</b>	Firm Performance
<b>GM</b>	General Manager
<b>HC</b>	Human Capital theory
<b>HR</b>	Human Resources
<b>HRM</b>	Human Resource Management
<b>HTMT</b>	HeteroTrait-MonoTrait ratio
<b>IC</b>	Intellectual Capital theory
<b>ICT</b>	Information Communications and Technologies
<b>IDC</b>	International Data Corporation
<b>IS</b>	Information System
<b>IT</b>	Information Technology
<b>ITBBV</b>	IT-Based Business Value
<b>KPI</b>	Key Performance Indicator
<b>MRP</b>	Materials Requirement Planning
<b>NOVA IMS</b>	Nova Information Management School
<b>Opex</b>	Operating Expenses
<b>PLS</b>	Partial Least Squares
<b>POS</b>	Point of Sale
<b>RBV</b>	Resource Based View
<b>RFID</b>	Radio Frequency Identification
<b>ROE</b>	Return on Equity
<b>ROI</b>	Return On Investment
<b>RQ</b>	Research Question

<b>SAAS</b>	Software-as-a-Service
<b>SAAS EA</b>	Software-as-a-Service Enterprise Applications
<b>SAP</b>	Multinational enterprise software vendor
<b>SCImago</b>	Journal Rank indicator
<b>SCM</b>	Supply-Chain Management
<b>SD</b>	Standard Deviation
<b>SEM</b>	Structural Equation Modelling
<b>SME</b>	Small and Medium Enterprise
<b>TCO</b>	Total Cost of Operation
<b>TOE</b>	Technology Organization Environment theory
<b>VAF</b>	Variance Accounted For
<b>VIF</b>	Variance Inflation Factor
<b>VRIN</b>	Valuable, Rare, Imperfectly Imitable and Non-substitutable

## **CHAPTER 1 - INTRODUCTION**

This chapter introduces the motivations, context and scope of the research of the dissertation, which were the objectives and methodological approach and path endured to achieve the results.

### **1.1 Motivation and research context**

Since the eighties to date, my professional career has given me the possibility to go through several waves of technology, and with a professional background of almost three decades working with or near information communications and technologies (ICT) and software vendors, which lead me to be directly involved in trying to convince organizations to change from mainframes to client-server architectures, and later into cloud computing, always with arguments based on profitability and productivity benefits, reasonable rates of return on investments and reduced total cost of ownership, to mention some. So, the beginning of a research path in academy led me to be interested in exploiting which are the factors that, from a management point of view, can be determinant to extract and maximize these benefits in each of these new waves of technology, and in particular, in the last few years, in the new paradigm of cloud computing.

The work performed in order to build this dissertation was centred around the growing availability of enterprise applications in cloud computing based deployment, which are also known as software-as-a-service enterprise applications (SaaS EA), or cloud enterprise applications (CEA), provided by third-party vendors, and how these, which are intended to optimize business operations, impact operational benefits and firm performance, resulting in a competitive advantage to the organization, and so fulfilling a strategic management role.

In this research, it was considered the Laudon and Laudon (2020) definition of enterprise applications, which includes mainly the enterprise resource planning (ERP), customer relationship management (CRM), and supply chain management (SCM) business applications, to which we also added human resources management (HRM) business applications, that support the management of human capital, one of the factors that is also evaluated on this research.

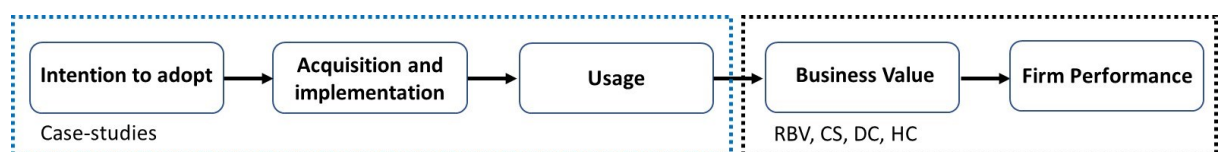
The two major research questions (RQ) that we want to address in this work, are:

RQ1: What is the impact on firm performance, of the capabilities of an organization that uses SaaS EA?

RQ2: How do factors such as business strategy, strategic alignment and human talent influence the level of firm performance created, in the context of organizations using SaaS EA?

## 1.2 Research focus

The research aims to understand the factors that influence the creation and maximization of firm performance of organizations that use SaaS EA. Based on the lifecycle proposed by Esteves & Pastor (1999), Fig. 1.1, we also want to get evidences regarding the role of operational benefits (business value) as part of this creation process, and which are the initial expectations of organizations when adopting and using SaaS EA.



**Fig. 1.1 Research focus, adapted from (J. M. Esteves & Pastor, 1999)**

### **1.3 Research objectives**

In this research we are looking to achieve the following objectives:

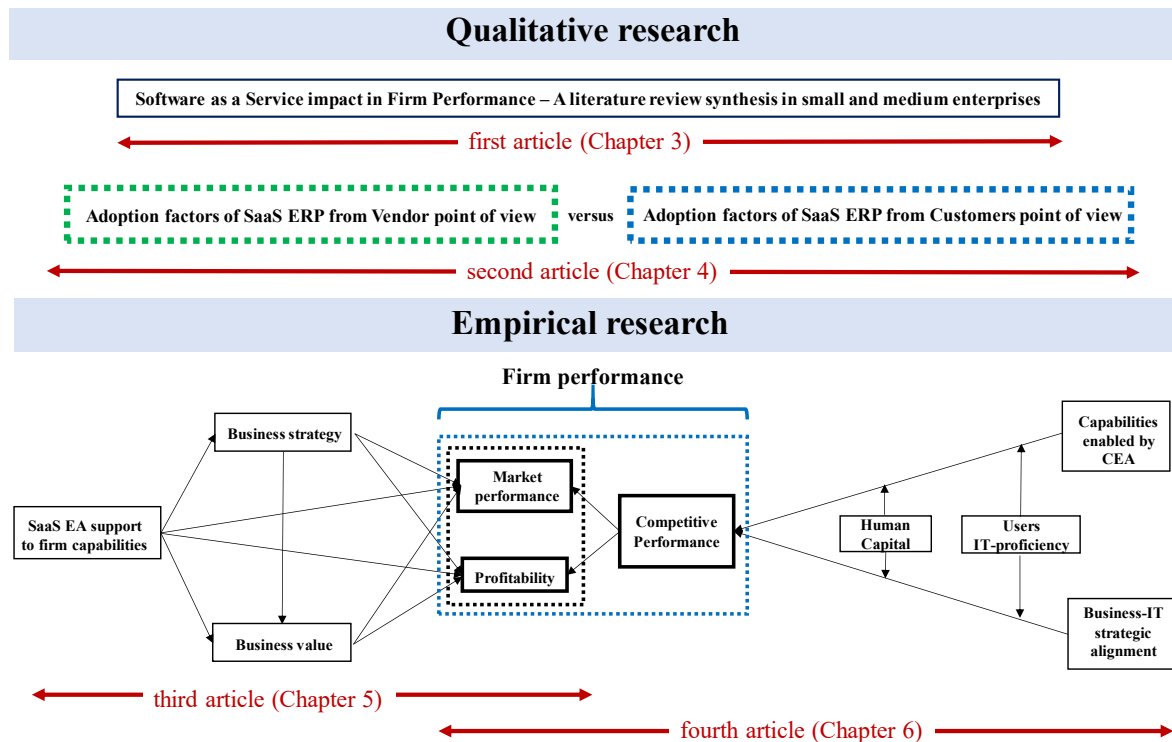
- understand the primary factors and benefits that lead organizations to adopt and use SaaS EA, and how different they are (or not) from the vision of the software vendors;
- clarify if in a company that uses SaaS EA, the impact on firm performance is a direct influence of the firm's capabilities or if it is a consequence of the operational benefits (business value) generated;
- get insights regarding the role that human capital and users IT-proficiency have in the performance impact in enterprises that adopted and use SaaS EA.

### **1.4 Research methodologies**

This dissertation is based on a mixed methodological approach, in which we begin with some qualitative research work that is followed up by two quantitative works. Although this does not seem to be the most common approach in many of the works in the area of information management, it was considered that it could be more enriching, as advocated by some authors (Onwuegbuzie & Leech, 2005).

So, this work started with a constructivist approach and then evolved into a positivist approach, through the development of a research model with several hypotheses based on a theoretical framework, composed by different theories from the areas of information systems, strategic management and organizational behavior and human resource management, which are then empirically tested. Fig. 1.2 presents the methodological approach graphically. Intending to understand which was the state-of-the-art around the research on the impact of

SaaS business applications in firm performance, the first work was an initial literature review synthesis.



**Fig. 1.2 Global research approach and empirical research model**

The following qualitative work focused on the identification and prioritization of the factors that lead to the adoption of SaaS EA, conducted through two phases qualitative methodology of semi-structured interviews. In the first phase, with experts from a SaaS vendor, and then followed-by interviews with executives of organizations which had adopted, implemented and use an ERP as SaaS, which allowed us to see the different points of view of valuation factors among the customers and the vendors.

Then, the first empirical work, departing from a theoretical framework based in resource-based-view (RBV) and competitive strategy theories, intended to understand how do the

organizational, marketing, and technical firm capabilities supported by SaaS EA create operational benefits (business value) and firm performance, and which are the effects of the business strategy chosen by the organization.

In the following empirical work, we wanted to understand how much the SaaS EA (which we named in that article (Chapter 6) - cloud enterprise applications (CEA)) enabled dynamic capabilities of an organization impact firm performance (FP), comparing with *business-IT strategic alignment*, and which is the degree of influence in this (FP) of factors such as human capital and users IT-proficiency.

The two empirical papers were possible through the data collection of web-survey based responses of 257 organizations based in Portugal, for the first one, during May and June of 2016, and of 256 organizations in North America (United States and Canada) for the second one, during September and October 2018.

In order to validate the results, and get conclusions, we used the Partial Least Squares (PLS) - Structured Equation Modelling (SEM) method, which has been considered most adequate to estimate complex path models with latent variables, their relationships, and mediation effects (Marko Sarstedt, Christian M. Ringle, 2017; Ramli, Latan, & Nartea, 2018).

### **1.5 Research path**

This research started in the first year of my doctoral programme (September 2013), where I had already an idea of the subject I wanted to study, following my professional career in the software industry, and namely in the last few years at Microsoft, where since 2010 till 2013 I was responsible for business development of the enterprise business applications offer in cloud computing near customer organizations and through the channel of partners and integrators of Microsoft. This role involved a value-based approach, at the time mainly based

in arguments around the reduction of cost to operate, reduced need for capital investment (Capex), change from capex to operational expenses (Opex), and several other advantages which we had to try to convince the organizations to adopt and use enterprise applications (or collaboration solutions) in cloud computing, also known as software-as-a-service.

So, having in mind to study which was the impact that this new paradigm of computing could have in the area of IT-based business value (ITBBV) research, in the enterprise applications market, my first task was to do an initial literature review focused mainly in applications to small and medium enterprises (SME). This literature review was accepted to the Conference on Enterprise Information Systems, CENTERIS 2014, and presented there in October 2014 (Jorge Rodrigues, Ruivo, & Oliveira, 2014). It was a limited work, but as a start, it was essential both to understand the state-of-the-art in the area and to get acquainted with the conference circuit environment network. I believe that, despite its limitations, it was important to be part of this dissertation (Chapter 3).

Between 2014 and 2016, some work was done for Conferences, regarding the providers' point of view for the adoption reasons of enterprise systems as a service (B. Johansson, Ruivo, & Rodrigues, 2015), and also on the surge of ERP hybrid models of implementation, part in the cloud, part on-premise (Pedro Ruivo, Rodrigues, & Oliveira, 2015). It was still in 2014 that, based on some of the work made previously (Björn Johansson & Ruivo, 2013), regarding adoption factors for SaaS ERP from the point of view of a major software vendor (Microsoft), I decided that it would be important to see if customer organizations that adopted and used SaaS ERP (as ERP is one of most diffused enterprise applications) mentioned the same attributes and its relevance. So, a qualitative study was made, based on case-studies of organizations that had adopted and used SaaS ERP for some time (Chapter 4), which was

published in Information Resources Management Journal in October 2016 (J. Rodrigues, Ruivo, Johansson, & Oliveira, 2016).

It is worth to mention that, till 2016, most of the work related to mine was still only focused on more generic cloud computing, not specific SaaS EA, and mainly in the adoption and usage aspects. So the work done between 2014 and 2016 had some relevance to support the subject I was intending to research, and it is evident that in my first two years of research, there was a focus on getting immersed in the area, and also be involved in research production for conferences.

Between 2016 and 2017, I was involved in another work for a conference, regarding ERP value (P. Ruivo, Rorigues, Johansson, Oliveira, & Rebelo, 2017), and started to establish the first theoretical model based on two theories – resource-based view (RBV) and competitive strategy, that would help to understand the impact in operational benefits and firm performance of SaaS EA enabled firm capabilities. With this model, data was still collected in 2016 and analysis of results and writing led to the first submission of an empirical paper (and third of my thesis (Chapter 5)) in the last quarter of 2017, to Information and Management journal, a quartile one journal on the SCImago index.

This work went through a lengthy process of several revisions, where the dataset of 257 company responses together with the proposed model (which went only through minor changes) was considered important to be diffused, proving that it was sufficiently reliable to give valid conclusions. Finally, in February 2020, it was accepted for publication (Jorge Rodrigues, Ruivo, & Oliveira, 2020).

During the path in this research there was always a concern of making the relation between the information systems (in an ITBBV research focus) with some management disciplines, such as business strategy or organizational alignment.

One of the aspects I became aware during the research was the difficulty that, in this fast-moving world of the technology, organizations are having to keep their human resources able to adopt, use and exploit all the potential of that technology. Moreover, there was a report that touched that point (Hoberg, Krcmar, & Welz, 2017) that made me think that I should also explore this area, integrated into my work.

This led me, just after submitting the previous work, to exploit the theories around intellectual capital, and human capital, and how to develop a theoretical model also trying to explain the influence of human capital and the users IT-proficiency, that together formed what I call human talent. Additionally, the last work suggested also to clarify the business-IT alignment, and this new model involved both the dynamic capabilities and human capital theories and was the basis for doing another empirical work, where I sought support from a vendor, in order to get to a sufficient number of organizations which had implemented and used SaaS EA, and with some dimension where it would be expected that subjects such as those related to human talent and also alignment between business and IT are sufficiently important to be taken in consideration.

I was fortunate, due to the relationship established between the University and SAP, to be supported by this vendor in the administration of a survey questionnaire based in the theoretical model, to their customer base in North America. As a result, it was possible to compile and validate the model near 256 organizations. The subsequent work resulted in a submitted article to a quartile one journal on the SCImago index, in 2020, which is also part of this dissertation (Chapter 6).

## 1.6 Dissertation structure

This dissertation has 7 chapters, organized in the following way:

- Chapter 1 introduces the motivation and context of the research, and then synthesises the focus, objectives, methodological approach and path taken during the research;
- Chapter 2 is about the systematic literature review on the subject of the research and the research opportunities open;
- Chapter 3 presents the first work of the research project, which was accepted at an indexed conference, being an initial literature review synthesis made till the end of April 2014, to shed some light regarding paths of research on the impact of SaaS business applications in firm performance, and which are the most significant variables that explain SaaS value influence to these organizations;
- Chapter 4 presents the qualitative work based on case-studies of organizations that adopted and use SaaS EA, and which were the reasons behind and respective relevance;
- Chapter 5 is about the first empirical work, based on a theoretical framework developed to uncover how SaaS EA based firm capabilities impact the creation of operational benefits and firm performance;
- Chapter 6 presents the second empirical work to understand the role of human talent in the impact of capabilities enabled by SaaS EA (also named Cloud EA (CEA));
- Finally, Chapter 7 discusses the findings and contributions of this work, also its limitations, and which are the areas of opportunity for further research work.

## **CHAPTER 2 – LITERATURE REVIEW**

### **2.1. Chapter Scope**

In the context of this dissertation, the literature review intends to help us understand which is the level of knowledge around the subject we are looking, and provide the theoretical foundations for the research questions (Paré, Trudel, Jaana, & Kitsiou, 2015). This literature review will uncover the emerging nature of the subjects we are studying in order to help develop possible conceptual models for this research (Webster & Watson, 2002), that make a significant contribution to the knowledge in the research stream of ITBBV of enterprise applications delivered as SaaS.

### **2.2. The usage of enterprise applications as software-as-a-service and IT-based business value**

The work performed to build this dissertation was centred around the evolution from an era of availability of enterprise applications on-premise into the cloud-based deployments which we designate as software-as-a-service enterprise applications (SaaS EA), provided by third-party vendors. In the area of information management, these enterprise applications intend to optimize business operations which should provide added value (competitive advantage) to the organization, fulfilling as such a strategic management role.

#### **2.2.1 Usage of enterprise applications**

There are several definitions for software applications that are used in organizations to support their business processes, either in specific functional areas such as the examples of

finance, or manufacturing, or sales or under a more holistic point of view of integrated business processes running among several functional areas of an organization.

For the scope of our research, as mentioned previously we follow Laudon's (2020) interpretation for the range of enterprise applications, but these can also be interpreted, or known, by terms such as *enterprise software*, *enterprise systems*, or *business applications*. And among the most common applications are the enterprise resource planning (ERP), or enterprise information systems, customer relationship management (CRM), supply chain management (SCM), or human resource management (HRM).

The research was focused on the premises that organizations had already adopted and have been using some or all of these types of enterprise applications, in particular in software-as-a-service mode.

### 2.2.2 Software-as-a-service

Software-as-a-service (SaaS) is one of the three types of services of cloud computing, and very often the usage of software applications, and more specifically of enterprise applications is commonly named of usage of software in the "cloud", as opposed to the installation of software on the organization's servers, which is commonly denominated as of software "on-premise".

As the availability of communications allowing growing power of bandwidth became wider, since the middle of the 90s, with also larger access to Internet services, a shift from the client/server model of computing to distributed computing over the Internet increased over time, towards what is called the "cloud computing model." This refers to a model of computing that uses shared resources, such as technological infrastructure, processing power, storage, applications, and services, over the Internet or other network resources (Pigni, 2016).

Cloud computing, which allows the connection of devices, from any location, to access those computing resources, has become the fastest-growing form of computing, with higher and higher percentages of computer workloads running over cloud infrastructures, and worldwide public cloud spending expected to reach \$411 billion by 2020 (Cisco, 2018; Gartner, 2017). During the 90's some software applications started to be available through Application Service Providers (ASP), third-party companies that made available some specialist applications to several organizations at the same time, so reducing the cost of access to each one of those. This was a similar concept to the nowadays SaaS, however with an architecture named single tenancy, which means that each organization had a dedicated stack, which was most similar to hosting than, on the other hand, SaaS which is provided with a multi-tenancy architecture allowing greater cost sharing and economies of scale, as from a single datacenter it is possible to serve hundreds or thousands of users, and so reducing the total cost of operation (TCO) per organization significantly (Kenneth C. Laudon; Jane P. Laudon, 2020). So, SaaS allows organizations to access software, hosted by providers in their remote servers and delivered as a service over a communications network. Today there are innumerable providers, some of which are renowned companies such as Google, Microsoft, Salesforce.com, among others that provide online access to collaborative or business applications, over the Internet, charging their customers per period of usage and number of users accessing those applications through web browsers.

### 2.2.3 IT-based business value

Research regarding the performance and business value of the usage, adoption and investments on IT made by organizations, either from the point of view of organizational or

business process performance (Melville, Kraemer, & Gurbaxani, 2004), is a subject which has been a significant concern since the 90s' (Kohli & Grover, 2008).

However, one of the challenges for the researchers in this area is the inexistence of a standard definition of what is business value, or, more specifically, firm performance. We see some researchers mentioning organizational performance as the later, focused on overall firm performance (Melville et al., 2004), but then other associate it to economic, social, and environmental aspects, also calling it sustainable performance (S. Gupta, Meissonier, Drave, & Roubaud, 2020), and most often the work does not evaluate the intermediate-process level impact of the usage of IT, focusing only in variables such as market performance and profitability (Rivard, Raymond, & Verreault, 2006).

Due to the context of this research, where we are focusing on enterprise applications, which commonly have a strong impact in business processes that embrace internal departments of an organization, it is essential to establish the distinction between the impact those applications have in operational benefits or business process performance, and strategic benefits or firm performance, as some authors did (Barua, Kriebel, & Mukhopadhyay, 1995; Ji-fan Ren, Fosso Wamba, Akter, Dubey, & Childe, 2016).

### **2.3. Literature review**

The literature review follows Webster (2002) guidelines for a systematic approach in order to get as much as possible the relevant work made to date, which we decided to make a cut-off till April 2020, regarding the subjects under evaluation. The primary sources selected included databases of Scopus and Web of Science (all databases), plus Google Scholar, with the following criteria:

- Publishing in Journal articles and conference proceedings, solely in English;
- Research produced since 2010;
- Selection of titles, abstracts, or keywords, comprising the words compiled in Table 2.1.

From an initial screening, where we obtained a global of 2,348 articles from Scopus and Web of Science (1,452 and 896 respectively) and 16,300 from Google Scholar, we made another refinement regarding the keywords from the articles found in Scopus, mainly focused on those most closely related to software-as-a-service, and also to economic factors, which limited those to 220 in Scopus. A similar screening from Web of Science results gave us 290 articles. On Google Scholar results, we limited our scope to the first 200 articles based on relevance.

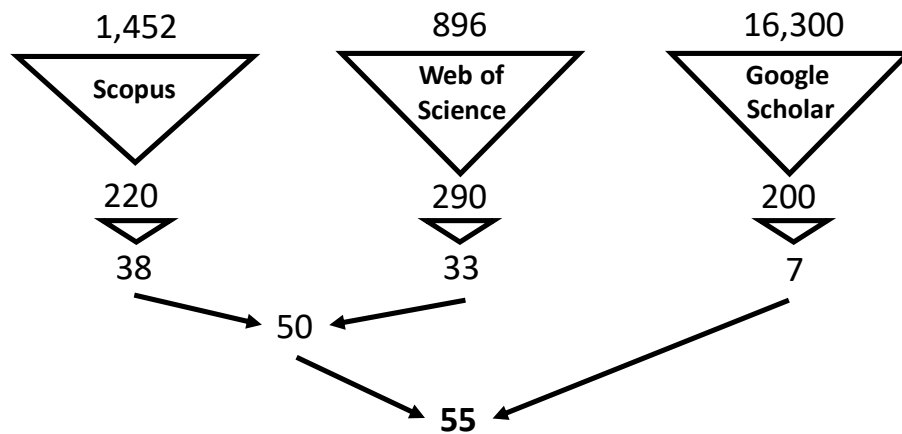
<b>Enterprise applications</b>	<b>Software-as-a-service</b>	<b>Value, Firm Performance</b>
business applications	cloud	advantage
enterprise applications	cloud computing	benefits
enterprise systems	software as a service	business value
enterprise software	saas	cost reduction
ERP	software-as-a-service	efficiency
enterprise resource planning		firm performance
enterprise information system		business performance
SCM		IT value
supply chain management		performance
CRM		ROI
customer relationship management		impact
HRM		
human resource management		

**Table 2.1 Keywords used for literature review**

So, we ended up from the first screening, with 710 articles to analyse, looking more closely to the abstracts in order to identify those which could provide the best combination of the

three factors – enterprise applications, software-as-a-service, and value and firm performance, for additional screening.

The second screening resulted in a total of 78 articles, where some were repeated among the several databases, resulting in 55 single articles. We can see in Fig. 2.1, the filtering process to arrive to those 55 articles which were analysed in more detail.



**Fig. 2.1 References selected per database**

Still, from these 55 articles, we made a classification of relevance on a scale of 1 to 5, being 1 the least relevant and 5 the most relevant, which lead us to exclude the ones that were below relevance 3, and also restricting the publications on journals which were indexed in the SCImago or ABS List. We ended up with 12 publications, considered to be the most relevant and closer to our specific field of research, which we present in the following Table 2.2.

Reference	Type	Theories	Methodology	Summary
(S. Gupta et al., 2020)	J	DC	Quantitative. Structural Equation Modelling	Research on linkage of Cloud ERP and attributes of organizational performance, considering effects of firm size, cloud service type, and other control variables
(Aulia, Putri, Raihan, Ayub, & Sulistio, 2019)	C	N.A.	-	Literature review on Cloud ERP
(S. Gupta, Qian, Bhushan, & Luo, 2019)	J	DC	Quantitative. Structural Equation Modelling.	Research on cloud ERP and big data predictive analytics (BDPA) impact on firm performance
(Loukis, Janssen, & Mintchev, 2019)	J	AC	Quantitative. Structural Equation Modelling.	Evaluation of organizational and inovational benefits resulting from SaaS financial applications usage, and impact on firm performance.
(Gupta, S., Kumar, S., Singh, S. K., Foroapon, C., & Chandra, 2018)	J	CRBV	Quantitative. PLS-SEM.	Cloud ERP impact in Supply Chain Performance and Organizational Performance.
(Seethamraju, 2015)	J	TOE	Qualitative research. Case-studies.	Evaluation of impact of factors that lead to adoption of SaaS enterprise systems in SMEs, in two countries, based in four case-studies.
(Peng, Guo Chao Alex; Gala, 2014)	J	N.A.	Qualitative. In-depth interviews with 16 consultants.	Potential benefits and challenges, related to technical and organisational factors of Cloud ERP adoption.
(Mital, Pani, & Ramesh, 2014)	J	N.A.	Qualitative. Semi-structured interviews	Factors of choice for SaaS e-procurement and ERP applications.
(Schäfer, Schulze, Yusuf, & Musa, 2013)	C	N.A.	Literature review	Literature review, discussing the limited benefits that SMEs get (in comparison with large enterprises) from the usage of SaaS enterprise systems.
(Faasen, Seymour, & Schuler, 2013)	C	TOE	Qualitative. Semi-structured interviews.	Qualitative study on intentions to adopt and use SaaS ERP.
(Seethamraju, 2013)	C	N.A.	Qualitative. Cross-sectional field study in four organizations	Research on the factors which lead companies to adopt na ERP in SaaS deployment, based in case-studies analysis.
(Yeh, 2012)	J	IC/HC	Conceptual article	Discusses how HRM in Cloud creates competitive advantage.

Notes: C=Conference; J=Journal; DC=Dynamic capabilities; AC=Absorptive capacity; CRBV=Contingent resource-based-view; TOE=Technology, Organization, Environment; IC/HC=Intellectual capital/Human capital

### Table 2.2 Literature review references

So, in summary, we have the following conclusions:

- Till 2016, most of the research focused on the factors for adoption and usage, literature reviews and qualitative studies (based on case-studies), mainly addressing (potential) soft benefits from the usage of SaaS EA. These were also our focus, that is, to understand the major motivations that organizations had to start adopting and using software-as-a-service enterprise applications, on a time which the major software providers on this area (e.g. Microsoft, Oracle, SAP, etc.) were pushing hard to lead their customer organizations to implement solutions within this deployment model. An interesting finding in this review was the first, and unique, article relating to human resources (HR) with cloud computing, even if only from the point of view of HR.

Among these articles, there are only a couple of references to the TOE theory and the IC/HC theory for the HR-focused article mentioned above.

- From 2018 on, all journal articles selected (four) study the effects of Cloud ERP or SaaS financial applications usage, on organizational and firm performance, with quantitative methods based in SEM-Structural Equation Modelling, which is also the methodology chosen in our studies. Those studies are mainly based on single theory frameworks, such as the contingent resource-based-view (CRBV), dynamic capabilities (DC) and absorptive capacity (AC), looking to evaluate:
  - the impact of Cloud ERP on supply chain performance or firm performance (three of those articles come from the same first author);
  - how do factors such as contractual and relational governance, absorptive capacity and capability to adapt to work with SaaS, determine the magnitudes of operational and innovation benefits, and their respective contribution to firm performance?

## **2.4. Research opportunities**

Software-as-a-service enterprise applications have been growing in adoption and usage, especially in the last ten years. However, in the academic research, the focus on how and which factors contribute to increasing operational benefits or business value, and strategic benefits or firm performance, is still reduced.

This growth in the availability on a services-based model, instead of a products-based model, is also causing an acceleration for the modernization of the digital core of the organizations, as it allows a cycle of increased functionalities over time, which are expected to impact the above-mentioned benefits.

However, it has been proven that it is not enough to have access or availability to technologies, to run a better operation and get more results. And, the research made previously to this work did not make visible yet the evaluation and importance of factors such as:

- the business strategy role in the creation of firm performance;
- the differentiation between operational benefits (or business value) created, and firm performance, and how the former impacts the way that SaaS EA creates firm performance;
- the relevance of business-IT strategic alignment;
- the role of human capital and users capabilities to fully exploit the potential of these digital core technologies.

So, these are some of the cross-topics that we studied for this research, from which we make some conclusions, and from which we also make some suggestions for future works, that can

benefit academics and practitioners interested in this area of digital transformation and innovation.

Among the areas to explore further, we propose:

- from a technological point of view, to consider the integration of SaaS EA with collaboration platforms, and exponential technologies, such as (e.g.) blockchain, internet of things, machine learning, artificial intelligence, virtual or augmented reality, 3D printing (Bodde & Odell, 2019; Ozdogru, 2019);
- to evaluate how these technologies, provided as-a-service, can generate greater competitive advantage, exploiting cross-disciplinary approaches such as innovation capabilities, implementation of new business models, servitization implementation models, or through support to the implementation of Industry 4.0;
- to analyse what is the role of organizational culture and change management approaches, together with the implementation and usage of these technologies, in the creation of operational benefits and firm performance.

## **CHAPTER 3 – Software as a Service Value and Firm Performance - a literature review synthesis in small and medium enterprises**

### **3.1. Introduction**

There is an increasing trend in the adoption of business solutions in the Software as a Service model as some market analysts, such as IDC point out, namely that more than 50% of medium and large organizations will use cloud services in 2014 and growth is at a two-digits rate at worldwide level (+20%).

To date most of the research focus regarding “cloud computing” or “software as a service” (SaaS) has been devoted to the aspects of adoption and usage, and there is less evidence of significant research regarding the impact of this usage on the value created and especially in its relative Impact in Firm Performance.

Business Value of IT research is considered an important element and the IS field have not done enough to explain how and when business value is created (Kohli & Grover, 2008; Nevo & Wade, 2010). In addition to this, Firm Performance impact from Value derived of business applications has been studied mainly in Medium-Large organizations, where one of the variables related with Firm Performance most common to find is “stock market valuation” (Dewan & Ren, 2011).

It could be argued that return on investment is even more critical for small and medium-sized enterprises (SMEs), for whom business applications implementations constitute a comparatively larger investment than for large enterprises (Pedro Ruivo, Oliveira, & Neto, 2014), however there has been limited focus on the study of business applications impact in the SMEs Firm Performance (from this point on referred as SME Performance) excepting

some specific researches in ERP post-adoption effects in SMEs (Pedro Ruivo, Oliveira, Johansson, & Neto, 2013).

The impact obtained from usage of business applications, delivered through SaaS distribution model, in Value creation and SMEs Performance is a subject even more understudied as this review found and makes this research significant for the authors and the subject for doctoral studies such as on theory based models that can explain and quantify the formation of SaaS value and respective impacted variables explaining SMEs Performance.

The academic research community can contribute to the field in various ways. A typical way of contributing to a knowledge field is by diffusing the researches through conferences and publishing journal papers for public benefits. Literature reviews represent a well-established method for accumulating existing knowledge within a domain of interest (Pedro Ruivo et al., 2014).

The objective of this study is to provide an updated review of the most relevant literature which can contribute to explain SaaS business applications value impact in SMEs Performance, and which are the major theories used to explain this. The set of 32 papers published in various reference journals and conferences is a starting point to build up a conceptual framework that can explain how this new business model of business applications adoption might influence some variables which in its combination give superior competitive advantage and enhance Firm Performance in SMEs.

### **3.2. Research Method**

In this article we have applied a systematic review approach, where the criteria for choosing articles for the review are as follows. First of all, the article must have been published in a peer-review, archival journal or conference. Second, to avoid never ending revision of the

article, 30 April 2014 was selected as the cut-off date. Third, the keywords were cloud computing, software as a service, organizational impacts of information systems, ROI, firm performance, business value, competitive advantage, cost reduction, efficiency, IT business value, CRM, customer relationship management, ERP, enterprise resource planning, ESS, enterprise system solutions. After refining the search through Web of Science, EBSCO, IS journals and IS conferences proceedings, a total of 32 articles were found: 29 are journal articles and 3 conference proceedings.

In this section we present a summary of present study results and we have both the studies applied at large enterprises and SMEs. The review shows a gradual increase in research interest of Cloud Computing and Enterprise System Solutions impact in Firm Performance, especially since 2010, and as the same time a decreasing degree of studies in Firm Performance impact from generic IT/IS implementations, as can be seen in Table 3.1. This seems also to be aligned with the increasing adoption of SaaS applications in the commercial market.

In the last four years there was an increase of interest in the subject of impact in Firm Performance from the adoption and usage of information systems at enterprise level, with 2.5 times more articles published than in a larger period of nine years.

One other important element of this Literature Review is the analysis of the theories used, as presented in Table 3.2. This shows clearly that most authors refer to Resource Based View (RBV) theory, especially in the analysis of generic IT/IS implementations in Firm Performance, where RBV stands in 85% of the articles. Excepting Diffusion of innovation, Organizational information processing and Transaction cost economics, which are referred more than once, all other theories mentioned are referred only once.

Subject	Year Range		
	< 2000	2000 - 2009	2010–To Date
IT/IS impact in Firm Performance	1	8	4
Cloud Computing and Value/ Performance/ ROI	-	-	11
ESS impact in Firm Performance	-	-	8

**Table 3.1. Number of selected articles published per period between 1995 and present**

It is also clear from this Review that in Cloud Computing research most academic articles still do not base their models on theories. This is also an indication that there is a very wide opportunity for deeper research on IS theory-based models explaining the impact from SaaS in Firm Performance.

Regarding the most referred Benefits and Advantages of Cloud Computing and SaaS adoption, which are mentioned in this Literature Review, these are summarized in Table 3.3, where we can see that Financial and Functional benefits are the most referred in the Literature.

	Subject		
	IT/IS and Firm Performance	Cloud Computing and Value/ Performance/ ROI	ESS and Firm Performance
Total # Articles	13	11	8
Theory referenced	# articles	# articles	# articles
Agency theory	1 (Dewan & Ren, 2011)		
Benefits realization			1 (Pedro Ruivo et al., 2014)
Competitive strategy	1 (Rivard et al., 2006)		
Delone and McLean			1 (Pedro Ruivo et al., 2014)
Diffusion of Innovation (DOI)		2 (Lin & Chen, 2012; Oliveira, Thomas, & Espadanal, 2014)	1 (Pedro Ruivo et al., 2013)
Dynamic Capabilities	1 (Benitez-Amado & Walczuch, 2012)		
Economic theory of production	1 (Bayo-Moriones, Billon, & Lera-Lopez, 2013)		
IT productivity paradox	1 (Bayo-Moriones et al., 2013)		
Natural resource-based	1 (Benitez-Amado & Walczuch, 2012)		
Organizational information processing			2 (Madapusi & D'Souza, 2012; Pedro Ruivo et al., 2014)
Resource Based View (RBV)	11 [ * ]		2 (Pedro Ruivo et al., 2013, 2014)
Schumpeterian innovation	1 (R Amit & Zott, 2001)		
Strategic management	1 (Dewan & Ren, 2011)		
Systems Theory	1 (Nevo & Wade, 2010)		
Theory of strategic networks	1 (R Amit & Zott, 2001)		
TOE		1 (Oliveira et al., 2014)	1 (Zhu, Li, Wang, & Chen, 2010)
Transaction cost economics	2 (R Amit & Zott, 2001; Dewan & Ren, 2011)		1 (Pedro Ruivo et al., 2014)
Value chain analysis	1 (R Amit & Zott, 2001)		
Value-Focused Thinking (VFT) approach			1 (May, Dhillon, & Caldeira, 2013)
No Theory referenced	1 (Kohli & Grover, 2008)	[ ** ]	[ *** ]

[ \* ] (R Amit & Zott, 2001; Aral & Weill, 2007; J. B. Barney, 2001; Bayo-Moriones et al., 2013; Benitez-Amado & Walczuch, 2012; Mata, Fuerst, & Barney, 1995; Melville et al., 2004; Nevo & Wade, 2010; Rivard et al., 2006; Tippins & Sohi, 2003; Wade & Hulland, 2004)

[ \*\* ] (Brumec & Vrcek, 2013; P. Gupta, Seetharaman, & Raj, 2013; Haselmann & Vossen, 2011b; Iyer & Henderson, 2010; Lee, Park, & Lim, 2013; Marston, Li, Bandyopadhyay, Zhang, & Ghalsasi, 2011; Misra & Mondal, 2011; N. Sultan, 2010; N. A. Sultan, 2011)

[ \*\*\* ] (Beheshti & Beheshti, 2010; Björn Johansson & Ruivo, 2013; Seddon, Calvert, & Yang, 2010)

**Table 3.2. Theories referrals**

---

<b>Financial</b>	
Cost Effectiveness	(Brumec & Vrcek, 2013)
Cost Reduction	(P. Gupta et al., 2013)
ROI	(Misra & Mondal, 2011)
Pay-as-you-go Cost structure	(N. Sultan, 2010)
SaaS reduces repair costs of application-based construction and maintenance	(Lee et al., 2013)
No upfront capital investments needed for hardware resources	(Marston et al., 2011)
Lower cost of entry to enhanced applications	(Marston et al., 2011)
<hr/>	
<b>Functional</b>	
Computational power	(Lin & Chen, 2012)
Easier for enterprises to scale their services	(Marston et al., 2011)
Controlled Interface	(Iyer & Henderson, 2010)
Addressability and Traceability	(Iyer & Henderson, 2010)
Ease of use & convenience	(P. Gupta et al., 2013)
Flexibility	(N. Sultan, 2010)
Location Independence	(Iyer & Henderson, 2010)
Ubiquitous Access	(Iyer & Henderson, 2010)
Rapid elasticity	(Iyer & Henderson, 2010)
Security & privacy	(P. Gupta et al., 2013)
Virtual Business Environments	(Iyer & Henderson, 2010)
<hr/>	
<b>Innovation and new services</b>	
Lower IT barriers to innovation	(Marston et al., 2011)
Possibility of new classes of applications and Services not possible before	(Marston et al., 2011)
<hr/>	
<b>Other</b>	
Instrument for sustainable improvements in the IT landscape supporting SMEs business	(Haselmann & Vossen, 2011b)
Sourcing Independence	(Iyer & Henderson, 2010)

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**Table 3.3. Benefits and Advantages of Cloud Computing**

The strong focus in Cost reduction or optimization, can be exploited in function of the impact in the bottom line in the Profit and Loss (P&L) account and consequently in the Firm Performance. However, there is the need to study further if this has to be balanced with the

time period usage in order to understand if this becomes a sustained competitive advantage. Other advantages such as lower cost of access to applications, less capital investment and delivery of new services, which do not limit only to financial advantages but also time to market or increased offer to market and as such, customer advantage, are also enablers of increased Firm Performance (Rivard et al., 2006).

### **3.3. Findings and Recommendations**

The use of theories in SaaS business applications impact in SMEs is very limited and as such we call for more theory use. Initially the research focused in articles published in reference journals since 2006. However, as the research proceeded there were some seminal articles which for the number of referrals and the ranking of the publications, enlarged the period since 1995 (Mata et al., 1995), being this an exceptional exception, but this article stands as a reference in the study of RBV theory application to analyse the impact of information technologies in creating sustained competitive advantages.

The major references found for Cloud Computing and Enterprise Systems impact in the creation of value and firm performance, which are the topics closer to the research topic, are mainly published after 2010, representing nearly 60% of the total selected references. There was also the need to enlarge the scope into the applications in large enterprises and especially the generic IT/IS applications impact in Firm Performance.

With the growing trend of Cloud Computing, and subsequently of SaaS, the emergence of business applications delivered through this distribution model is also growing, with more offerings from the software suppliers and an increasing interest from the market. We believe this can have a significant impact in the performance of SMEs but need to understand and answer some questions, such as (1) if in general SaaS business applications are a valuable IT

resource to increase an SME Performance, then (2) which are the specific performance indicators impacted by SaaS business applications in a SME and (3) how can the value of a SaaS business application be assessed.

These are questions which we recommend further research and this literature review is also an indication that the practices and understanding of the SaaS business applications value amongst SMEs and impact in respective Firm Performance have matured enough to warrant some serious reflections on its essential issues. Reflecting about the low number of articles surveyed which study this subject turns out to make this an area with large potential for more future research.

### **3.4. Concluding remarks**

The field of SaaS business applications impact in Firm Performance is still very much understudied by the research community, even more in the case of the SMEs segment which only starts to see relevant articles in the last 4 years.

The articles under review were analysed with a focus on the following topics – First, if SaaS business applications are a valuable IT resource to increase firm performance; secondly, which values/benefits does SaaS business applications brings to a firm, and lastly, how can the value of a SaaS business application be assessed.

This study contributes to research through providing a literature review of SaaS value and impact in Firm Performance in SMEs, and several areas for future research seem promising such as which is the model, based in theories such as RBV and/or a combination with other theory, that can explain better and quantify the formation of value through SaaS applications and which are the impacted variables related to explain SMEs Performance and relative competitive advantage.

As more SME adopt this type of distribution model for their business applications, the questions on the value generated calls for a more rigorously investigation.

The research field of SaaS business applications adopted by SMEs and in particular the business value is sub-studied probably due also to more focus on large enterprises. We believe that our findings and recommendations for future research should lead to a more cohesive stream of literature that yields actionable steps for researchers, managers, and regulators working in the SME domain through the study of theory based models explaining impact in Firm Performance from value obtained of SaaS business applications usage.

## **CHAPTER 4 – Factors for adopting ERP as SaaS among SMEs: The Customers vs Vendor point of view**

### **4.1. Introduction**

Cloud computing and more specifically Software as a Service (SaaS) have been associated with benefits by several industry players such as software vendors and market analysts (Iyer & Henderson, 2010), but there is a need for more empirical research on this subject as pointed out in 2010 Davos World Economic Forum meeting (Gordon J et al., 2010). Enterprise Resource Planning (ERP) is an area which is not seen as the one with greatest adoption rate in SaaS, despite the fact that it seems to be an excellent way for Small and Medium Enterprises (SMEs) to provide themselves with an ERP. From one hand, established and “traditional” ERP vendors, like Microsoft, have developed new versions that can be deployed in the cloud (Gartner, 2010, 2013). On the other hand there is a perception that enterprises have also been less receptive to the adoption of ERP as SaaS, due to fear of losing control over the data, security and privacy and “systems ownership” (Cusumano, 2010; Gordon J et al., 2010; McAfee, 2011). Moreover, according to the European Commission (2011), 99% of all European firms are SMEs with less than 250 employees. However the literature suggests despair factors about what influence the adoption of an ERP as SaaS model, in particularly if it is from the customer or from vendor’s point of view, and from large enterprises or SMEs (Erik Brynjolfsson, Hofmann, & Jordan, 2010; Buonanno et al., 2005; Campbell-Kelly, 2009; Laukkanen, Sarpola, & Hallikainen, 2007; Jorge Rodrigues, Ruivo, & Oliveira, 2014).

The major question we want to clarify in this research is: which are the factors that influence willingness for adopting ERP as SaaS among SMEs? This work started in 2013 investigating

the vendor point of view, gathering the opinion of 20 experts of Microsoft (Björn Johansson & Ruivo, 2013). In that research 10 factors for adoption of ERP as SaaS were identified from interviewing vendor experts. The findings were based on what these experts thought were the motivations of the customers and thereby limited and in a certain extent biased to the vendor claimed advantages of this choice. The missing piece to answer the suggested research question with greater reliability is the customer's point of view. So, in 2014 the initial work was followed up with customers through the collection of data from three case-studies. Thus the purpose of this paper is to compare Microsoft's perspective on what factors affect adopting ERP as SaaS with three customers that already adopted ERP through SaaS and to the authors knowledge, this study is the first research work that analyses both points of view regarding adoption factors of an ERP as SaaS.

The rest of the article is organized as follows. Section 3.2 presents the research Background. Then we explain the Research Methodology in Section 3.3. Case studies and Findings are presented in Section 3.4. The discussion of Implications, Contributions, Limitations and future work are presented in Section 3.5. and Section 3.6 closes with Concluding remarks.

## **4.2. Background**

ERP systems have been greatly adopted by SMEs in the past decade, they are integrated software packages, commonly known as business applications, designed to integrate and optimise the business processes and transactions in a firm, comprising different functional modules; accounting, procurement, sales, production, warehouse, etc., in order to improve firm performance (J. Esteves, 2009; Federici, 2009; B. Johansson & Sudzina, 2008; Ramdani, Kawalek, & Lorenzo, 2009; Raymond & Uwizeyemungu, 2007; Pedro Ruivo et al., 2013; Pedro Ruivo, Oliveira, & Neto, 2012; Pedro Ruivo et al., 2014; Shiau, Hsu, & Wang, 2009).

Software as a Service (SaaS) is a way of delivering business applications (Armbrust et al., 2010; Cusumano, 2010; Haselmann & Vossen, 2011a; Marston et al., 2011; Oliveira et al., 2014; Yogesh & Navonil, 2010), being a distribution model where the applications are hosted by a vendor or a third party provider (eg. telco/hoster) that make software applications available to customers over a network (Benlian & Hess, 2011; Castellina, 2012; Dubey, 2007; Sharif, 2010).

ERP as SaaS is accessed through Internet, where the application and data are under control of the service provider, with payment for the software services provided usually through subscriptions paid by user on a monthly basis (Addo-Tenkorang & Helo, 2014; Awad, 2014; Dubey, 2007; Mezghani, 2014; Mital et al., 2014; Seethamraju, 2015). Some software vendors deliver ERP only in this distribution model, namely Acumatica, Netsuite and Plex Online. And the largest players in the ERP market, such as SAP, Oracle, Sage and Microsoft, companies which have most of its customer base in the “traditional” “on premise”, now also offer their ERP as SaaS (Gartner, 2011; IDC, 2009). However for these vendors there seems to be a conflict of interest between the direct provisioning to their customers through this distribution model and the traditional indirect sales channel they have been establishing during some decades, which might see this as a cannibalization of sales and this is also a subject of interest for study. Especially when one of these vendors is Microsoft that built up an ecosystem of implementation partners for their Dynamics suite, where traditionally ERP systems had been implemented “on premise” as products bought by customers.

According to studies from Aberdeen Group (Castellina, 2012) and McKinsey (Hestermann, Pang, & Montgomery, 2012), more standardized processes in SMEs than in Large Enterprises and less complex implementations might be the reason why these vendors are providing ERP as SaaS mainly in the SME market, these studies show that the percentage of

deployments of ERP as SaaS is larger in SMEs (26% versus 12% for Large Enterprises). There seems to be more momentum for ERP as SaaS, even if this is lagging behind other applications in terms of SaaS based applications.

### **4.3. Research Methodology**

Value propositions can be identified by exploratory interviews and case studies research (Voss, Tsikriktsis, & Frohlich, 2002) and in order to determine “which are the adoption factors for an ERP as SaaS?”, an inductive approach was used and the data analysis method selected was the "content matrix analysis" (Naresh Malhotra & Birks, 2007). Few studies have addressed the topic of ERP as SaaS adoption and we started first with semi structured expert interviews conducted with 20 experts (Consultants, Architects, Engineers, program managers, technical sales) in ERP and SaaS domain within Microsoft, during January and February 2013. The statements identified by these participants were grouped into a list of 10 factors (Björn Johansson & Ruivo, 2013). For case research, three organizations which already implemented ERP as SaaS and have been using this model since 2007, were chosen - “Security Services Ltd”, “Copy and Printing Ltd” and “BPO Services Ltd”. The selection of these three SME companies was based on the following criteria – First, they are from different industries, such as B2B/B2C security services, B2B professional services, B2B printing industry with retail outlets; Secondly, they have diverse geographic presence and thirdly they have different levels of IT maturity (with or without CIO, with outsourced IT services, with IT internal organization). The semi structured interviews were done with C-level executives, such as CIO, COO and CEO level (Partner), whom were responsible for the decision-making process.

The interviews with the customers happened in November 2014. The interviews followed a guide in order to characterize the organization, its needs at the time of adoption and firstly with open questions regarding the major factors for adoption. After that the interviewees were asked about the remaining factors identified from the vendor study and asked in the end to make a classification of factor relevance (1 from least important to most important 5) and degree of Importance (1 to 13). Because the three participating customers came with new factors and after the first analysis of the results, they were asked a second time to re-evaluate the classifications with all 13 factors, which gave the final results presented. These results were averaged for the 3 organizations and calibrated in order to give a unique classification of importance comparable with the vendor classification of factors.

#### **4.4. Case Studies and Findings**

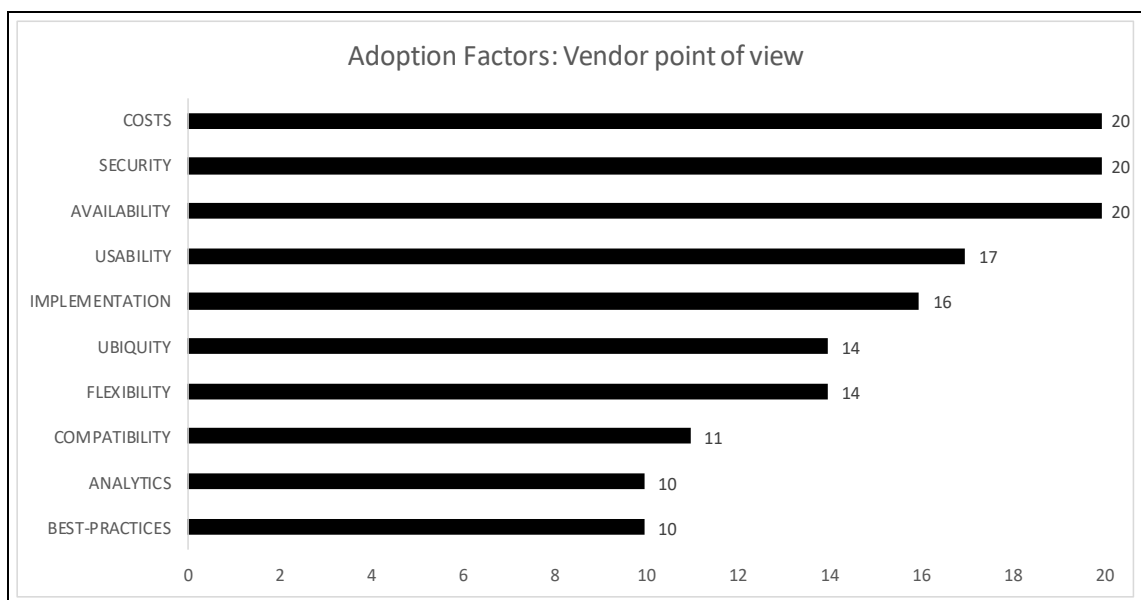
##### **4.4.1 The Vendor Case**

###### 4.4.1.1 Case Study 1: Microsoft

The vendor, Microsoft Corporation, was founded in 1975 and based in North America. With 86,833 M \$US of total revenue in the fiscal year of 2014 (year ended June 30) and 128,000 employees, Microsoft Corporation develops, licenses, markets, and supports software, services, and devices worldwide. Microsoft operates a line of business with ERP and CRM solutions, known as Microsoft Dynamics, with four offerings in ERP (AX, GP, NAV, and SL) and CRM. These offerings are available for “on premise” installations or through SaaS, directly from Microsoft or through hosting providers. Microsoft announces to have 181,500 ERP customers and among these 56,2% are NAV customers such as the customers of the case studies (Erpsoftwareblog, 2014; Microsoft, 2014).

#### 4.4.1.2 Summary of Vendor findings

A list of 10 factors emerged as the prominent top propositions from Microsoft to offer added value to the customer and as differentiation to “on premise” solutions. These factors include: Costs concerns, Data Security, Systems Availability, Usability, Implementation, Ubiquity, Flexibility, Compatibility, Analytics and Best practices. However, Cost concerns, data security and system availability were perceived by all experts as the most important factors in customer perspective for adopting ERP systems in a SaaS delivery model.



**Figure 4.1. The ranking of the 10 factors of ERP as SaaS for the Vendor**

#### 4.4.2 The Customer Cases

The customers selected for these case-studies come from different industries, sizes and have different types of implementations. The decision-making process was done at CXO level, and we have different profiles in a mix of Business oriented and CIO profiles. Following, we have their characterization and also some information regarding IT/IS maturity.

##### 4.4.2.1 Case Study 1: “Security Services Ltd”

“Security Services Ltd” is a company of global Security services, based in Europe, and operating in European and African countries. Created in 2013 from the acquisition of an operating company with 70 employees, it has been growing fast in the first year of operation and expanding in geographies, with an estimated turnover in excess of 7 million EUR (€) and operating in three countries. Since the beginning, IT was viewed as strategic to business development and an experienced CIO was hired. Starting from “scratch” meant that cloud computing solutions were strongly considered to establish the new IT/IS infrastructure, based in platforms such as Office365, SharePoint Online, Azure and hosting of databases, active directories and other service in a third party operated datacentre.

Presently there are approximately 70 users, from which 40 use the ERP system, Microsoft Dynamics NAV, selected in comparison with Oracle and SAP. “Security Services Ltd” implemented in Azure both the Dynamics NAV with its core modules and also the add-on NAV-HR for training and payroll functionalities. This organization has only 4 people in IT with “access to external resources as needed”.

The interview was conducted with the CIO, who was the major decision maker in the adoption of this ERP as SaaS.

#### 4.4.2.2 Case Study 2: “Copy and Printing Ltd”

“Copy and Printing Ltd” is a company created in 2001 in the area of digital printing services, based on a European capital, addressing business customers and with two service centres and retail shops located in city centre shopping malls, near most of its important business customers. With an annual turnover of nearly 700 K EUR (€), the company has 21 employees, most of them in the shops and reduced head-office and administration personnel.

In 2006 the company was looking to expand the business, with a franchise model to add on their own shops, and one of the major concerns was the need to control and centralize the operations in the shops. In 2007 the selection was made to use Microsoft Dynamics NAV, hosted by a Solution partner (Microsoft partner) with the LSRetail add-on for retail front-office transactions and connection to NAV.

The ERP has 5 users and “Copy and Printing Ltd” does not have any IT personnel, so all IT resources are outsourced and managed by a 3d party company, partner of the ERP Solution partner.

The interview was conducted with the COO, the major decision maker in the adoption of this ERP as SaaS.

#### 4.4.2.3 Case Study 3: “BPO Services Ltd”

“BPO Services Ltd” is a company created in 2009, located in an European capital and acting also as a Member subsidiary from an international brand in the areas of management, strategic and HR consulting, auditing and “business process outsourcing” in the areas of finance and accounting and HR processing. The market addressed is mainly medium and large enterprises (typically greater than 3 Million EUR (€)).

“BPO Services Ltd” has 100 employees and an annual turnover of 3,5 Million EUR (€). Since 2012 it is also operating in a Eastern Africa country with 15 employees and an annual turnover of 0,5 Million EUR (€). “BPO Services Ltd” also operates in one other southern African country through a partner.

Since its creation the decision was made to use the ERP both for internal usage and for their customers BPO. Microsoft Dynamics NAV was implemented in the SaaS model, in their own datacentre, following a proposal from the Solution partner, which was quite an

innovative approach at the time (2009). In the last 5 years “BPO Services Ltd” has already made one version migration and are planning to evolve into the next version during the next two years, also the time to migrate from their datacentre into the Microsoft Azure platform. Presently the ERP has nearly 40 regular users, which include 15 internal, 15 for the BPO in Europe, 2 users from BPO in Africa and also 8 users from a single medium/large customer operating in B2B Marketplace (a “BPO Services Ltd” customer which has their own instance and database, and integrated also the SaaS ERP with their own systems (such as electronic invoicing)). All other productivity software (Office, Outlook, SQL) is also from Microsoft. “BPO Services Ltd” has experienced IT resources that take care of the datacentre but also serve as consultants to their own customers. In complement they also work closely with the Solution partner resources when needed.

The interview was conducted with the Partner responsible for the BPO operations, who was also the major decision maker in the adoption of this ERP as SaaS.

#### 4.4.2.4 Summary of Customer findings

The customers interviewed first started to speak about their major motivations for adopting ERP as SaaS and made evident their first factors for adoption. They were after asked about the relevance and importance of the factors previously considered by the vendor.

From this approach, there was the emergence of 3 new factors not previously mentioned: Integration of cloud platforms (mentioned by “Security Services Ltd”), Data integrity (mentioned by “Copy and Printing Ltd”) and trust in the Solution partner influence/importance (mentioned both by “Copy and Printing Ltd” and “BPO Services Ltd”).

After the first round of interviews and considering the additional factors introduced, we decided to ask again the customers to review the relevance and importance now with the suggested 13 factors.

The greatest surprise came from the relevance given to Solution partner, which came just after the financial factors/Costs and has not been considered by the vendor. This is especially surprising as the business model used by the vendor for most of its business lines and especially the business solutions one, where business industry processes know-how is one of most important factors for a successful implementation, is based in Partner channel consulting, sales, implementation and services.

Among the other major factors of ERP SaaS adoption (other than Costs and trust in the Solution partner) we register Availability, Implementation, Security (much lesser important than the vendor considers) and Flexibility (slightly more important to customers than to vendor).

After Data integrity and Uniformity of cloud platforms factors, others such as Usability, Compatibility, Ubiquity, Analytics and Best Practices are not seen as relevant from the customer point of view.

In summary we have the following Table 4.1 with the Rankings attributed by the customers and the vendor. The Table with content analysis is available from the authors on request.

Analysing the results from the customers point of view, we see that the three major factors influencing ERP as SaaS adoption are Cost concerns (same as the vendor), influence and trust in the Solution partner and system Availability (also same as the vendor), but Security comes only as the fifth element. Next, we analyse in more detail each of the statements from the customer's point of view, for each of these factors.

<b>Factors</b>	<b>RANKING</b>	
	<b>Customers</b>	<b>Vendor</b>
Costs	1	1
Solution Partner	2	-
Availability	3	1
Implementation	4	5
Security	5	1
Flexibility	6	7
Data Integrity	7	-
Integration of Cloud Platforms	8	-
Ubiquity	9	6
Compatibility	10	8
Usability	11	4
Analytics	12	9
Best-Practices	13	10

**Table 4.1: Ranking of the 13 factors of ERP as SaaS for Customers and Vendor**

Analysing the results from the customers point of view, we see that the three major factors influencing ERP as SaaS adoption are Cost concerns (same as the vendor), influence and trust in the Solution partner and system Availability (also same as the vendor), but Security comes only as the fifth element. Next, we analyse in more detail each of the statements from the customer’s point of view, for each of these factors.

#### **4.4.3 Specific Analysis of the Factors for Adoption**

##### *Costs*

The following statements from the interviews support the motion of changes in costs and costs structure as reasons for adoption.

From the vendor perspective most of the experts talked about lower total cost of ownership (TCO) when comparing SaaS ERP with “on premise” ERPs, stating for example that “the most appealing SaaS feature is the lower TCO” or “as soon as customers realize the costs

figures they become more receptive to continuing the conversation”. Cost reductions, lower investment needs and lower TCO are in fact confirmed by the customers as major drivers for adoption of ERP as SaaS, as the statements of the customers interviewed testify.

“Security Services Ltd” says that "costs have to be in first place....We made a comparison between SaaS costs and investments .vs. “on premise”, with a vendor other than Microsoft and came up with figures which were 60% less in 1st year (costs of implementation and Opex vs costs of investment and Capex)". Even a 3 years TCO analysis brings an estimated saving of at least 30%. "It was obvious that with NAV we only needed to focus in the SaaS option". Cost flexibility regarding an organization growth (or decrease) is also a major reason, as “BPO Services Ltd” says: “In the beginning (of our operations) we needed to adapt the cost structure to the revenue turnover. With this SaaS implementation we were able to have cost flexibility towards our internal team resources and the number of customers in “business process outsource” progressed from 2 to 25 users in these 5 years, and so the costs have been adjusted also according to the revenue growth”.

Both vendor and customers testimonials are in line with previous research that costs reduction and cost control are the main factor for adopting ERP as SaaS (Benlian & Hess, 2011; Marston et al., 2011; Ross & Beath, 2006).

#### *Trust in the Solution partner*

Among the factors referred spontaneously by the customers that had great influence in the adoption of an ERP as SaaS, a new one emerged namely trust in the Solution partner. For two of the customers interviewed this was considered as a major factor influencing adoption. “BPO Services Ltd” says that “the Solution partner was very important in the process of adoption of the ERP as SaaS, probably more than the Supplier supposed ... I also know that

with this (SaaS) implementation I must have a Solution partner which can intermediate between us and the Supplier” in accordance with Johansson and Newman (2010). And “Copy and Printing Ltd” COO testified that “trust in the Solution partner was crucial in helping us to implement this ERP (as SaaS), because we needed to react rapidly in order to have a company wide information control and management and they gave us trust and the answer to these requests”.

### *Availability*

Both the vendor and customer’s perceive that systems availability affect the adoption of ERP as SaaS. For “Security Services Ltd” CIO, "availability was very important as I did not have to worry with acquisition of high availability hardware”, whereas for “BPO Services Ltd” it is “important especially for some of our customers, more than to us”. And as one interviewee of the vendor stated: “regardless customer claims, the system capacity of our datacentres ensures high system availability and data availability”. Other vendor participants have noted that customers concerns about future developments of the ERP SaaS system: “you lose the ownership and lose the control that you have over the system and you are forced into the direction by the system as when you actually hosting it yourself” in line with IDC report (IDC, 2009).

### *Implementation*

Most of the participants from the vendor and all customers agree that Implementation of ERP in a SaaS model is an important factor. Vendor expressions come up as: “the ERP implementation effort has lost its complexity”, or “proof of concepts, testing as well short

development cycles are greatly enhanced” and “the risk of a possible bad implementation shifts from the customer to the provider”.

For the customers, reduced Implementation time is a major and important differentiation. As stated by “Copy and Printing Ltd”, “we do not had any server and so it came natural to use the Solution partner resources and the idea was to have access to the information at any time”, especially because the initial idea was to have a franchise of the retail shops and at the same time “this implementation gave us immediate access to the solution we needed, as it was immediately available”. And “Security Services Ltd” CIO refers several advantages when speaking also about Implementation: “we do not wanted to invest in hardware, servers, etc and because we were in the beginning of our expansion plan, we had to take advantage of the fact that we didn’t have anything and as such the cloud systems seemed very advantageous, very scalable, flexible, with short implementation times and less initial investment”. However, for the “BPO Services Ltd” Partner, the “implementation in an ERP has some impact in the beginning, because the system has to be customized to each customer. However, when considering the difference of implementation between the ERP as SaaS or “on premise”, we did not see any major differences" in line with traditional outsourcing of IT (Ross & Beath, 2006; Whitaker, Mithas, & Krishnan, 2010).

### *Security*

This is an important factor but in the end is given greater relevance by the vendor participants, than by the customers. In fact, all participants from the vendor view Security and confidentiality of customer data as a concern. Four experts mentioned that customers usually ask questions about confidentiality and critical information, asking questions such as: “How are you going to ensure confidentiality of information?”, “What happens if the vendor goes

out of business?”. There were also statements expressing concerns about local laws in countries where they operate which prevent certain kinds of information to be kept off-shore, such as: “how do you secure the jurisdictional boundaries location(s) in which the breach might occur?”, “How are you just going to leave that in the cloud somewhere?”.

Regarding the customers point of view on the Security Factor, “Security Services Ltd” says “I cannot say that the (ERP as SaaS) system is insecure and in face of all the strong factors in favour, the decision was very logical to make this type of implementation”. On the other hand, for “BPO Services Ltd” who has both internal users and customer users, this is “a factor that (our) customers always have as a concern, because they have to trust in the supplier. However this is mainly a concern from the IT people, not from the finance people who are more concerned with the costs involved with a system”, claim in line with Clair (2008).

### *Flexibility*

70% of the vendor participant specialists mentioned that Flexibility in ERP as SaaS has an enhancement over “on premise” solutions, stating for example that “enhancements to the ERP are easy to implement and inexpensive”. Two reinforces that “onsite ERP functions can be individually adjusted as needed and without external assistance”. For the customers this seems to be a relevant factor, allowing to easily adapt the system to the organization dimension, as “BPO Services Ltd” says, “the ERP as SaaS model excels in providing great flexibility allowing to grow the system since the initial basic functions to more functionalities over time... It’s like a LEGO, where we put more modules as we have more needs”. And “Security Services Ltd” which relies in geographic expansion to grow its business, says “this (ERP as SaaS) gives us the possibility of opening a new company very quickly in another country, even if in each country there is a specific customization due to the legal obligations,

but we have the same "core" system". Only "Copy and Printing Ltd" is less concerned with this factor, because as the COO says, "we do not have needs for any sophisticated requests in functionalities, only the "plain vanilla" ones", which is in line with Cusumano's (2010) study.

### *Data Integrity*

This is a factor which was mentioned spontaneously by one of the customers and not by the vendor specialists, but has its relevance especially for customers with several locations who want to have control and easier access to distributed information, such as "Copy and Printing Ltd" COO says: "it's important to have centralized and integrated information (eg. same products updated, same prices, etc). And because we could start this implementation in SaaS, we had immediately available reliable information and its control and management, which were urgent and important aspects to us", in line with Hwang and Li (2010).

### *Integration of cloud platforms*

Another factor which was not initially considered by the vendor specialists and was mentioned spontaneously by one of the customers, being of relevance for some "IT mature" organizations is the possibility of the ERP as SaaS allowing to create a cloud integrated platform (Li et al., 2013). As the "Security Services Ltd" CIO referred, "we were not only searching for an ERP as SaaS, but all components, in order to get all the advantages in terms of time to implement, costs and investments... In the ERP, one of the factors important for us was the integration between systems. It didn't make sense that one day we had a CRM and there was the need to build interfaces to exchange data between systems". This is even

more relevant in the case of this vendor – Microsoft – which has several productivity and infrastructure platforms.

### *Ubiquity*

In the case of the vendor, 14 out of its 20 experts classified Ubiquity as a major driver for choosing SaaS over “on premise”. “The access to ERP over the internet through any device allows independent access possibility” and “a mobile access” build up a flexible and mobile workforce. Some specialists asserted that “for customers the IT is nowadays a process supporting commodity”. Among the customers, one – “Security Services Ltd” - referred this as an important factor of adoption, stating: “for our company the ERP is a corporate solution, that is, the same system will be used in several countries... It is very significant that we can open a company in another country without the need to setup infrastructure there and doing it the same way as we open an unit in Europe, as an example, same assertion as noticed by Chao and Sun (2013).

### *Compatibility*

Compatibility was referred by 11 experts from the vendor, with statements such as: “based on an interoperable technology platform and an ecosystem - specific requirements are covered by a repository with available add-ons” or “it is now possible to plug-and-play POS and RFID systems and use without worries on the background compatibility”. As “on premises” installations often need to be electronically linked with other software systems (e.g. legacy systems or partner systems), the feasibility of such adaptations is one of benefits to go to the cloud. Moreover, another participant claims that “going to cloud can be beneficial in the surrounding areas such office computing and collaboration”.

Regarding the customers opinion, we have “Security Services Ltd” saying that “compatibility was only considered as important as the ERP could be easily integrated with the CRM”, but as “Security Services Ltd” is also planning the implementation of the CRM from Microsoft and because it does not have any specific devices to connect to the ERP, it does not consider it an important factor of choice in the ERP as SaaS. On the other hand, “BPO Services Ltd” Partner says: “our IT people says that it is very easy to connect the Microsoft ERP to other systems and tools and we consider it has moderate importance, but we do not see it as much different as the “on premise” version” which is in line with other authors assertion (Barnatt, 2010).

### *Usability*

Usability is too much valued by the vendor and almost irrelevant for the customers. One vendor expert specified that: “managers are not likely to move the processing power into the cloud when it is not guaranteed that the system performs at least at the same level as a comparable “on premise” solution”. Other vendor experts claim that customer usually ask questions about the user interface, such as: “is the user interface the same as “on premise”?” in line with other authors claim (Seethamraju, 2015). However, the customers interviewed considered that this was not an issue as it would be “the same Microsoft applications look and feel”. As one of the customers says – “Security Services Ltd” - "the same interface of NAV SaaS as NAV “on premises” was important due to the familiarity with other Microsoft applications, such as Outlook, which was not the case in other vendor applications".

### *Analytics*

Half of the vendor experts defined Analytics as an important factor in an on-demand service model.

These experts supported the notion that SaaS model powers the use of integrated analytics tools for design making, planning and transparency. Three participant's mentioned that "reports can be quickly and easily adapted to customer requirements", and two strengthen that "customers can use different analysis functions, for example creating real-time reports, KPIs, etc" (Cusumano, 2010).

However, for the customers this was not a relevant factor of adoption of an ERP as SaaS, and no special mentions were given to this topic.

### *Best practices*

Ten vendor experts perceived best-practices with a positive impact in the adoption of ERP as SaaS. It was described not only in terms of possible cost decreases but also in terms of business process standardization. The issue of best-practices came out as important because it is seen as a way to refocus on the activities that are really valuable by end-customers (McAfee, 2011). One interviewee stated that: "customers were consuming a lot of time in achieving differentiation on their business models which implied customizations, nowadays they wish us to provide them the best-practices to free them to focus on product/service differentiation". Another expert stated that a typical claim from customers is: "I would like to have a system that works accordingly with standard practices, as each time a new director comes aboard he/she complains that practice is not fine for their teams....and again embrace an expensive IT project". The experts perceive customer's expectations about adopting ERP as SaaS model as standardization of processes (McAfee, 2011).

This is the least valued factor of adoption from the customers point of view, as “Security Services Ltd” CIO says, “best practices was not considered important as each company has its own way of using NAV”.

#### **4.4.4 Analysis and differences between Customer and Vendor points of view**

Initially the vendor specialists identified ten factors as influencing the Adoption of ERP as SaaS versus “on premise” ERP. The customers interviewed referred some of those factors but introduced also three new factors.

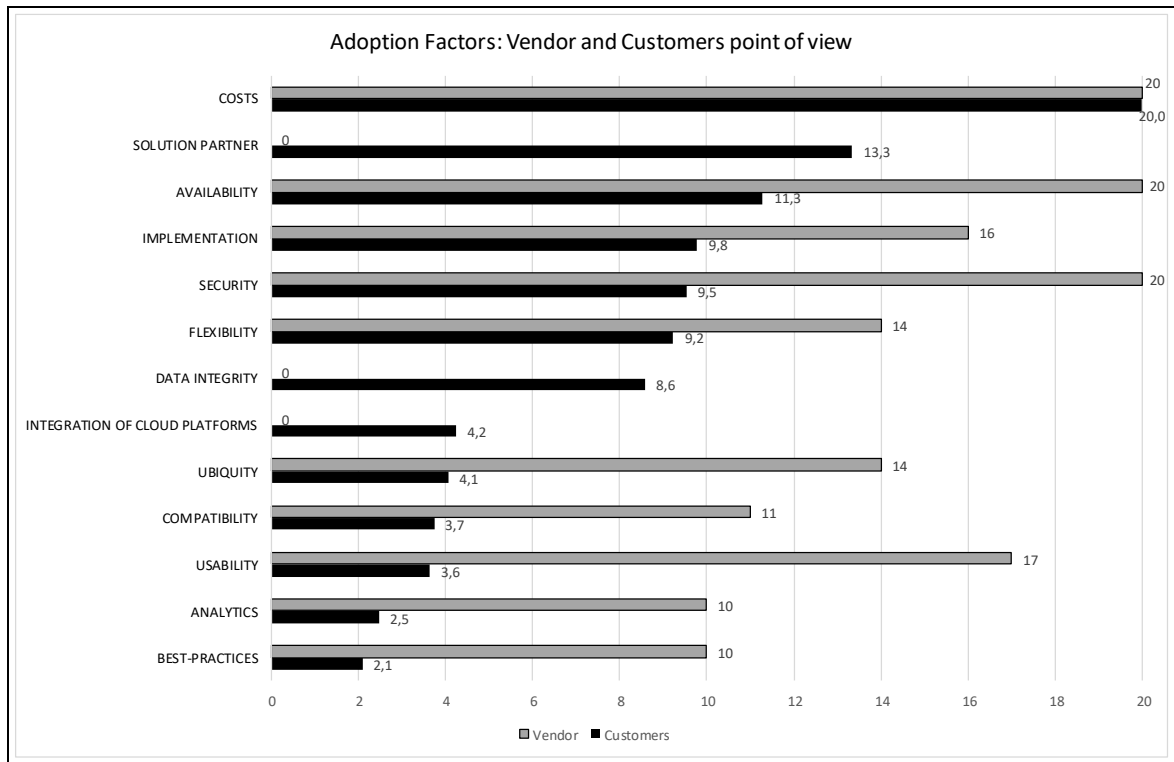
The first factor which is equally relevant for all parties is related to Cost concerns, especially the reduced initial investments needed and TCO along time.

From that point on, the relative importance from the factors differs between the opinion of the vendor specialists which emphasize Security, Availability and Usability, whereas the customers introduce as a second most relevant the importance and confidence in the Solution partner in the adoption decision-making process and Availability and Implementation next, not giving so much importance as thought to the Security factor.

In the following tier of relevance to the customers comes Flexibility and two factors not considered by the vendor, which has to do with the customer IT maturity - Data Integrity, which is more relevant to an organization with lower IT maturity and distributed multi-site, and the second is Integration of cloud platforms, in this case more relevant to an organization with a solid IT strategy, know-how and multiple systems.

The other factors initially referred by the vendor specialists - Ubiquity, Compatibility, Usability, Analytics and Best-practices - were not referred spontaneously by the customers and only when asked about they made an evaluation also showing lesser degree of importance than the other eight.

In Figure 4.2, the Graph shows all factors in order of relevance top-down as given by the customers and the respective classification (# of mentions) from the vendor specialists.



**Figure 4.2: Relative importance of the 13 factors of adoption of an ERP as SaaS for Customers and Vendor**

#### 4.5. Implications, Contributions, Limitations and future work

As SaaS gains increasing acceptance among organizations, software vendors in the area of business applications, and in particular in the ERP systems area, there exist an interest in increasing the offering of ERPs to be delivered and consumed as SaaS. The vendors have in general several arguments considered as advantages for the adoption and consumption of an ERP as SaaS, but the existing literature still shows that there is a lack of empirical research about SaaS and ERP systems, especially in the area of adoption factors.

This exploratory research started as a first explorative research to study which value propositions can be offered by SaaS from a vendor’s point of view. That study came up with

10 suggested factors influencing adoption of the SaaS ERP model: Costs, Security, Availability, Usability, Implementation, Ubiquity, Flexibility, Compatibility, Analytics and Best practices.

Initially the overall conclusions from the vendor's point of view is that the reasons to use an ERP do not change no matter if the software is installed "on premise" or consumed on-demand. As evidenced before, the paradigm changes from product feature to service trust, which calls for further research

In the subsequent work with three customers (three case-studies), not only new factors emerged as reasons to adopt a solution in a different distribution model, the relative importance of some factors was different or made irrelevant between the customers and vendor point of view. Being a model of distribution with strong and direct ties between the vendor and the customer it came as a surprise that as the second factor for adoption considered by the customers, but not identified by the vendor, is the importance of trust in the Solution partner, a third party organization acting as vendor partner, associated with implementation of the ERP, services, industry expertise and consulting. Other new factors that emerged are also relevant for some types of customers, such as organizations that have multiple sites and need to have a system that concentrates management information and facilitates homogeneous operations, and this new factor is Data integrity; another one which can be relevant for IT mature organizations, which are looking to evolve to or set up a cloud computing infrastructure is the level of Integration of cloud platforms, which translates in interoperability of systems such as productivity, business applications and other technologies provided as a service.

The results of this study have implications for academic researchers and ERP practitioners from organizations involved in software development, sales and customization and as end

users and customers. For academic researchers, this study provides insights into the factors of adoption of an ERP as SaaS, introducing also the point of view from customer organizations which had already adopted this distribution model for the usage of ERP functionalities. This can have an impact for organizations such as vendors and solution partners which have some preconceived ideas about what is valued by customers and what influences the greater or lesser adoption acceptance of an ERP as SaaS. Our findings show that some of the factors considered important by the vendors are not valued by the customers, and that it is important to identify groups of customers (clusters), with similar needs, to build a great value proposition for the case of adoption of an ERP in the SaaS model.

However, since this work is explorative in nature, with one vendor and three customers, it is recommended that future work develops a quantitative research approach with the aim of validating and refining identified factors from the customer's perspective.

#### **4.6. Concluding remarks**

The field of adoption factors of Software as a Service (SaaS) business applications, such as Enterprise Resource Planning (ERP) is still not very much exploited by the research community and it is a field where opinions from the industry players prevail. Regarding the adoption factors for an ERP as SaaS there was a first research done with 20 Microsoft experts in ERP and SaaS, which arose 10 factors - Costs concerns, Data Security, Systems Availability, Usability, Implementation, Ubiquity, Flexibility, Compatibility, Analytics and Best-practices. Following this, a second research was done with customer case-studies, with 3 organizations that implemented the ERP SaaS model already in 2007, which unveiled three other factors – trust in the Solution partner, Data integrity and Integration of cloud platforms. Cost concerns is among the most important factors for adoption but trust in the Solution

partner comes immediately after and Systems Availability is described as the third most important factor.

For all three customers (“Security Services Ltd“, “Copy and Printing Ltd” and “BPO Services Ltd”) Implementation, Security and Flexibility have similar importance but bottom line is that Security is not considered as important by customers as vendor experts predicted. A possible explanation to this is in line with what the interviewee at the “BPO Services Ltd” stated, which means that Security is mainly a concern to IT specialists and not so much by the users.

The main conclusion drawn from the comparison of the two studies is that vendors should be looking for groups of customers with similar needs where an ERP as SaaS is of great advantage comparing with “on premises” and the importance of the Solution partners in building trust and confidence in the customer organizations.

## **CHAPTER 5 – Mediation role of business value and strategy in firm performance of organizations using software-as-a-service enterprise applications**

### **5.1. Introduction**

There is an increasing trend to adopt enterprise applications in the software-as-a-service model (Seethamraju, 2015). This tendency is in line with the expected growth of the worldwide market for cloud software (considered as SaaS and platform as a service by market analysts, IDC) until 2020, at 18.6% in a five-year compound annual growth rate, a growth rate more than five times greater than that of the traditional software market (Benjamin McGrath, 2016). More specifically, other market analysts (Gartner) say that the enterprise application software market continues to exhibit its most dramatic shift in 30 years; an irreversible shift that will continue and which by 2020, 35% of all application software spending will be on SaaS (Swinehart, Montgomery, & Rizzuto, 2017).

Information technologies' (IT) and information systems' (IS) return on investment and impact on business have always been a major industry and market concern (Schryen, 2013). However, subjects such as the benefits or economic dimensions of cloud computing adoption and usage are still among the less studied aspects (Bayramusta & Nasir, 2016). As we probed deeper into our research, we also did not uncover significant research regarding how software-as-a-service enterprise applications (SaaS EA) might create an impact on productivity, profitability, and competitive performance (e.g., revenue growth and market share). According to several researchers, firm capabilities are among the primary drivers of economic value, and IT can magnify those (Kohli & Grover, 2008), which motivated us to

look at how SaaS EA-supporting firm capabilities generate an impact on firm performance as the first subject we wanted to address with this work.

Additionally, the usage of enterprise applications is frequently associated with the creation of intermediate-process level impact in the organization, also known as operational benefits (Shang & Seddon, 2002), that we refer to as “business value,” whereas many researchers associate firm performance to strategic benefits. The majority of relevant studies in IT-based business value research either about the impact of more generic IT systems or enterprise applications. Even in cloud computing (Garrison, Wakefield, & Kim, 2015), they do not make a clear distinction between those two types of benefits, save for some rare exceptions (Ji-fan Ren et al., 2016), which makes it often common to find research work citing the impact of firm capabilities supported by IT in firm performance (Rivard et al., 2006), without delineating that distinction and marking the dependency among the two types of benefits, that is, “business value” and “firm performance.” In our research, we want to clarify if in a company that uses SaaS EA, the impact on firm performance is a direct influence of the firm's capabilities or if it is a consequence of the business value generated.

Some market analysts and consultancies, such as McKinsey (2018), state that despite the adoption growth of software-as-a-service, many organizations experience difficulty to get all the potential value from their transition of enterprise applications to the cloud, probably because they “are not taking this approach as part of a holistic strategy.” How important is the organization’s business strategy, both in the intermediate-process level impact (“business value”), deriving from the effectiveness of the business processes supported by those enterprise applications (Al-Debei & Avison, 2010), and in the “firm performance,” is also another topic we want to address in our research. So, in summary, we want to answer the following research question:

*How do “capabilities supported by software-as-a-service enterprise applications” contribute to firm performance, and what are the roles of business value and business strategy?*

Motivated by the previously described issues, and to try to answer this question, we built a theoretical model combining the resource-based view (RBV) (Wernerfelt, 1984) and Michael Porter’s competitive strategy theories (Michael E Porter, 1980) that we empirically assess using structural equation modeling (SEM) and partial least squares (PLS) path modeling. The purpose of our work is to make relevant contributions to academics and practitioners regarding the advancement of knowledge in the areas of enterprise applications software and software-as-a-service. The first one regarding the contribution to the research stream of business issues in cloud computing, especially in areas such as intermediate-process level performance, financial performance, and relevance of competitive strategies, supported by a theoretical model and a quantitative methodology, because, to date and according to a recent literature review (Senyo, Addae, & Boateng, 2017) most of the research in cloud computing lacks theoretical models and established methodologies such as quantitative methods. Secondly, by studying “how” and under “which conditions” SaaS EA-enabled capabilities influence the creation of different types of performance, and the complementarity of other mediating factors, such as business strategy, we are trying to respond to the challenges of some authors (Kohli & Grover, 2008) regarding areas of research to be developed, to contribute to the advancement of knowledge in the field of value creation. Thirdly, this work also makes additional contributions to the advancement of knowledge of researchers and practitioners in the areas of cloud computing and enterprise applications software, as it brings clarity about the complementarity or competitiveness role of the combination of two mediators in the proposed theoretical model (Laumer, Maier, & Eckhardt, 2010), to evaluate

the impact of competitive strategy and intermediate-process level performance in the creation of firm performance arising from firm capabilities supported by SaaS.

We organized the remainder of this article as follows. The next section presents the theoretical background. We then describe the research model and propose the hypotheses in Section 5.3. In Section 5.4, we explain the research methodology. Sections 5.5 and 5.6 present the results, discussion, contributions, limitations, and suggest future work. We make the concluding remarks in Section 5.7.

## **5.2. Theoretical background**

The theoretical background in this research starts with an analysis of the IT-based business value research done to date and where SaaS EA stands when compared to traditional implementation models, such as “on-premise” and more generic IT investments. We then clarify the differences between business value and firm performance, and afterward go more in-depth into how the integration of the RBV and competitive strategy theories can be used to explain operational and strategic benefits.

### **5.2.1 IT-based business value and software-as-a-service enterprise applications**

IT-based business value research has already demonstrated that investments in IT have an important effect on productivity and the market value of firms, especially when these investments are combined with changes in the way people work and are organized (E Brynjolfsson & Hitt, 2000). However, much of this research refers to IT generically, which has a vast scope, as it can mean several types of applications, including productivity tools (e.g., Microsoft Office and Google Docs), infrastructure like middleware, network software, etc.

More specific IT applications such as enterprise applications are used to manage activities and processes that spread through the organization and, in some cases, also through other third-party organizations such as customers, suppliers, or both. Among the most common enterprise applications are enterprise resource planning (ERP), customer relationship management (CRM), manufacturing resource planning (or materials requirement planning) (MRP), human resources management (HRM), and supply chain management (SCM) (Cho, Subramanyam, & Xia, 2013; Lorenzo, Kawalek, & Ramdani, 2012; Pedro Ruivo, Mestre, & Oliveira, 2017). Moreover, as some authors point out (P.-F. Hsu, 2013; Krishnamoorthi & Mathew, 2018), there might be differences in IT-based value research between the results arising from all types of generic IT implementation and the impact of enterprise applications. The latter is very much related to process standardization and integration, and often we cannot distinguish which type of systems are inserted into the term “generic IT.”

To date most implementations and usage of enterprise applications remain “on-premise,” and SaaS EA refers to the delivery of enterprise applications hosted at a third-party data center, usually as a “pay per use” model through a monthly fee depending on the number of users and functionalities (Espadas, Molina, Jimenez, Molina, & Ramirez, Concha, 2013). This model is an evolution from the application service provisioning model (Susarla, Barua, & Whinston, 2003), which was limited by its single-tenant architecture, whereas SaaS architecture is multi-tenant (Benlian & Hess, 2011). This type of architecture and the advances in telecommunications capabilities at a low price (Nielsen, 1998) allowed a significant increase in the deployment of enterprise applications such as ERP and CRM in software-as-a-service, and these are also the leading product categories in SaaS, expected to represent nearly 36% of all public cloud spending in 2021, according to IDC (Robert P. Mahowald, Amy Konary, 2017). This development will provide the possibility, especially to

small and medium enterprises (SMEs), of more convenient access to new software packages and added functionalities for organizations that did not have these before, or for replacement of the existing ones.

In similar conditions between two firms with identical enterprise applications (versions and functionalities), but one with an “on-premise” EA and the other with a SaaS EA, similar results in several items would be expected, except perhaps in some financial KPIs. Simply because in one case, we have a “capital expenditure,” which can affect the Return on Equity (ROE), for instance, differently from the other deployment, which is characterized by “operational expenditure.” However, SaaS EA also accelerated the availability of what is called ERP II, which on the base of core ERP functionalities, enlarges the functions into CRM, MRP, SCM, and HRM functionalities (Møller, 2005), sometimes with several other modules (add-ons), also in SaaS. This improvement means that firms that deploy enterprise applications as a service are accessing the most up-to-date software versions with added functionalities, in comparison with most of the organizations that have “on-premise” installations. The latter often already with old or not up-to-date versions (e.g., on average, the lifetime of an ERP installation is five to ten years (Gabriel Gheorghiu, 2017)), especially in the case of SMEs. This aspect is an important difference between SaaS EA and traditional IS implementation because IT capabilities increase, and so the enhancement of business processes can increase firm capabilities as well (Pedro Ruivo et al., 2017). Therefore, the expectation from a positivist point of view (and cloud vendors also try to make their prospects believe it) that the adoption and usage of SaaS EA should reflect better support to the capabilities of the enterprises, and consequently lead to increased business value and firm performance.

However, as some other authors have already cautioned in recent studies (Peng, Guo Chao Alex; Gala, 2014; Seethamraju, 2015), the success of enterprise applications in software-as-a-service might be challenged by organizational, management, and strategic issues and, as such, these must be taken into account before making decisions. It is, therefore, our aim to verify how the adoption and usage of enterprise applications delivered as software-as-a-service influence business value and its respective mediation role in the creation of firm performance, and to the best of our knowledge, to date, no study has probed this topic specifically.

### **5.2.2 Business value and firm performance**

In IT-based business value research, there seems to be no consensus about what business value and firm performance are and the difference between them. This debate arises from a heterogeneous terminology that has persisted over time, as pointed out in recent reviews (Schryen, 2013). Our point of view and definition intends to differentiate between the internal impact that IT investments have on the organization and how and if these internal effects are also reflected in performance compared to competitors, to reflect competitive advantage.

We take the view of a stream of researchers who make a clear distinction between operational and strategic benefits, corresponding to our business value and firm performance, respectively. Business value results from intermediate-process level impact, reflecting an internal perspective effect from the firm capabilities, which has consequences on items such as customer service or inventory management, to name only two. This approach is similar to that of other authors (Di Valentin et al., 2012; Morris, Schindehutte, & Allen, 2005; Schief, 2014) whose work regarding the connection of business strategy and business processes or the relationship between the performance of business processes and the business model, also

consider that there is an intermediate (operational) process level perspective of value creation, with such value creation stemming from RBV capabilities such as production or service delivery methods, administrative processes, resource flows, knowledge management, and logistical streams.

On the other hand, the business model concept has also been considered as a conceptual alignment layer that allows translating the business strategy into business processes, especially as these are nowadays more IT-enabled, and the success of an organization is highly dependent on a successful relationship between business strategy and business processes along with the IS (Al-Debei & Avison, 2010). Hence, business value, as an intermediate-process level impact, is expected to be the result of the effectiveness of this relation underlying the business model of the organization.

Different authors assign diverse nomenclature to what we refer to as “business value” and “firm performance,” and in Table 5.1, we summarize some of the various designations adopted to distinguish between these two terms.

Firm performance is also intended to be comparable among different organizations, with financial performance indicators such as revenue, profits, and return on capital, or others such as market share, to name a few. These are commonly associated with a competitive advantage, which is represented through the creation and sustaining of superior performance and market value (Michael E. Porter, 1991) when compared to the competition. In IT-based business value research, some authors (L. M. Hitt & Brynjolfsson, 1996) also represent the competitive advantage with the financial impact measured by profitability, distinguishing it from the intermediate value (Kohli & Grover, 2008). Others explicitly distinguish between business value and firm performance, to differentiate between the impact of IT felt at low levels in the organization, before it can be demonstrated as competitive advantage through

firm performance indicators such as “market share” and “return on assets” (Barua et al., 1995), or use business value as a mediator between big data analytics and firm performance (Ji-fan Ren et al., 2016).

Finally, in the specific area of enterprise applications, business value is also considered as the benefit obtained through the improvements in processes throughout an organization, efficiency, cost reductions, and increased productivity (P.-F. Hsu, 2013; Krishnamoorthi & Mathew, 2018).

<b>Business Value</b> <i>(items)</i>	<b>Firm Performance</b> <i>(items)</i>	<b>Author(s)</b>
<b>Intermediate level variables</b> <i>(Capacity utilization, Inventory turnover, Relative inferior quality, Relative price, and New products)</i>	<b>Final performance variables</b> <i>(Market share and Return on assets)</i>	(Barua et al., 1995)
<b>Operational benefits</b> <i>(Generated through reengineering of the internal processes of an organization, resulting in (e.g.) order processing cycle)</i>	<b>Strategic benefits</b> <i>(Sales gains (direct strategic impact). Improvement in operational measures bring in further indirect strategic benefits)</i>	(Mukhopadhyay & Kekre, 2002)
<b>Business process performance</b> <i>(Operational efficiency of specific business processes, measures of which include customer service, flexibility, information sharing, and inventory management)</i>	<b>Organizational performance</b> <i>(Overall firm performance, including productivity, efficiency, profitability, market value, competitive advantage, etc.)</i>	(Melville et al., 2004)
<b>Operational business value</b> <i>(Efficiency improvement, process optimization, and time and cost reduction)</i>	<b>Strategic business value</b> <i>(Improvements in effectiveness, profitability, market share, and customer satisfaction)</i>	(Fink, 2017)
<b>Business value</b> <i>(Savings in supply chain management, Reducing operating costs, Avoiding the need to increase the workforce, Increasing return on financial assets, Enhancing employee productivity, Creating competitive advantage, Enabling quicker response to change, Improving customer relations, Providing better products or services to customers, An improved skill level for employees, Developing new business plans, Expanding organizational capabilities, Improving business models, and Improving organizational structure/processes)</i>	<b>Firm performance</b> <i>(Customer retention, Sales growth, Profitability, New markets entered, New products or services introduced, Success rate of new products or services, and Market share)</i>	(Ji-fan Ren et al., 2016)

**Table 5.1 – Examples of terminology and items of “Business Value” and “Firm Performance”**

### **5.2.3 The resource-based view and competitive strategy theories**

RBV theory is based on the idea that firms comprise a bundle of resources, and the more valuable, rare, not imitable, and difficult to substitute they are, the higher is the impact on the firm's competitive advantage and performance (J. Barney, 1991; Penrose, 1959; Wernerfelt, 1984). The deployment of a combination of these resources (which might be physical, human, or technological) using organizational processes can build firm capabilities in several functional areas (Raphael Amit & Schoemaker, 1993). IT-based business value research dedicated to analyzing the impact of IT in value and performance at the organization, economy, or country level, is a stream in which RBV theory has often been the basic theory for modeling (Melville et al., 2004; Seddon, 2014; Wade & Hulland, 2004).

One of the first steps to set up the business strategy of the firm is to choose the positioning that a company elects to create value for buyers and to obtain a competitive advantage relative to its competitors. Considering industry structure as a constant, a company does this by selecting a competitive strategy, which can be a cost base lower than the competition (low-cost strategy), or going for the differentiation of its offer (differentiation strategy), enabling it to establish pricing that consumers are less sensitive to, due to the differentiation through its marketing approach (marketing differentiation) or offer innovation (innovative differentiation) (Danny Miller, 1986; Michael E Porter, 1980). The competitive strategy that is chosen to be the company business strategy commonly involves setting goals, determining actions to achieve the goals, and mobilizing resources that are usually limited to execute these goals to increase firm performance (Linton & Kask, 2017). With a low-cost strategy, the firm is trying to generate competitive advantage through cost control and cost reductions from all possible sources, whereas with a differentiation strategy the firm is looking for uniqueness, either from the image and branding or from the product or services provided to generate higher returns (Michael E Porter, 1980). Therefore, the effects on firm performance from the chosen business strategy can be reinforced more or less successfully by the IT adoption choices, as some

authors have shown (Croteau & Bergeron, 2001; Peppard & Ward, 2004; Michael E Porter & Millar, 1985).

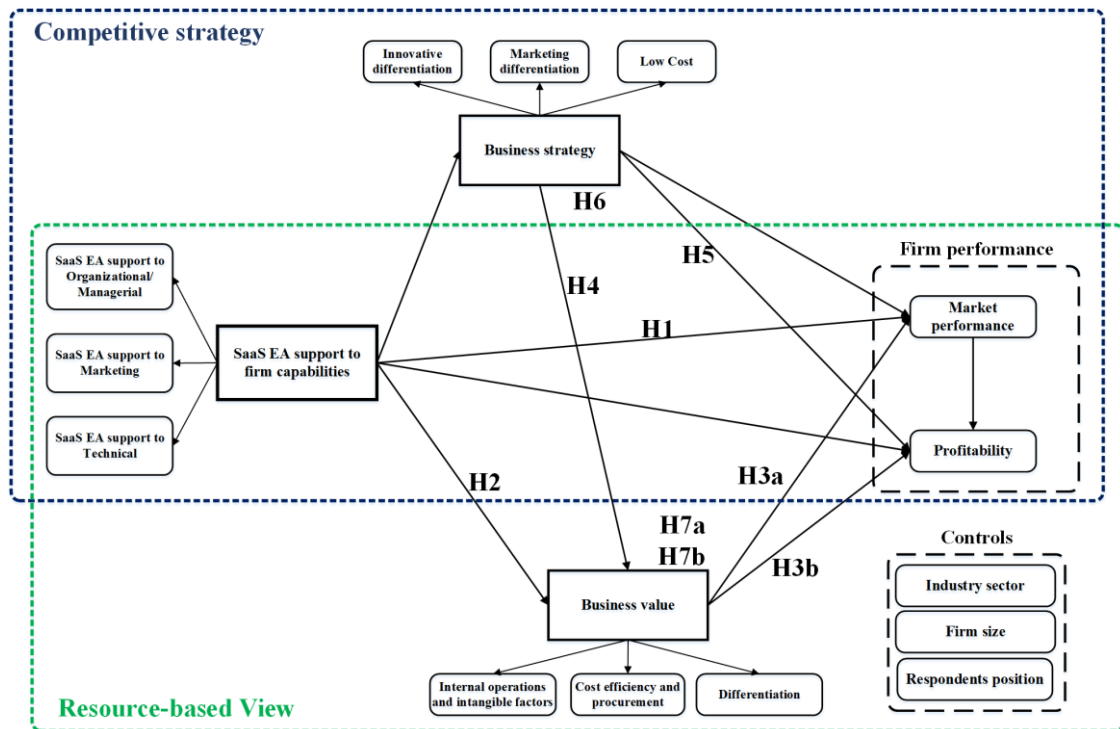
On the other hand, some authors (J. Barney, 1991) argue that the competitive advantage resulting from the selected competitive strategy, which is primarily driven by a market-centric point of view, can only be sustainable over time if the firm has valuable, rare, imperfectly imitable, and not substitutable (also known as VRIN) capabilities, suggesting the importance of integrating the RBV theory; an idea that was later reinforced by other strategic management authors (Raphael Amit & Schoemaker, 1993; Mahoney & Pandian, 1992; Peteraf, 1993), who argued about the importance of integrating both theories to have a complementarity that can best explain firm performance. This aspect was also the starting point of the work by Spanos (2001), which proved that firm performance was best explained through the complementarity of the two theories.

In IT-based business value research, combining both the RBV and the competitive strategy theories to explain firm performance has not been common, as far as we know, except for some cases (Rivard et al., 2006), that also departed from the Spanos (2001) model. However, these previous researches do not cover the context of this new delivery model of enterprise application functionalities, which is software-as-a-service-based, supporting firm capabilities in the creation of competitive advantage, not the influence through the creation of intermediate-process level performance, which we refer to as business value. These are research gaps that led us to create a research model relating these variables, which, as far as we know, has not been the subject of any previous work.

### **5.3. Research model**

In the literature, the RBV theory emphasizes the importance of firm capabilities in the creation of firm benefits. Moreover, according to the competitive strategy theory, an organization's firm performance is influenced by the chosen competitive strategy, which makes us expect that its capabilities, supported by functionalities provided through SaaS EA, will reinforce the elected business strategy to obtain a competitive advantage. Firm benefits should be considered in its internal

and external dimensions, to be more accurate as to how firm capabilities exert its effects, a separation that has been classified in operational and strategic benefits, that we designate as business value and firm performance, and we are exploiting how the latter is influenced by the former. Accordingly, we developed a research model, as shown in Fig. 5.1.



**Fig. 5.1. Research model**

We argue that firm capabilities supported by SaaS EA are a driver for organizations to create firm performance, represented through market performance and profitability, and we also postulate that these have the contribution of the elected business strategy and business value, both acting as mediators of the effects of firm capabilities supported by SaaS EA on the impact on firm performance. Additionally, we also consider that the selected business strategy should influence business value. The proposed model also includes control variables such as industry sector, firm size, and respondent position (to remove whatever effects these may have on firm performance); we incorporate some effects already tested by Rivard et al. (2006). We only want to confirm (or rebut) this behavior toward previous conclusions – these are the effects of firm capabilities on business strategy and profitability;

the direct effect of business strategy on market performance, or mediation between the capabilities and market performance; and the effect of market performance on profitability.

### **5.3.1. Software-as-a-service enterprise applications and firm capabilities**

Firm capabilities are the articulation of the capacities, materials, and expertise that a firm needs to implement advantageous strategies to meet its business goals and transform inputs into outputs of greater worth (Raphael Amit & Schoemaker, 1993), that is, grow its business value, especially when supported by IT investments (Côrte-Real, Oliveira, & Ruivo, 2016). In our model, firm capabilities are based on RBV theory and conceptualized as other authors did (González-Rodríguez, Jiménez-Caballero, Martín-Samper, Köseoglu, & Okumus, 2018; Rivard et al., 2006; Spanos & Lioukas, 2001), where high-level firm capabilities include concepts such as organizational-managerial, marketing, and technical capabilities that can govern various business processes, and business functions, which, as mentioned previously, can be amplified by IT (Kohli & Grover, 2008). This measuring variable from Spanos' (2001) work was chosen due to the context of our research, with the significant fit between the mentioned conceptual capabilities of an enterprise and the usage of IT enterprise applications in SaaS, that affect business processes and functions ruling these capabilities, which are detailed next.

*Organizational capabilities* refer to organizational and managerial processes, reflected through managerial expertise, the ability to attract human talent and grow its knowledge and skills, or the firm's culture, or coordination and integration capacity, and strategic planning competences (David J Teece, Pisano, & Shuen, 1997). Enterprise applications for HRM or ERPs are enablers for the development of human talent, greater connectivity and integration of processes among different departments, and the availability of accurate data for planning

(HassabElnaby, Hwang, & Vonderembse, 2012; Masini & Van Wassenhove, 2009; Stratman, 2007). Increased availability of these enterprise applications in software-as-a-service, with up-to-date and state-of-the-art functionalities, predicts that firms that adopt and use these should expect a reflection in their organizational capabilities.

*Marketing capabilities* enhance the firm's relationship with its clients (García-Villaverde, Ruiz-Ortega, & Ignacio Canales, 2013), comprising items such as market knowledge, market presence, or market-share represented by the existing customer base, the distribution channel, and added-value relationships with the customers, also known as “output-based competencies” by other authors (Lado, Boyd, & Wright, 1992). The most widely used enterprise applications to support and enhance marketing capabilities are CRM solutions (W. Chang, Park, & Chaiky, 2010), and these are also among the segment of the most available as software-as-a-service (Robert P. Mahowald, Amy Konary, 2017).

*Technical capabilities* are considered as the capabilities necessary to convert inputs into outputs (Lado et al., 1992), which include the technological resources available to the organization (Leonard-Barton, 1995), and can also include optimized sourcing of materials and efficient communication with suppliers (Parmigiani, Klassen, & Russo, 2011). These are based on items such as production efficiency, increased technological capability, and the implementation of economies of scale (Spanos & Lioukas, 2001). Enterprise applications such as ERP, MRP, and SCM (Hendricks, Singhal, & Stratman, 2007; D. L. Zahay & Handfield, 2004) are the ones that best support and enhance these capabilities, also in the software-as-a-service model.

Through the support that SaaS EA gives to organizational, managerial, marketing, and technical capabilities, the “SaaS EA support to firm capabilities” construct aims to capture all the causal complementary effects, departing from Spanos' (2001) firm assets variable; and

thus representing a second-order reflective-reflective type (Ringle, Sarstedt, & Straub, 2012) construct.

According to some authors, firm capabilities represent how the firm can achieve new and innovative forms of competitive advantage and produce a direct effect on performance (Spanos & Lioukas, 2001; David J Teece et al., 1997). The two dimensions of market performance and profitability represent both the external view and the internal view of value creation (Spanos & Lioukas, 2001), where the first is mainly related to the competitive strategy adopted by the firm and the second to the effectiveness of usage of internal resources and capabilities. Rivard et al. (2006) tested the direct impact of firm capabilities supported by IT in one of the dimensions of firm performance (profitability), considering that RBV mainly affects internal efficiency, which is aligned with profitability, but not the direct effect on market performance. In our model, we are led to believe that enterprise applications in SaaS enable improved capabilities in areas such as marketing and sales, organizational processes, and cost reductions, which lead to immediate effects in additional competitiveness through added sales volumes and an increase in market share, which posits:

*H1: SaaS EA support to firm capabilities positively affects market performance.*

The proposed model, based on the complementarity between the RBV and competitive strategy theories to explain the contribution to firm performance, also establishes the relationship between the firm capabilities supported by SaaS EA and the business strategy. This attribute is in line with the support of the theory, given by several other authors (Raphael Amit & Schoemaker, 1993; Grant, 1999; Mata et al., 1995) that the available capabilities constrain the choice of the strategy. Therefore, in our model, we want to confirm the hypothesis already tested by Spanos (2001) that “firm capabilities,” in this case, supported by SaaS EA, positively determine the configuration of the business strategy.

### 5.3.2 Business value

As we have seen in sub-section 5.2.2, the difficulty of finding a single definition of “business value” is due to the different theoretical perspectives adopted by researchers. Several authors integrate both the items of operational benefits and strategic benefits, like impact in Return on Assets or the creation of competitive advantage (2006), to cite an example under the business value variable. Moreover, other authors only focus on the impact on the strategic benefits, hiding the intermediate-process level performance, or operational benefits, under “efficiency effects” (Rivard et al., 2006; Spanos & Lioukas, 2001).

In our research, business value, or intermediate-process level performance, represents benefits from improvements in processes, efficiency, cost reductions, and increased productivity, or in similar items such as internal operations, procurement, marketing, and sales, as is the case of enterprise mobility applications usage (Picoto, Belanger, & Palmados-Reis, 2014).

These intermediate benefits are also often cited by software vendors as the result of enterprise software implementation, and according to the comprehensive review made by Hsu (2013) in the area of enterprise applications, these are felt in cost efficiency, differentiation, and intangibility. Hence, we depart from Hsu’s (2013) model, to establish the construct “business value,” due to the similarities of context – empirical work about enterprise applications impact on business value, and the impact at operational level, plus the same understanding of operational benefits, which is also shared by other authors (Loukis et al., 2019; Mabert, Soni, & Venkataramanan, 2003), representing cost savings, improved support quality of business processes and integration, and availability and quality of information. Some detail on these sub-constructs is provided as follows: *cost efficiency* is about lower-cost ratios or

cost reductions (A. S. Bharadwaj, 2000; Melville et al., 2004; Santhanam & Hartono, 2003), which are frequently the most cited benefits of IT/IS implementations; *differentiation* relates to the quality of products (Banker, Bardhan, Chang, & Lin, 2006; P.-F. Hsu, 2013; Shang & Seddon, 2002), customer service (Fink, 2017; Shang & Seddon, 2002), and on-time delivery (Shang refers it as “cycle time reduction”); and *intangible factors* refer to the ones that arise from the usage of EA, such as availability and information quality or improved decision support (Gattiker & Goodhue, 2005; Mabert et al., 2003; Shang & Seddon, 2002). As such, business value in our research was conceptualized as a second-order reflective-reflective type (Ringle et al., 2012), based on three first-order constructs: cost efficiency, differentiation, and intangibility, and this also led us to posit:

*H2: SaaS EA support to firm capabilities positively affects the creation of business value.*

Moreover, the intermediate benefits resulting from the capabilities supported by SaaS EA are expected to be reflected in lower costs. This advantage, in turn, allows the firm to be more competitive in pricing and so augmenting the elasticity in sales volumes and market share; on the other hand, benefits such as lower costs should also reflect in higher profit margins, net profits, and ROE. Therefore, we posit the following:

*H3a, b: Business value positively affects market performance (a) and profitability (b).*

### **5.3.3 Business strategy**

To gain competitive advantage and increase firm performance (Linton & Kask, 2017), a firm should choose a competitive strategy among the options of low-cost, marketing differentiation, and innovative differentiation. However, it is not sure that a firm has made a single choice, and in fact, especially in SMEs, a combination of strategies might be made that is viable in the long term, as some researchers argue (Leitner & Gü, 2010). In strategic

management, some previous research also considers that a differentiation strategy can be a way to achieve low-cost competitive advantage and that it is often a result of a mixed choice of strategies (Hill, 1988).

Thus, to capture the complementarities among the three dimensions encompassing low-cost and differentiation choices, we conceptualize a business strategy as a second-order reflective-reflective type (Ringle et al., 2012), based on three first-order constructs: low cost, marketing differentiation, and innovative differentiation, as other research analyzing the intermediary role between resource-based capabilities and firm performance, have done (Spanos & Lioukas, 2001).

Current expectation is that the choice of a particular competitive strategy will be accompanied by the implementation of the adequate business processes that generate higher intermediate-process level impact, especially when those processes are also automated with IT (Al-Debei & Avison, 2010), or, according to Porter (1996), an “alignment” between their operational activities and strategies. Therefore, if low cost is the main strategy chosen by an organization, the way to succeed in implementing this strategy, and getting the respective competitive advantage, is expected to be to perform business processes differently. With *modi operandi* supported as much as possible by automation and as such to reduce operational costs to a minimum (M.E. Porter, 1996), or in the case of a marketing differentiation strategy to implement customer-centric relationship management processes and culture supported by contact management and CRM technologies (W. Chang et al., 2010). Therefore, it is expected that this relationship between business strategy and processes, which is nowadays considered the business model (Al-Debei & Avison, 2010) can generate business value, and as such, we posit:

*H4: The chosen business strategy positively affects business value.*

The research model suggests that the chosen business strategy impacts firm performance (market performance and profitability). The impact on market performance has already been successfully tested (Rivard et al., 2006; Spanos & Lioukas, 2001), and we will confirm, or not, that business strategy positively affects market performance. Several authors have already evaluated the possible impact of the chosen business strategy on profitability (Leitner & Gü, 2010), with some arguing that a differentiation strategy can eventually lower costs and increase profitability (Hill, 1988) or defending the impact from a combination of strategies to improve profitability (Leitner & Gü, 2010; Spanos, Zaralis, & Lioukas, 2004).

Thus, we might be led to suppose that a company that invests in SaaS EA to reinforce its firm capabilities can reinforce the business strategy to use these capabilities for competitive advantage and thereby achieve greater returns. Enterprise applications consumed as software-as-a-service improve processes, allowing to increase volumes and obtain cost reductions, implementing a successful business strategy of lower costs that we would expect to be reflected in increased profits. At the same time, if it improves marketing differentiation, such as easier and increased customization of products or services according to customer requests or innovative features, these can lead the customers to be less price-sensitive because perceived value justifies a premium price, also meaning a higher profit margin. Therefore, we posit the following:

*H5: Profitability of a firm with SaaS EA-enabled firm capabilities is impacted by the business strategy.*

#### **5.3.4 Firm performance**

Most of the work related to firm performance measurement has been centered on financial metrics. However, as some researchers mention (Tippins & Sohi, 2003), access to financial

data is never easy to obtain, because of the sensitivity of this information, and this is especially true in the case of SMEs, in which the stock market valuation typically does not make sense, and other performance indicators must be found. Therefore, in these cases, the recourse to indirect or perceived measures has been employed to establish firm performance (Powell, 1992; Powell & Dent-Micallef, 1997) enabling comparisons among organizations, and in this research, managers were asked to make a perceived valuation of the items corresponding to market performance and profitability over the last three years, in comparison to their competitors.

Firm performance has two dimensions, market performance and profitability, but although it could be conceptualized as a whole, as a second-order reflective-reflective type (Ringle et al., 2012), we decided to follow Spanos' (2001) measurement model, to make this work more rich in findings and conclusions about the effects. Thus, the two dimensions are first-order constructs, where market performance is based on the perceived measurement of items such as sales volume, market share, and their respective growth, and profitability with items such as profit margin, net profits, and ROE (Rivard et al., 2006; Spanos & Lioukas, 2001). According to several authors, market performance has a considerable effect on profitability (Davis, Babakus, Englis, & Pett, 2010; Rivard et al., 2006; Spanos & Lioukas, 2001), a hypothesis that we primarily want to confirm, or not, in our model.

### **5.3.5 Mediation hypothesis**

This research model is a multiple mediator model (Nitzl, Roldan, & Cepeda, 2016), in which both business strategy and business value are mediator variables between SaaS EA support to firm capabilities and firm performance. We have seen that the configuration of the activities of a firm allows the implementation of the chosen business strategy to achieve a

competitive advantage, be it a low-cost approach or through differentiation (Michael E. Porter, 1991). The intermediate effects of business strategy, between firm capabilities and the creation of firm performance, have been the subject of previous work (Rivard et al., 2006; Spanos & Lioukas, 2001), where the mediation effects of business strategy were tested with respect to market performance, with significant results that we will try to confirm in this work. However, we are especially interested in probing the following hypothesis:

*H6: Business strategy positively mediates the relationship between SaaS EA support to firm capabilities and profitability.*

We also conceptualize that business value is a mediator between the firm capabilities supported by SaaS EA and firm performance, in both dimensions of market performance and profitability, and this is an important difference from the earlier work with a similar model (Rivard et al., 2006; Spanos & Lioukas, 2001). Other authors also considered business value as a mediation factor impacting firm performance (Ji-fan Ren et al., 2016; Picoto et al., 2014; Stratman, 2007), which also motivates our hypothesis between the firm capabilities supported by SaaS EA and the creation of business value. So, we posit:

*H7a,b: Business value positively mediates the relationship between SaaS EA support to firm capabilities and market performance (a) and profitability (b).*

In both cases of the variables, business strategy and business value, we are evaluating them as mediators of firm capabilities enabled by SaaS EA, and not on any reverse causalities.

## **5.4. Research methodology**

### **5.4.1 Measurement model, validation, and administration**

The measurement model was based on a comprehensive review of the literature, and departing from earlier work (P.-F. Hsu, 2013; Rivard et al., 2006; Spanos & Lioukas, 2001),

the proposed model was operationalized through a questionnaire to be submitted as a web-based survey, choosing the appropriate items and following the same set of questions to reinforce construct validity (Venkatesh, Thong, & Xu, 2012). The definitions of the measurement items are listed in Table 5.2, with “SaaS EA support to firm capabilities,” business value and business strategy configured as second-order constructs of reflective-reflective type (Ringle et al., 2012). There are some similar terms, such as “cost” or “differentiation,” in subconstructs of the business strategy and business value variables, but this is not an issue regarding respondents interpretation because, in the first variable, we are looking at how the company compares to its competitors at the level of implementation of each of the competitive strategies, whereas in the second variable we are looking at how much the operational benefit items increased, decreased, or stayed the same, as a result of using SaaS EA.

The evaluation of the theoretical model was conducted in firms that have adopted SaaS EA, located in a southern European country, using a questionnaire with items mentioned in published literature (see Table 5.2) of which the several constructs are reflective (J. Hair, Hult, Ringle, & Sarstedt, 2017). These items were measured using a seven-point range scale - where 1 represents “totally disagree” or “without any support from SaaS EA” or “much less than competitors” or “never uses” or “decreased strongly” or “much less than average,” and 7 represents “totally agree” or “strongly supported by SaaS EA” or “much more than competitors” or “frequently uses” or “increased strongly” or “much more than average.”

Qualification of respondents includes questions to determine the industry sector, the firm size determined by the number of employees, and the turnover volume (stratified under European enterprise size class (European Commission, 2015)), the position of the respondent in the organization and corresponding department. Prior to the main survey application, a pilot

study was conducted with responses from 30 companies from a similar sample, but which were not included. This phase permitted checking the validity and scales' reliability with Cronbach's  $\alpha$  coefficients exceeding 0.70, which led to the deletion of the items "managerial competencies" and "efficient organizational structure," from the "SaaS EA support to firm capabilities" construct, due to weaknesses in the respective discriminant validity analysis affecting business value outer loadings; some other items were also revised for increased clarity.

#### **5.4.2 Data collection**

The survey was presented online, including an explanation of the research scope and relevance, through an invitation email sent by IDC, a major worldwide research analyst in the area of IT/IS, to a selected sample of respondents in board and management positions (such as Chief Executive Officers (CEO), Chief Financial Officer, Chief Information Officer, General Manager (GM), directors, and senior managers), from 2000 organizations in different industry sectors (e.g., services, commerce, health, information and communications, manufacturing, and construction). Instructions included a statement that it should be filled out by the individuals who are most familiar with the firm's usage and policies regarding SaaS EA, to obtain the best content validity.

Data collection occurred over six consecutive weeks during May and June 2016, with a total of 381 responses received. There was a steady stream of responses, due to some reminders from IDC in their usual communication channels (e.g., newsletters and seminar announcements), which caused the first 105 responses in the first week of administration and 276 responses in the remaining 32 days. However, from the total responses received, only a

total of 257 have been considered usable, representing a response rate of 12.9% from the initial global sample.

Common method bias was examined using Harman's one-factor test (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), revealing that none of the factors had a variance explained by one factor with more than the 50% threshold value, with a maximum of 35.6%. The marker-variable technique (Lindell & Whitney, 2001; N Malhotra, Kim, & Patil, 2006) also had a good outcome.

The sample profile is in Table 5.3; 56% of the respondents are from the services sector, 14% from the information and communication industries, 13% from the manufacturing industry, and the remaining 17% are from other sectors.

The respondents, in its majority, are qualified managers/top management within the firms, indicating good quality of data, with 53% at board level or 1<sup>st</sup> line Directors and a further 24% of managers, with the remaining 23% of the respondents as specialists or information workers with specific knowledge of the subject.

	Construct	Item	Item description	Base literature
SaaS EA support to firm capabilities (second-order construct)**	Organizational/managerial (O/M)**	O/M1	Managerial competencies *	(Rivard et al., 2006; Spanos & Lioukas, 2001)
		O/M2	Knowledge and skills of employees	
		O/M3	Firm climate	
		O/M4	Efficient organizational structure *	
		O/M5	Coordination	
		O/M6	Strategic planning	
		O/M7	Ability to attract creative employees	
	Marketing (Mkt)**	Mkt1	Market knowledge	
		Mkt2	Control and access to distribution channels	
		Mkt3	Advantageous relationships with customers	
		Mkt4	Customers “installed base”	
	Technical (Tec)**	Tec1	Efficient and effective production department	
		Tec2	Economies of scales and technical experience	
Tec3		Technological capabilities and equipment		
Business strategy (second-order construct)**	Innovative differentiation (ID)**	ID1	Research and Development expenditure for product development	(G. G. Dess & Davis, 1984; D. Miller, 1988; Spanos & Lioukas, 2001)
		ID2	Research and Development expenditure for process innovation	
		ID3	Emphasis on being ahead of the competition	
		ID4	Rate of product/service innovations	
	Marketing differentiation (MD)**	MD1	Innovations in marketing techniques	
		MD2	Emphasis on marketing department organization	
		MD3	Advertising expenditures	
		MD4	Emphasis on strong sales force	
	Low cost (LC)**	LC1	Modernization and automation of (production) processes	
		LC2	Efforts to achieve economies of scale	
LC3		Capacity utilization		
Business value (second-order construct)**	Internal operations and intangible factors (IOIF)**	IOIF1	Support to Decision-making	(P.-F. Hsu, 2013)
		IOIF2	Quality of the Information	
	Cost efficiency and procurement (CEP)**	CEP1	Operational Costs	
		CEP2	Procurement Costs	
		CEP3	Inventory Costs	
	Differentiation (Df)**	Df1	Quality of Customer Service and Support	
		Df2	On-time Delivery	
Df3		Product/Service Quality		
Firm performance	Market Performance (MP)**	MP1	Sales Volume	(Spanos & Lioukas, 2001)
		MP2	Growth in Sales Volume	
		MP3	Market Share	
		MP4	Growth in Market Share	
	Profitability (Pf)**	Pf1	Profit margin	
		Pf2	Return on own capital (/Equity)	
Pf3		Net profits		

**Notes:** (\*) The items “managerial competencies” and “efficient organizational structure” were deleted due to weaknesses in the respective discriminant validity analysis affecting business value outer loadings, and therefore were not included as measurement components of the “SaaS EA support to Firm capabilities” construct in this study. (\*\*) Reflective constructs. (\*\*\*) The full questionnaire is available from the authors on request.

**Table 5.2 - Measurement items of research variables**

<b>Industry</b>			<b>Firm size</b>		
Services	143	56%	Micro	89	35%
Health	12	5%	Small	60	23%
Commerce	17	7%	Medium	41	16%
Construction	8	3%	Large	67	26%
Manufacturing	34	13%			
Information and communications	36	14%			
Other	7	3%			
<b>Respondent's position</b>					
Board Member/CEO/GM	90	35%			
Director	46	18%			
Manager	62	24%			
Specialist/Technical worker	46	18%			
User/Information worker	13	5%			

**Table 5.3 - Sample characteristics**

## 5.5. Results

For an empirical assessment of the research model, this work uses SEM with the variance-based technique (Henseler, Ringle, & Sinkovics, 2009) of PLS path modeling. This method is the most adequate for cases like ours, with a complex model, insufficient theoretical information (Henseler et al., 2009), and in which the items are not normally distributed ( $p < 0.01$ , Kolmogorov-Smirnov's test) (Chin, Marcolin, & Newsted, 2003; Ryans, 1974), as is the case with our data.

### 5.5.1 Measurement model

Table 5.4 shows the results for the average variance extracted (AVE) and composite reliability (CR). All of the constructs have an AVE greater than 0.5, which demonstrates a measurement model with adequate convergent validity, as the latent variable explains more than half of the variance of its indicators (Fornell & Larcker, 1981; J. F. Hair, Sarstedt,

Ringle, & Mena, 2012). Also, the CR is higher than 0.7 for all constructs, which is a confirmation of the reliability of scales (Henseler et al., 2009; Straub, 1989). Table 5.5 reports that all loadings (in bold) are higher than 0.7, confirming that the measurement model has good indicator reliability (Chin, 1998).

The results also reveal good discriminant validity, for all constructs, as i) the square root of the AVE of each latent construct is greater than the correlation between that construct with all other constructs (Fornell & Larcker, 1981; Henseler et al., 2009); ii) based on Table 5.5, all loadings (in bold) are higher than respective cross-loadings (except O/M1 and O/M4, which were eliminated due to lower loadings); iii) the heterotrait-monotrait ratio also meets the criterion of being less than 0.90 (Henseler, J.; Ringle, C. M.; Sarstedt, 2015).

With all these criteria met, there is a good confidence level for using the constructs proposed in this conceptual research model.

Constructs	Mean	SD	CR	O/M	Mkt	Tec	ID	MD	LC	IOIF	CE	Df	MP	Pf
Organizational/Managerial (O/M)	4.35	1.75	0.95	<b>0.89</b>										
Marketing (Mkt)	4.53	1.76	0.94	0.77	<b>0.90</b>									
Technical (Tec)	4.51	1.87	0.96	0.80	0.71	<b>0.94</b>								
Innovative differentiation (ID)	4.49	1.47	0.94	0.52	0.50	0.49	<b>0.89</b>							
Marketing differentiation (MD)	4.26	1.52	0.95	0.46	0.52	0.47	0.68	<b>0.90</b>						
Low cost (LC)	4.63	1.42	0.95	0.52	0.39	0.55	0.66	0.55	<b>0.93</b>					
Internal operations and intangible factors (IOIF)	5.06	1.26	0.94	0.55	0.47	0.47	0.39	0.35	0.46	<b>0.94</b>				
Cost efficiency and procurement (CEP)	4.09	1.23	0.92	0.32	0.31	0.31	0.22	0.32	0.21	0.37	<b>0.90</b>			
Differentiation (Df)	4.78	1.27	0.96	0.62	0.61	0.55	0.54	0.48	0.49	0.71	0.41	<b>0.94</b>		
Market performance (MP)	4.52	1.14	0.95	0.50	0.43	0.44	0.49	0.50	0.50	0.46	0.29	0.59	<b>0.90</b>	
Profitability (Pf)	4.48	1.23	0.97	0.42	0.29	0.35	0.42	0.39	0.47	0.41	0.25	0.51	0.76	<b>0.96</b>

Note: Standard deviation (SD); The diagonal elements (in bold) are the square root of the average variance extracted (AVE).

**Table 5.4 – CR, AVE, and correlations**

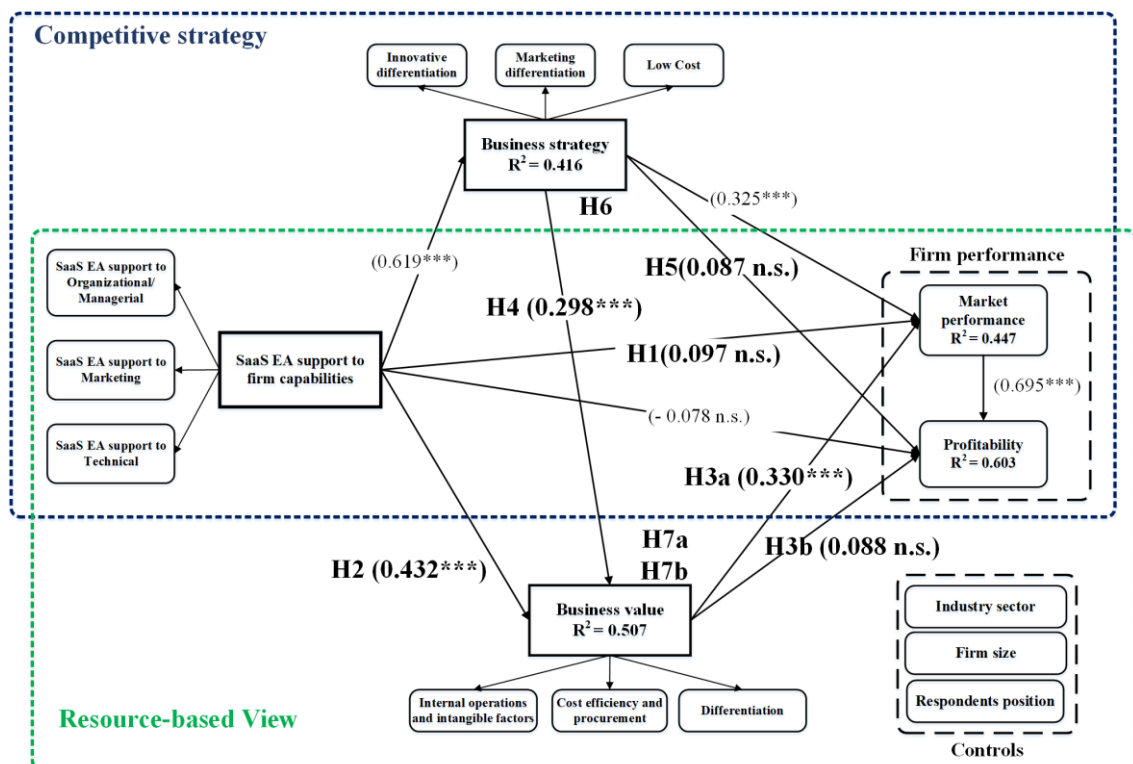
	O/M	Mkt	Tec	ID	MD	LC	IOIF	CEP	Df	MP	Pr
O/M2	<b>0.91</b>	0.75	0.75	0.51	0.46	0.50	0.47	0.32	0.59	0.47	0.38
O/M3	<b>0.91</b>	0.65	0.69	0.44	0.35	0.44	0.48	0.25	0.58	0.44	0.37
O/M5	<b>0.90</b>	0.70	0.72	0.42	0.37	0.48	0.57	0.27	0.56	0.43	0.35
O/M6	<b>0.88</b>	0.66	0.70	0.46	0.42	0.46	0.51	0.28	0.52	0.43	0.35
O/M7	<b>0.86</b>	0.69	0.71	0.50	0.46	0.47	0.43	0.28	0.52	0.45	0.41
Mkt1	0.71	<b>0.91</b>	0.62	0.49	0.53	0.34	0.40	0.28	0.53	0.41	0.27
Mkt2	0.68	<b>0.89</b>	0.67	0.49	0.48	0.38	0.37	0.31	0.49	0.36	0.28
Mkt3	0.71	<b>0.92</b>	0.62	0.45	0.43	0.36	0.43	0.25	0.60	0.37	0.24
Mkt4	0.68	<b>0.88</b>	0.64	0.38	0.42	0.34	0.50	0.26	0.56	0.39	0.26
Tec1	0.75	0.69	<b>0.92</b>	0.45	0.43	0.50	0.46	0.30	0.53	0.39	0.33
Tec2	0.77	0.67	<b>0.96</b>	0.47	0.44	0.54	0.42	0.28	0.50	0.42	0.34
Tec3	0.75	0.65	<b>0.95</b>	0.45	0.47	0.53	0.46	0.31	0.52	0.43	0.32
ID1	0.42	0.42	0.37	<b>0.87</b>	0.62	0.52	0.32	0.14	0.44	0.41	0.31
ID2	0.47	0.39	0.44	<b>0.88</b>	0.54	0.56	0.33	0.20	0.44	0.40	0.35
ID3	0.47	0.45	0.39	<b>0.90</b>	0.58	0.61	0.32	0.23	0.47	0.46	0.43
ID4	0.50	0.51	0.51	<b>0.90</b>	0.68	0.65	0.41	0.21	0.55	0.47	0.40
MD1	0.48	0.51	0.45	0.65	<b>0.92</b>	0.52	0.33	0.27	0.47	0.48	0.40
MD2	0.46	0.47	0.46	0.64	<b>0.93</b>	0.51	0.34	0.28	0.47	0.45	0.34
MD3	0.37	0.43	0.41	0.61	<b>0.90</b>	0.50	0.27	0.32	0.39	0.43	0.33
MD4	0.35	0.46	0.38	0.57	<b>0.87</b>	0.46	0.31	0.29	0.40	0.45	0.36
LC1	0.49	0.37	0.53	0.61	0.49	<b>0.92</b>	0.40	0.20	0.42	0.41	0.41
LC2	0.46	0.35	0.51	0.63	0.55	<b>0.94</b>	0.41	0.17	0.43	0.51	0.45
LC3	0.51	0.38	0.51	0.61	0.49	<b>0.92</b>	0.47	0.22	0.52	0.48	0.43
IOIF1	0.51	0.43	0.45	0.38	0.36	0.44	<b>0.94</b>	0.36	0.67	0.42	0.36
IOIF2	0.52	0.45	0.44	0.35	0.29	0.42	<b>0.94</b>	0.33	0.65	0.44	0.41
CEP1	0.27	0.28	0.25	0.19	0.28	0.15	0.32	<b>0.90</b>	0.36	0.23	0.23
CEP2	0.29	0.28	0.29	0.19	0.30	0.18	0.31	<b>0.94</b>	0.35	0.26	0.22
CEP3	0.29	0.26	0.31	0.21	0.28	0.24	0.36	<b>0.84</b>	0.37	0.28	0.22
Df1	0.60	0.62	0.54	0.49	0.45	0.44	0.65	0.39	<b>0.94</b>	0.54	0.46
Df2	0.55	0.53	0.49	0.49	0.42	0.46	0.66	0.37	<b>0.95</b>	0.54	0.47
Df3	0.60	0.58	0.52	0.54	0.48	0.49	0.69	0.39	<b>0.94</b>	0.59	0.50
MP1	0.47	0.41	0.43	0.47	0.49	0.49	0.40	0.26	0.55	<b>0.93</b>	0.70
MP2	0.43	0.39	0.35	0.43	0.42	0.41	0.45	0.28	0.56	<b>0.90</b>	0.68
MP3	0.43	0.36	0.40	0.45	0.43	0.47	0.37	0.24	0.49	<b>0.90</b>	0.71
MP4	0.46	0.38	0.40	0.43	0.47	0.45	0.43	0.25	0.53	<b>0.88</b>	0.66
Pf1	0.40	0.29	0.34	0.36	0.35	0.43	0.38	0.23	0.49	0.73	<b>0.95</b>
Pf2	0.38	0.27	0.32	0.42	0.40	0.46	0.40	0.25	0.50	0.73	<b>0.97</b>
Pf3	0.42	0.29	0.34	0.42	0.38	0.45	0.40	0.24	0.47	0.75	<b>0.97</b>

**Notes:** Organizational/managerial (O/M), marketing (Mkt), technical (Tec), innovative differentiation (ID), marketing differentiation (MD), low cost (LC), internal operations and intangible factors (IOIF), cost efficiency and procurement (CEP), differentiation (Df), market performance (MP), profitability (Pf).

**Table 5.5 – Loadings and cross-loadings**

### 5.5.2 Structural model

We started with an analysis of the absence of multicollinearity between the constructs/variables based on the variance inflation factor to assess the structural model, which was confirmed by the value of the factor below the threshold of 3.3 (J. (J. Hair et al., 2017)), with values between 1.00 and 2.25. We then tested the research model with the PLS structural model with an assessment of the hypotheses based on the path coefficients and respective significance levels. We used a bootstrapping procedure with the resampling method of 5000 iterations (J. F. Hair, Ringle, & Sarstedt, 2011; Henseler et al., 2009; Temme & Kreis, 2006) to estimate the statistical significance of the parameter estimates, and the path coefficients results are shown in Figure 5.2.



Notes: n.s. = non-significant. \* p<0.10; \*\* p<0.05 level; \*\*\* p<0.01

**Fig. 5.2. Research model results**

### 5.5.3 Mediation models and analysis

To test hypotheses H6, H7a, and H7b, we performed a mediating effects analysis by evaluating the single importance of each of the mediators, tested with declined versions of the global structural model, in which one of the two constructs is eliminated. Table 5.6 presents the results.

Path: from -> to	Total effect (mediated)	Direct effect	Indirect effect	VAF	Conclusion
<b>Direct, indirect, and total effects of proposed model</b>					
SEA Firm capabilities -> Market performance	0.502	0.097	0.405	81%	full mediation
SEA Firm capabilities -> Profitability	0.380	-0.078	0.458	n.a.	no mediation
<b>Direct, indirect, and total effects. With Business Strategy mediator (only)</b>					
SEA Firm capabilities -> Market performance	0.489	0.237	0.252	52%	partial mediation
<b>SEA Firm capabilities -&gt; Profitability (H6)</b>	<b>0.371</b>	<b>-0.046</b>	<b>0.417</b>	<b>n.a.</b>	<b>no mediation</b>
<b>Direct, indirect, and total effects. With Business Value mediator (only)</b>					
<b>SEA Firm capabilities -&gt; Market performance (H7a)</b>	<b>0.433</b>	<b>0.235</b>	<b>0.198</b>	<b>46%</b>	<b>partial mediation</b>
<b>SEA Firm capabilities -&gt; Profitability (H7b)</b>	<b>0.416</b>	<b>-0.047</b>	<b>0.463</b>	<b>n.a.</b>	<b>no mediation</b>
<b>Notes:</b> [VAF>80% : Full mediation] [20% ≤ VAF ≤ 80% : Partial mediation] [VAF< 20% : No mediation] [n.a. = not applicable] [SEA Firm capabilities = SaaS EA support to firm capabilities]					

**Table 5.6 – Results from mediating effects tests**

Variance accounted for analysis reveals that both business value and business strategy have complementary effects (Nitzl et al., 2016) on the impact of SaaS EA support to firm capabilities on market performance, and both are partial mediators. Thus, hypothesis H7a is

also confirmed, and, for the original overall research model proposed, it is possible to see that the total mediation effect resulting from the two mediator variables between firm capabilities supported by SaaS EA and market performance, is important, with a VAF of 81%, and indirect effect of 0.405.

However, regarding the impact of SaaS EA support to firm capabilities on profitability, neither business value nor business strategy is seen as a mediator, and thus, neither H6 nor H7b is confirmed.

## **5.6. Discussion and implications**

This research started with the goal of determining the influence of business strategy and business value on the impact of firm capabilities supported by SaaS EA on firm performance. To date, research about enterprise applications in cloud computing has mostly focused on adoption and usage but work on the impact in value and performance using a model based on RBV and competitive strategy theories is, as far as we know, an unexploited area of research. The empirical analysis demonstrated several significant findings, which we discuss in this section, together with some of this study's limitations and contributions for practitioners and researchers. We start by discussing these significant findings.

### **5.6.1 Discussion of findings**

**Finding 1 – *There is no direct impact of the capabilities that are supported by software-as-a-service enterprise applications in Firm Performance!***

The fact that H1 is not confirmed is an important conclusion, and because there are also no impacts on profitability, it brings significant differences to the results of earlier studies that combined RBV and competitive strategy theories. In those studies, where firm assets or firm

assets supported by IT were found to have significant impact on market performance (Spanos & Lioukas, 2001), or profitability (Rivard et al., 2006), through the so-called “efficiency effects,” which apparently concealed cost reductions due to improved process efficiency, higher customer satisfaction, and loyalty or increased productivity, and which in our model are part of the variable business value. Furthermore, this is an important finding because it demonstrates the relevance of introducing this variable.

**Finding 2 - *Capabilities supported by software-as-a-service enterprise applications positively impact the creation of business value*** resulting from the improved quality of information to make better decisions, better procurement costs, and quality differentiation, confirming H2. As the use of SaaS EA improves the technical capabilities related to economies of scale and technical expertise, there is a stronger relationship with the satisfaction of deliveries according to the established schedules, which is followed closely by improved customer service and quality in the products/services provided. Better procurement costs and quality of information and support to decisions are also similarly related, confirming the conclusions of earlier studies regarding business value and IT (P.-F. Hsu, 2013). These findings also match those of other earlier studies that enterprise applications, such as ERPs and CRM, improve production and product planning, avoiding stock shortages, and thereby also keeping procurement costs more controlled or optimized and improving service and support to customers, respectively (Mabert et al., 2003).

**Finding 3 - *Business value positively affects market performance but not profitability.***

The confirmation that business value has a direct impact on items such as an increase in sales and market share (H3a) but not on profits or ROE (H3b) seems contradictory. When looking at the loadings in this study, it seems that in SMEs the intermediate-process level performance caused by capabilities supported by SaaS EA is mostly felt in increases of

product, services, and process quality that, for a given price (or lower prices, allowed by cost efficiencies), give the possibility to increase sales but are not the direct cause for more profits. However, the proposed model establishes the direct impact of market performance in profitability, which in the case of our sample is confirmed as also confirmed by previous work (Davis et al., 2010; Homburg & Pflesser, 2000; Spanos & Lioukas, 2001). Additionally, in this case, an analysis of the level of mediation effects from market performance between business value and profitability was made, and there is a statistical significance of the indirect effects. The direct effect is not statistically significant, revealing that market performance acts as a full mediator between those variables.

**Finding 4 - *Business value is dependent on the chosen business strategy***

The confirmation of H4, and looking at the results obtained, in this measurement model, for the constructs business strategy and business value, also highlights that if the strategy is more targeted at innovative differentiation than lower costs, with organizations looking at how to continuously differentiate their products and services from their competitors and investing in process innovation, which results in higher business value reflected in improved quality of product, services, and processes (S. C. Chang, Lin, Yang, & Sheu, 2003; Prajogo, 2007).

**Finding 5 - *Profitability is only impacted by market performance***

Hypothesis H5 is also not confirmed, and so neither business strategy, business value, nor the capabilities supported by SaaS EA have a direct effect on profitability other than market performance. Moreover, this is in line with Spanos (2001) and Rivard et al. (2006), who also showed that higher market performance reflects improved profitability.

Finally, **finding 6 – *Both business value and business strategy mediate the relationship between SaaS EA support to firm capabilities and market performance***, and this is also the answer to the research question *How do “capabilities supported by software-as-a-service*

*enterprise applications” contribute to firm performance, and what is the role of business value and business strategy?*

The combined effects of both business value and business strategy result in establishing a strong relationship between “SaaS EA support to firm capabilities” and market performance, meaning that both variables create a full mediation effect. When analyzed separately, both business strategy and business value demonstrate partial mediation effects, although the mediation role of business strategy between capabilities and the market performance had already been confirmed previously (Rivard et al., 2006; Spanos & Lioukas, 2001).

Therefore, this study also demonstrates that organizations with SaaS EA support to firm capabilities can increase sales volumes by achieving business value through more timely deliveries, better quality in products, customer service, information that supports decision-making, and optimized procurement costs. Previously, other authors (Melville et al., 2004) also related business value, which they called business process performance, with firm resources in association with IT and the respective impact on organizational performance, in which market performance is included. Market performance, such as an increase in revenues, is also referred to by some authors as strategic benefits, which are a result of operational benefits gained through the capabilities enhanced with IS such as business intelligence (Loveman, 2003).

### **5.6.2 Theoretical implications**

Most of the research and literature in the context of SaaS EA, as seen previously, has been focused on the areas of intent to adopt and usage (Senyo et al., 2017), and as per the authors knowledge no work has been done around the post-implementation stages – the creation of value and firm performance. This research contributes to this stage of the literature stream of

IS value related to enterprise applications deployed as a service, with empirical research focusing on intermediate-process level performance, strategy, and financial performance factors.

For researchers, this study provides a basis for further refinement of theoretical models on firm performance, being a starting point for future research on this crucial subject. Competitive strategy and RBV have been two of the most known and complete theoretical models used in IS research at the firm level; so, identifying factors to extend them is always an important fact, even more, if it reinforces results significance and predictability. Other significant contributions include (i) understanding the role of complementary mediation (Laumer et al., 2010) of business value and business strategy, among the firm capabilities supported by SaaS and firm performance, to explain the impact on firm performance, and to fill some gaps in theory and previous studies; (ii) to show how business value, as an intermediate internal perspective (Fink, 2017; Melville et al., 2004), differs from firm performance, contributing to the IT-based business value stream of research (Ji-fan Ren et al., 2016; Kohli & Grover, 2008); and finally, (iii) the evidence of the importance of market performance mediation role between, either business strategy or business value, and profitability, which should be taken into account in future research on the value of IT.

Overall, our findings demonstrate that business value and business strategy are essential links between the contribution of capabilities supported by SaaS EA and the firm performance, confirming the crucial relevance of the mediators used in our study, and supporting the overall recommendation to include them in future SaaS EA technological studies.

### **5.6.3 Managerial and practical implications**

The managerial and practical implications of our results are: firms that invest in SaaS EA can expect that their firm capabilities impact firm performance, through indirect effects obtained with the created business value and the supported business strategy. This factor also reveals the importance of having a proper alignment between the business and IT choices, because decisions of adoption and the use of enterprise applications in SaaS should be made to obtain business value and serve a defined business strategy. The results in our case show that the business strategy is mainly focused on obtaining a low-cost advantage by enabling technical capabilities and economies of scale, which is possible through a SaaS ERP (or an MRP) with MRP functionalities, which will allow to improve the production efficiency and lower costs, contributing to those, and if this is integrated with a business intelligence application it will also allow managerial information and decision-making improvements. However, if the organization focuses on achieving marketing differentiation, then the adoption of a CRM in SaaS that affects marketing capabilities is also expected to improve firm sales and boost profitability growth (D. Zahay & Griffin, 2010).

### **5.6.4 Limitations and suggestions for future research**

Regarding limitations and possible future directions, we believe there are several opportunities for further work, starting from the fact that these results are based on respondents from firms of only one southern European country. Other areas of application of this model that could be interesting to make an in-depth analysis of are the application to different regions in Europe and diverse continents. The sample respondents belong mainly to services and information and communications organizations (70%), which is a figure similar to the one found in the Eurozone EU-28 for use of cloud computing services in the

“information and communications” and “professional, scientific, and technical activities” economic areas (Magdalena Kaminska, 2018).

Similar to previous work (Bourgeois, 1980; Gregory G. Dess & Robinson, 1984; Spanos & Lioukas, 2001; Venkatraman & Ramanujam, 1986), the fact that this work is based on subjective measures of performance, capabilities, and strategy, compared with other companies, can be seen as a limitation<sup>1</sup>. We therefore also propose that future work based on this model can be developed for specific industries, with the collection of objective measures of performance and evolving the questionnaire to normalize and make the capabilities and strategies of each respondent company more tangible.

The research was not intended to make a comparison between companies with firm capabilities supported by SaaS EA and similar samples of firms with “traditional” or “on-premise” EA. However, it would be interesting to see future empirical work addressing this comparison to best validate some of our conclusions. Future work can also include questions to clarify the business-IT choices alignment, as in whether a selected competitive strategy or the expected business value to be obtained by the organization influenced the enterprise applications adopted and the chosen deployment model (“on-premise” vs. software-as-a-service).

<sup>1</sup> As noted by one of the reviewers, it might be argued that the subjectivity of the responses regarding the relative comparisons can perhaps be problematic for the conclusions. However, the alternative of collecting quantifiable measures in a multisectoral study in SMEs from developing countries is also very challenging and does not guarantee total accuracy. We also assume that the respondents, by their position in their companies and respective industries, have some sensitivity of their relative position regarding the most direct competitors.

## 5.7. Conclusions

SaaS EA is increasingly adopted by firms, often under the promise of increased benefits. However, there is little academic evidence on the impact on firm performance arising from the use of these applications in this deployment model. This study departs from previous work made by joining RBV and competitive strategy theories in a model to test the impact on strategic firm performance but differentiates by creating a variable that explains intermediate-process level performance, which is considered to be strongly influenced by enterprise applications. The research framework is tested empirically through a survey with a sample of southern European firms using PLS structural modeling. Our model has three constructs: the SaaS EA direct effect construct and two intrinsic mediation constructs (business value and business strategy).

In fact, business value, the intermediate-process level performance variable, introduces a major distinction with most of the research done so far on the value of IT, which has mainly been focused on extrinsic firm performance, usually composed of some items comparable with other companies (e.g., market share or growth of market share), and serves to distinguish the effective impact results created by firm capabilities supported by enterprise applications in SaaS. The results show a significant contribution to IT value literature because the direct effects of the capabilities do not impact firm performance, whether it is market performance or profitability, but results in increased business value, intrinsic to the firm, and stronger business strategy effects, which in turn build up firm performance. The importance of business value as a mediator construct is reinforced, as the indirect effect from firm capabilities in firm performance is stronger than that of a model with business strategy as the single mediator. Another conclusion, in line with previous studies, is the fact that profitability is not significantly affected by firm capabilities, business value, or business strategy, but is

strongly affected by market performance, which means that market leader companies also tend to be more profitable.

## **CHAPTER 6 – Does human talent play a role in the performance of an enterprise using cloud enterprise applications?**

### **6.1. Introduction**

Today's accelerated cycle of innovation in digital technologies is frequently a challenge to enterprises that are looking to obtain the maximum potential in firm performance, due to the importance of the human talent (e.g., skills and competences) available (European Commission, 2019; Hess, Benlian, Matt, & Wiesböck, 2016). Some studies mention that only 15% of enterprises consider that they have enough personnel with the skills necessary to implement digital transformation (Hoberg et al., 2017).

Enterprises today rely more and more on applications for supply chain management (SCM), human resources management (HRM), or customer relationship management (CRM). These programs are expected to enhance their capabilities (Kohli & Grover, 2008), provide competitive advantage and value (K. C. Chang & Seow, 2016; Shang & Seddon, 2002), and they are increasingly available in cloud computing (Swinehart et al., 2017). Cloud computing allows a higher frequency in the cycle of functionality updates than traditional on-premise deployments, which, in the case of enterprises that want to take full advantage of those capabilities as they become available, is a factor requiring more excellent user proficiency. Also, the decisions to adopt and use these new technologies are taken under some degree of strategic alignment between the business and technology areas (Chan & Reich, 2007; Gerow, Grover, Thatcher, & Roth, 2014). Thereby, influencing the IT-based business value (ITBBV) created (Gerow, Thatcher, & Grover, 2015; Tallon, Kraemer, & Gurbaxani, 2000), but, no matter how good the strategy is, once again the question arises of how relevant is the human talent available in order to generate higher or lesser value.

This research considers two variables for human talent - the "users IT-proficiency," representing the capability that any user in the organization has to take more or less advantage of the IT applications available, and the existing "human capital," which is the human resources mix of attributes such as attitude, commitment, experience (Z. Wang, Wang, & Liang, 2014). Also, including skills such as technical, business, and firm-specific knowledge (e.g., understanding of the culture and routines of the organization) (Ravichandran & Lertwongsatien, 2005). IT-proficiency is frequently seen as part of the generic IT capabilities of an organization (Ordanini & Rubera, 2010; Tarafdar & Gordon, 2007). It is mostly associated with IT department users, not the organization's IT users in general, save for some rare exceptions (Pavlou & El Sawy, 2006; N. Wang, Liang, Zhong, Xue, & Xiao, 2012), which makes it a human talent variable we want to analyze regarding the influence in the generation of competitive performance, in enterprises that use cloud enterprise applications (CEA). Also, in ITBBV research, human capital has been mostly associated with the specific IT human resources (A. S. Bharadwaj, 2000) or considered concerning the degree of an organization's IT usage (L. M. Hitt & Brynjolfsson, 1997). In this study, we are mainly interested in evaluating how the existing global level of human capital in an organization influences the performance generated, and we, therefore, drew into the human capital theory (Becker, 1962).

Two of the variables which are often considered to explain the creation of ITBBV are 1) firm capabilities enhanced by IT (Gerow et al., 2014; Kohli & Grover, 2008), and 2) "business-IT strategic alignment." Regarding firm capabilities enhanced by IT, and the subsequent impact in firm performance, this has been frequently addressed with the dynamic capabilities (DC) theory. The DC concept seems particularly adequate when we have enterprises using CEA, that allows automatic access to functionalities updated periodically, that enable the

development of the capabilities that can provide an improved customer-centric competitive approach, whether we are speaking of the development of new products, revamped business processes or new business models (Melville et al., 2004; D. J. Teece, 2014). In large enterprises, "business-IT strategic alignment" is also essential, as it should precede the technology choices to provide increased competitive performance (A. Bharadwaj, Sambamurthy, & Zmud, 1999; Chen et al., 2014). So, motivated by these issues, we want to answer the following research question: *Does human talent play a role in the performance of an enterprise using cloud enterprise applications?*

To do this, we built a theoretical model, grounded in dynamic capabilities and human capital theories that was empirically tested in 256 large companies in North America, which is the continent with higher cloud computing usage maturity (Laurence Goasduff, 2019), with the purpose to clarify the contingency role of human talent variables - "users IT-proficiency" and "human capital" - in competitive performance impact for enterprises using CEA. This work departs from an ontological realism point of view, and positivist epistemology, with the following, expected contributions, to academics and practitioners, in the areas of post-adoption usage of cloud enterprises applications: first, the creation of a new theoretical model with a multidisciplinary approach, combining the human resources and the information systems fields, involving the human capital and dynamic capabilities theories to advance the knowledge in the field of cloud computing software. This model allows us to study the role of two moderators - usage IT-proficiency and human capital - on the effects of "capabilities enabled by cloud enterprise applications" on competitive performance. Secondly, we evaluate the impact of strategic business-IT alignment and the dynamic capabilities supported by CEA on competitive performance, and which is the influence of human talent in this process. We expect to improve knowledge in the area of value creation, which has

been previously identified as one necessary to develop more extensive research (Kohli & Grover, 2008). Finally, this research aims to advance the knowledge in the stream of cloud computing business issues, that has been lagging in the development of theoretical models and quantitative methods, according to a recent literature review (Senyo et al., 2017).

Following this section, Section 6.2 presents the theoretical background, preceding the research model and hypotheses in Section 6.3. The research methodology is explained in Section 6.4, and the results in Section 6.5. The last two sections are dedicated to the discussion, contributions, limitations, future work, and concluding remarks.

## **6.2. Literature review and theoretical framework**

### *Dynamic capabilities and firm capabilities enabled by cloud enterprise applications*

Firms have a bundle of resources that, according to the resource-based view (RBV) theory, can impact the firm's competitive advantage and performance (J. Barney, 1991). However, in today's market dynamics this might be ephemeral, and so, an extension of this concept is the capabilities that can create, or modify, or change ordinary capabilities, named as dynamic capabilities (DC) by several authors (Drnevich & Kriauciunas, 2011; Karimi & Walter, 2015), and also considered as antecedents to competitive advantage and performance (D. J. Teece, 2014).

In IT research, enterprise applications support or enhance firm capabilities (Tan, Tan, Wang, & Sedera, 2017). However, one of the differences between CEA and on-premise software is the cycle of innovation, with an increase in the frequency of new functionalities released, that allows to reengineer or improve business processes in the organization, among other capabilities, which makes cloud computing a strong enabler for the increase of dynamic capabilities (Battleson, West, Kim, Ramesh, & Robinson, 2016).

### *Business-IT strategic alignment*

The strategic alignment between business and IT is an object of extensive research since the early nineties (Coltman, Tallon, Sharma, & Queiroz, 2015), with sometimes different conclusions regarding the impact on firm performance. The majority of studies have shown a positive direct impact between those two variables, save for some exceptions that did not, or have shown the existence of intermediate effects among them (Palmer & Markus, 2000; Tallon & Pinsonneault, 2011). This alignment is also part of a more extensive set of firm IT capabilities, considered as enterprise-wide dynamic capabilities (A. Bharadwaj et al., 1999), which is in line with other researchers considerations that strategic alignment is not static but must be continuously adapting and changing (Henderson & Venkatraman, 1993).

### *Human talent and IT-based value*

Human talent in this study is considered to integrate both: a) the most holistic human capital and b) the users' IT-proficiency, that is, the user capabilities to explore IT applications.

#### a. Human capital

Human capital theory (Becker, 1962), is a dimension of intellectual capital (Y. H. Hsu & Fang, 2009; Youndt, Subramaniam, & Snell, 2004), and a resource that integrates attributes such as the competence of employees, knowledge, skills, attitude, commitment, and experience, among others (Z. Wang et al., 2014). Several studies and meta-analyses demonstrate that human capital positively impacts firm performance (Crook, Todd, Combs, Woehr, & Ketchen, 2011; Y. H. Hsu & Fang, 2009; Hurwitz, Lines, Montgomery, & Schmidt, 2002), with practitioners' points of view (Benson-Armer, Otto, & Webster, 2014)

stating also that building both organizational and individual capabilities, through skills enhancement and learning, is essential to build up business performance.

Most of the studies in the economics area analyzed the effects of human capital on firm performance and strategic management, independently from the IT/IS resources and capabilities. However, in the information systems area, some researchers associate human capital with organizational culture, focusing mainly on the IT professional (Wingreen & Blanton, 2018), whereas others established the relationship between human capital and IT usage, showing that generically firms that use more IT also have higher human capital (L. M. Hitt & Brynjolfsson, 1997).

#### b. Users IT-proficiency

An organization's ability to take full advantage of technology, from the human resources perspective, has been mostly assessed based on the personnel that works in the IS management organization. Research on the impact driven by the capabilities of business functional areas, and its users, in particular, to exploit new technologies, is much more scarce, with rare exceptions and in particular contexts, such as the use of specific applications for the development of new products (Pavlou & El Sawy, 2006), that designates "IT leveraging competence" as the effective use of IT functionalities, but focuses mainly from a specific department point of view. In contrast, enterprise systems involve a broader range of business users of an organization.

In the enterprise systems context, there is research on how better an organization can assimilate the capabilities provided by those systems, according to the training that is given to its employees (Liang, Saraf, Hu, & Xue, 2007), but this is in the traditional "on-premise" implementation. In this case, it brought up the possibility that in the immediate post-implementation phase, there may be some productivity or performance loss attributable to

the organization's learning needs (L. M. Hitt, Wu, & Zhou, 2002). However, enterprise systems applications in the cloud have more frequent updates and changes in functionality, that are only useful if there are strong user IT proficiency capabilities, as is the case with some other technologies (e.g., e-learning tools) that emphasize the importance of new user skills (Wu, Tennyson, Hsia, & Liao, 2008). So, the fact that users are working with online applications brings a different context to this study regarding the effects that will result from a greater or lesser IT proficiency, after the immediate post-implementation phase.

### *Competitive performance*

Competitive advantage from one company on other is called competitive performance, which might be demonstrated through a superior performance and market value (Michael E. Porter, 1991), represented through financial indicators like revenue, profits, return on equity, and market share, among others, which some researchers also designate as strategic benefits (Mukhopadhyay & Kekre, 2002). According to researchers in ITBBV (Kohli & Grover, 2008), there is a difference between the intermediate value created and competitive advantage, which can also be measured by the level of profitability created (L. M. Hitt & Brynjolfsson, 1996).

Appendix -Table 1 summarizes this literature review analysis, also presenting the theories used. Through this analysis, and as far as we know, we do not have evidence that in ITBBV research, there has been a theoretical model combining both the dynamic capabilities and the human capital theories, in order to explain how competitive performance might be impacted by the moderating role of human talent variables. In particular, in the context of organizations using enterprise applications in cloud computing, this work has not been done, so we believe

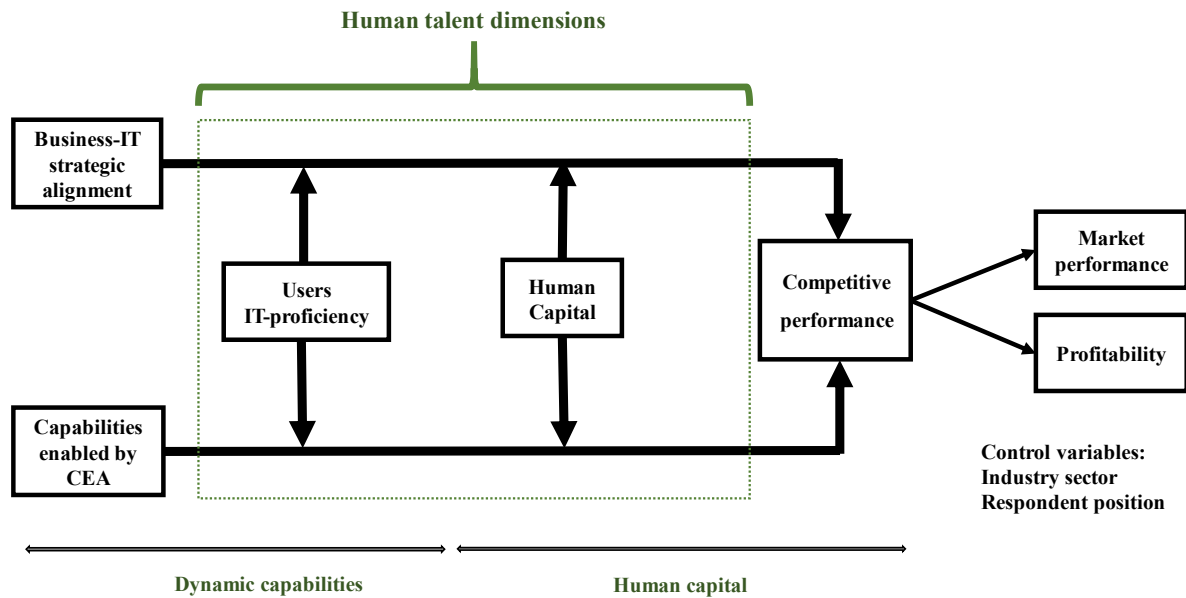
that the theoretical model presented in the next section represents a contribution to this research, together with the answer to the research question.

### **6.3. Research model and hypothesis**

The theory of dynamic capabilities stresses that, in order to maintain competitive advantage, it is essential that over time a company is able to evolve its capabilities according to the changes in its external environment. Cloud enterprise applications are continuously evolving its functionalities, allowing as such to enable the development of those capabilities. At a firm level, dynamic capabilities can also be IT capabilities, according to several authors (A. Bharadwaj et al., 1999; Pavlou & El Sawy, 2006), and among these are the business-IT strategic alignment and the IT usage capability (which we named "users IT-proficiency," this last variable being evaluated as a moderator among the other capabilities. Another moderator, human capital, arises from the human capital theory. With these assumptions in mind, a research model (represented in Figure 6.1) was framed based on the argument that competitive performance can be driven by the level of business-IT strategic alignment, and by the dynamically evolving firm capabilities, which are enhanced by the use of cloud enterprise applications. Competitive performance is a second-order reflective-reflective construct, with market performance and profitability dimensions. We argue that the impact on these is moderated by users' IT proficiency and human capital.

Figure 6.1 presents the theoretical model base of our study, with the hypothesis to be tested, some of which we want to confirm because they were already previously tested, such as the positive impact of "business-IT strategic alignment" and "capabilities enabled by CEA" in competitive performance. Nevertheless, our research is mainly focused on the moderators' "users IT-proficiency" and "human capital" effect on those relationships, hypotheses which

have not been tested before and that are expected to provide significant contributions to this research. The control variables are the industry sector and respondent position.



**Figure 6.1. Research model**

### 6.3.1 Business-IT strategic alignment

Technology choices in an organization should be made in line with the competitive strategy chosen. Furthermore, within these choices, there will also be the deployment model of enterprise applications, i.e., whether it will be in the cloud, "on-premise," or in hybrid mode. In ITBBV research, strategic alignment between business and IT has also been one of the most studied areas from the impact on firm performance, as can be seen from a review of the work done in recent decades (Coltman et al., 2015). Some researchers evidence that larger enterprises tend to have a better alignment due to a better integration of IT into the business objectives (Chan, Sabherwal, & Thatcher, 2006). In the operationalization of the construct business-IT strategic alignment, we took the view of previous researchers (A. Bharadwaj et al., 1999; Chen et al., 2014) which considered this alignment as part of the IT capabilities in

a firm, that comprises the way that senior executives understand the importance of IT to create value, and how strong the level of integration between the planning of the business strategy and IT is. Hence, we posit the following hypothesis to confirm that:

*H1: Business-IT strategic alignment positively affects the competitive performance of the enterprise.*

Furthermore, in the proposed model, it is also interesting to evaluate how the effects of this variable in performance are affected by human talent contingencies.

### *6.3.2 The effect of capabilities enabled by CEA on competitive performance*

In open economies such as in North America, market dynamics are very high in general, and so the ability to respond quickly to those can be enhanced by IT resources which are more flexible and frequently updated, with improved functionalities such as those provided with cloud computing (Narasimhan & Nichols, 2011). The capabilities enabled by CEA, in this study, are what some authors refer to as external capabilities (Neirotti & Raguseo, 2017), comprising new product development processes, market adaptation, focalization (e.g., marketing one-to-one), electronic-based transactions with suppliers and customers, supported by applications such as CRM, SCM, and e-commerce. Capabilities enabled by CEA is a reflective first-order construct, operationalized through items that reflect how enterprise applications available in the cloud enable increased development of products and services, process reengineering, improvements in customer relationships, and change the way of doing business (Drnevich & Kriauciunas, 2011). Moreover, these capabilities should improve competitive performance, which posits a hypothesis we want to verify, but also in which way it is affected by human talent contingencies:

*H2: Capabilities enabled by CEA positively affect the competitive performance of the enterprise.*

In this research, with the purpose of clarifying the contingency role of "users IT-proficiency" and "human capital" on competitive performance, we are not evaluating the direct effects of those two variables, but only the moderation effects, which we describe in the following subsection.

### *6.3.3 The moderation effects of users IT-proficiency and human capital*

Some researchers found that human resource and organizational factors can have a stronger influence on firm performance than strategy (Hansen & Wernerfelt, 1989), and influence the level of competitive advantage to be obtained from IT (Powell & Dent-Micallef, 1997). So, studying the moderation effects of human talent means that we want to understand how powerful human capital and users IT-proficiency are, in conditioning the effects of two variables that have been frequently known to impact firm performance positively.

Among the core IT capabilities, business-IT strategic alignment plays a fundamental role (Feeny & Willcocks, 1998) and, among the levers to successfully implement this, strengthening the relationship between IT personnel and users should allow to develop, work together and help the users in order to make them understand and exploit all the potential of IT. As such, we believe that users who are more IT proficient will also benefit the impact of that alignment in the performance of the company involved. Users' IT-proficiency is based on the knowledge and ability that the business users in the organization have to use and explore the IT applications at their disposal and their perception of value that can be provided, with items previously tested by Wang et al. (2012). Following this rationale, we posit:

*H3: Users IT-proficiency positively moderates the impact of business-IT strategic alignment on competitive performance*

We also posit that the capabilities enabled by CEA are more likely to have a positive influence on competitive performance when users are knowledgeable in exploiting the business applications at their disposal. In fact, if users are more skilled and capable of using the full set of functionalities made available by their enterprise applications, it might be possible that an immediate exploitation of these increases its company customer-centricity. This core value can be achieved through the development of new products and services, revamped business processes, or new business models (D. J. Teece, 2014), and as such, improves the levels of efficiency and productivity. Based on this discussion, we propose the following hypothesis:

*H4: Users IT-proficiency positively moderates the impact of the capabilities enabled by CEA on competitive performance*

Human capital represents the knowledge, skills, and experience of employees that can generate new ideas and ways to change processes to be more productive. We operationalize this variable based on the work of Youndt et al. (2004), with five items that assess employees' overall skills, expertise, and creativity. Human resources are also an essential part of strategy implementation (Pfeffer, 1994), and previous studies in other specific and different contexts have already considered its role as a moderator between strategy and firm performance (M. A. Hitt, Bierman, Shimizu, & Kochhar, 2001). So, we posit the following:

*H5: Human capital positively moderates the impact of business-IT strategic alignment on competitive performance*

Strong human capital is also an important driver to generate and implement new ideas for an increased customer-centric approach that provides a competitive advantage to the

organization. If an organization with higher human capital provides its employees with more capabilities to develop new products or services, streamlined processes, and new ways to establish and nurture relationships with the organization's customers, then their competitive performance would be positively impacted. So, with these ideas in mind, we posit the following:

*H6: Human capital positively moderates the impact of the capabilities enabled by CEA on competitive performance*

#### **6.4. Research method**

##### *6.4.1 Measurement model*

To measure and validate the proposed research model, we designed and built a questionnaire, choosing the appropriate items to operationalize the constructs as listed in Appendix - Table 2, in order to be submitted as a web-based survey. Among the measurement items listed in that Table, competitive performance is configured as a second-order reflective-reflective type of construct, composed of first-order constructs market performance and profitability, and all other constructs are configured as a first-order reflective type (Ringle et al., 2012). Due to the difficulty in obtaining reliable direct measures of competitive performance, and because often the respondents do not want to share figures related to profitability and return on assets or investments, we used an indirect approach, as in other studies (Gregory G Dess, 1987; Powell, 1992; Powell & Dent-Micallef, 1997; Spanos & Lioukas, 2001), asking respondents to make a comparative evaluation in the last three years, towards their most direct competitors, on those items.

The theoretical model evaluation was made on a sample of large companies (more than 250 employees and annual turnover above 50 Million Euros) that have already adopted and are

using CEA. These companies are located in North America (the United States and Canada). The model was measured through the previously mentioned instrument based on items already used in previous literature, where the several constructs are reflective (J. Hair et al., 2017) and using a seven-point range scale, as indicated in the referred Appendix – Table 2. In order to qualify the responses better, there are a set of initial questions regarding the industry sector, annual turnover, number of employees, the function of the respondent and respective department. A pilot study was also made, before the application of the primary survey, with responses from 26 executives of firms using CEA, which is not part of the main survey but allowed us to check the validity and scales' reliability and fine-tune the survey and its wording (in English), before being submitted through SAP data collection software.

#### *6.4.2 Data collection*

SAP submitted the survey to its customer base in North America (Canada and the United States of America) that uses their cloud enterprise applications (e.g., SAP Ariba, Hybris, SuccessFactors, and others such as business intelligence analytics), addressing the functional areas of CRM (customer relationship management) sales and service, HRM (human resources management), SCM (supply chain management), procurement, and e-commerce. This customer base represents a sample of 610 enterprises, from industries as diverse as services, commerce, health, information and communications, manufacturing, and construction.

The distribution of the survey included an explanation of the research scope and relevance. Also, in order to minimize the subjectivity of responses regarding relative comparisons, and obtain the best content validity, it included a statement that it should be filled out by the individuals who are most familiar with the firm's usage and policies regarding CEA. So, the

target contacts included selected board and management positions, such as senior managers, directors, general managers, or other executive officers inside the companies. Data was collected between September and October 2018, with a total of 256 valid responses, representing 42% of the original sample. In order to test the existence or not of common method bias in the response data, a post hoc assessment with Harman's single factor test (Podsakoff et al., 2003) was performed, resulting in a maximum variance explained by a single factor, of 26.4%, for all factors, which is well below of the 50% threshold value.

The sample profile is in Table 6.1 below, with more than one third in the manufacturing industry, followed by nearly 19% from commerce, 17% from construction, 13% from information and communication, and less than 10% each for the health sector and services. From this table, it is also possible to note that respondents are all from management and business decision-maker positions, which, for the objective of our study seems to prove an adequate qualitative basis of the data collected.

<b>Industry</b>			<b>Position of respondent</b>		
Services	20	7.8 %	Board Member	30	11.7 %
Health	22	8.6 %	Director	100	39.1 %
Commerce	48	18.8 %	Manager	126	49.3 %
Construction	43	16.8 %			
Manufacturing	89	34.8 %			
Information and communications	34	13.3 %			
<b>Business Unit</b>			<b>Size of Enterprise</b>		
Board of Directors	30	11.7 %	Nb. of employees >= 250	256	100%
Finance	38	14.8 %	Annual turnover >= 50 M\$US	256	100%
Human Resources	27	10.5 %			
Sales, Marketing, Export	31	12.1 %			
Customer Service or Maintenance	5	2.0 %	<b>Country of Origin</b>		
Production or Manufacturing	20	7.8 %	Canada	107	41.8%
Logistics	20	7.8 %	USA	149	58.2%
Other	85	33.2 %			

**Table 6.1 - Sample characteristics**

## 6.5. Results

In this study the research model was assessed using PLS-SEM (partial least squares – structural equation modeling) with SmartPLS 3.0 (Ringle, Wende, & Becker, 2015), to examine the validity of the constructs and items, and test the research hypotheses (J. F. Hair et al., 2011).

### 6.5.1 Measurement model assessment

An evaluation of the initial model was made, and some items were excluded due to low outer loadings, such as DC2 and DC4, from "Capabilities enabled by CEA." The results for composite reliability (CR) and average variance extracted (AVE) greater than 0.5 for all constructs demonstrate an adequate convergent validity as the latent variable explains more than half of the variance of its indicators (Fornell & Larcker, 1981; J. F. Hair et al., 2012), as shown in Table 6.2. The composite reliability (CR) of all constructs is above 0.7, showing that the reliability of scales for all constructs is acceptable (Henseler et al., 2009; Straub, 1989).

Constructs	Mean	SD	CR	AVE	BZITSA	CECEA	UITP	HC	MP	PF	CP
<b>Business-IT strategic alignment (BZITSA)</b>	6.123	0.698	0.945	0.895	<b>0.946</b>						
<b>Capabilities enabled by CEA (CECEA)</b>	4.881	1.422	0.784	0.646	-0.024	<b>0.803</b>					
<b>Users IT-proficiency (UITP)</b>	5.296	0.758	0.938	0.752	0.363	0.220	<b>0.867</b>				
<b>Human Capital (HC)</b>	5.428	0.702	0.864	0.566	0.228	0.106	0.209	<b>0.753</b>			
<b>Market performance (MP)</b>	5.372	0.727	0.932	0.775	0.462	0.456	0.361	0.274	<b>0.880</b>		
<b>Profitability (PF)</b>	5.037	0.806	0.878	0.783	0.350	0.380	0.285	0.499	0.623	<b>0.885</b>	
<b>Competitive performance (CP)</b>	5.260	0.753	0.917	0.649	0.468	0.473	0.369	0.382	0.960	0.817	<b>0.805</b>

Note: Standard deviation (SD)

**Table 6.2 - Factor correlation coefficients and AVE square roots (bold diagonals)**

The model has good discriminant validity, based on the following analysis: i) Table 6.2 shows that the square root of the AVE of each latent construct is higher than the correlation between that construct with all other constructs (Fornell & Larcker, 1981; Henseler et al.,

2009), except for competitive performance (CP), which was to be expected since it corresponds to a second-order construct of market performance (MP) and profitability (PF); ii) Table 6.3, shows that all loadings (in bold) are higher than the respective cross-loadings (except ST3 and PF3, which were eliminated due to lower loadings), and iii) the heterotrait-monotrait ratio (HTMT) has a maximum value of 0.79 that meets the criterion of being less than the more conservative figure of 0.85 (Henseler, J.; Ringle, C. M.; Sarstedt, 2015).

Cross loadings	Business-IT strategic alignment (BZITSA)	Capabilities enabled by CEA (CECEA)	Users IT-proficiency (UITP)	Human Capital (HC)	Market performance (MP)	Profitability (PF)
ST1	<b>0.968</b>	0.042	0.359	0.212	0.511	0.384
ST2	<b>0.923</b>	-0.122	0.324	0.225	0.330	0.254
DC1	-0.295	<b>0.768</b>	0.147	0.153	0.332	0.294
DC3	0.217	<b>0.837</b>	0.204	0.028	0.398	0.316
UC1	0.254	0.063	<b>0.748</b>	0.144	0.118	0.121
UC2	0.445	0.098	<b>0.871</b>	0.146	0.329	0.292
UC3	0.331	0.277	<b>0.959</b>	0.210	0.354	0.265
UC4	0.294	0.281	<b>0.945</b>	0.200	0.357	0.267
UC5	0.229	0.162	<b>0.794</b>	0.196	0.307	0.228
HC1	0.446	0.031	0.317	<b>0.858</b>	0.268	0.332
HC2	0.287	0.053	0.221	<b>0.907</b>	0.263	0.369
HC3	0.149	0.054	0.299	<b>0.619</b>	0.061	0.429
HC4	0.025	0.061	0.159	<b>0.609</b>	0.030	0.348
HC5	-0.089	0.177	-0.110	<b>0.720</b>	0.272	0.438
MP1	0.411	0.396	0.260	0.347	<b>0.852</b>	0.674
MP2	0.443	0.395	0.329	0.101	<b>0.931</b>	0.563
MP3	0.517	0.407	0.408	0.265	<b>0.836</b>	0.491
MP4	0.258	0.412	0.279	0.259	<b>0.899</b>	0.453
PF1	0.420	0.366	0.246	0.460	0.616	<b>0.905</b>
PF2	0.180	0.302	0.260	0.423	0.475	<b>0.864</b>

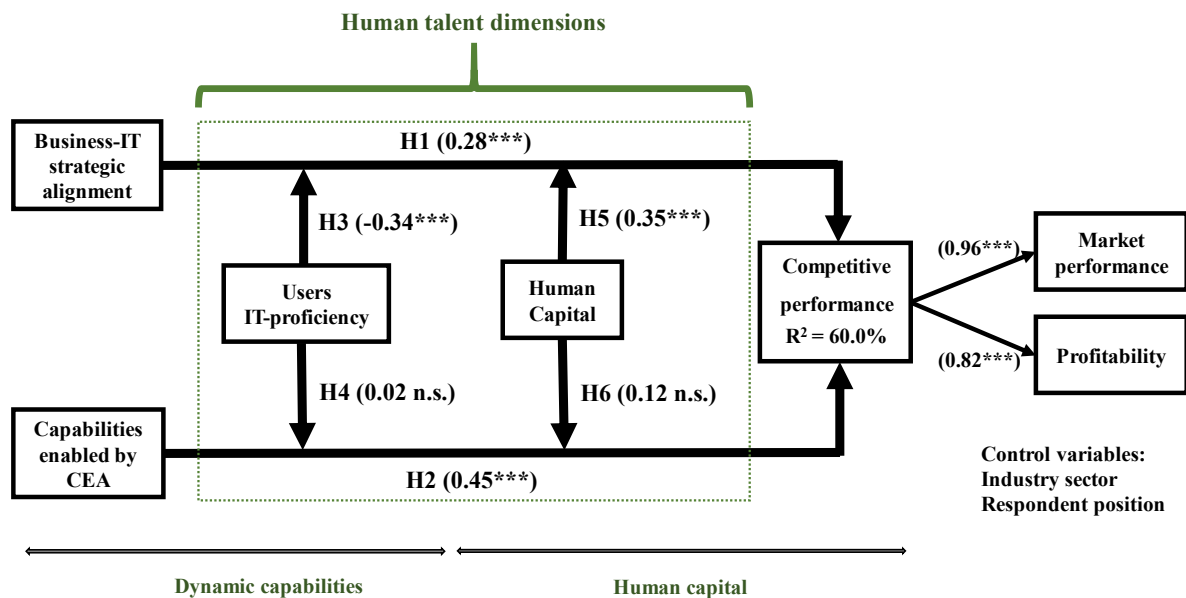
**Table 6.3 – Loadings and cross-loadings**

### 6.5.2 Structural model

An assessment of the structural model is performed through an analysis of potential multicollinearity of the constructs, where the variance inflation factor (VIF) evidenced values between 1.195 to 2.162, so below the threshold of 5 (J. Hair et al., 2017), which means there

are no significant correlations among variables. In Figure 6.2, it is possible to see path coefficients and statistically significant levels of the research model for each hypothesis and parameter estimates. A bootstrapping procedure with the resampling method of 5,000 iterations (J. F. Hair et al., 2011; Henseler et al., 2009; Temme & Kreis, 2006) was used with PLS-SEM.

The results confirm that this model explains 60 % of the variation of competitive performance and that this is affected by "business-IT strategic alignment" and "capabilities enabled by CEA," with statistical significance ( $\hat{\beta}=0.28$ ,  $p<0.01$ , and  $\hat{\beta}=0.45$ ,  $p<0.01$ , respectively), thereby confirming H1 and H2. The analysis also demonstrates that "human talent" dimensions do not moderate the relation between the "capabilities enabled by CEA" and competitive performance, as its relations are not statistically significant, and so, both H4 and H6 are not confirmed.

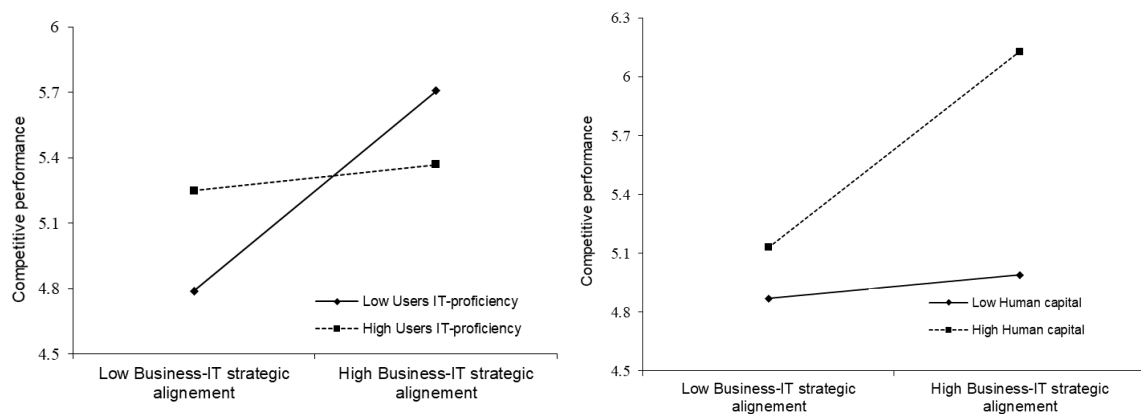


**Figure 6.2. Research model results**

However, the human talent variables induce interesting moderation results between "business-IT strategic alignment" and "competitive performance."

Contrary to the postulated, "users IT-proficiency" has inverse effects on moderation, contradicting the initial hypothesis formulated (H3), with statistical significance ( $\hat{\beta} = -0.34$ ,  $p < 0.01$ ). On the other hand, "human capital" has a positive moderating effect, confirming H5, with statistical significance ( $\hat{\beta} = 0.35$ ,  $p < 0.01$ ).

In figure 6.3, the graphical representation of the statistically significant moderators makes it evident that in an environment with low users IT-proficiency, the business-IT strategic alignment is crucial to explain higher levels of competitive performance (Figure 6.3a). On the other hand, in organizations that have high levels of human capital, the better the business-IT strategic alignment is, the higher the impact on competitive performance..



**Figure 6.3 (a). Interaction plot of business-IT strategic alignment and users IT-proficiency;**  
**(b). Interaction plot of business-IT strategic alignment and human capital**

## 6.6. Discussion and implications

The empirical results based on the presented theoretical model demonstrated three significant findings. First, we found that *competitive performance is directly and positively affected by the business-IT strategic alignment (H1) and by the firm capabilities enabled by CEA (H2),*

which is in line with previous research (Kearns & Sabherwal, 2006; Luftman, Lyytinen, & Zvi, 2015) that have shown the positive impact of alignment on firm performance, and the positive impact created by capabilities enabled by CEA (Drnevich & Kriauciunas, 2011). However, contrary to the above-reported studies as discussed, we assessed competitive performance by using a second-order construct. In comparison to first-order with correlated factors, a second-order factor provides a more parsimonious and interpretable model that can validate the key factors for an enterprise using cloud enterprise applications as an aggregation of the firm competitive performance across each of the dimensions: market performance and profitability. Logically each of these two dimensions is independent of each other, cannot be interchanged, and has been considered essential for further work in IS research (Petter, Straub, & Rai, 2007; Pedro Ruivo, Johansson, Sarker, & Oliveira, 2020). This first finding provides the empirical support that our model is reasonable to suggest that the human talent dimensions (users IT-proficiency (H3, H4) and human capital (H5, H6)) play a contingency role in the creation of a firm's competitive performance.

Second, we found that *human talent dimensions have a contingency role between business-IT strategic alignment and competitive performance*. Our results show that, if on the one hand, the higher the human capital level is (H5), also the higher the business-IT strategic alignment impact is (H1) on the firm competitive performance. On the other hand, the effect of business-IT strategic alignment is more significant when the users' IT-proficiency level is lower (H3).

The fact that users IT-proficiency has a statistically significant adverse effect (H3) means that when an organization has a lower than average strategic alignment between business and IT, a user's base that is more proficient in the usage and exploitation of the IT applications at

their disposal will allow achieving higher levels of competitive performance, and this is an important finding from this research.

Nonetheless, the confirmation that human capital has a statistically significant and positive moderating role in business-IT strategic alignment (H5) means that firms with higher human capital to perform daily business operations will significantly improve the competitive performance in organizations with strong strategic alignment (Figure 3b). This finding is in line with previous research that defines the need to have adequate human skills and capabilities to execute and support the strategies defined (Venkatraman, Henderson, & Oldach, 1993). In this research, the respondents considered their firm's employees as the best in the industry (HC2), and so they are an essential factor in moderating the clarity of vision regarding how IT contributes to business value (ST1), which in turn is reflected in the growth of sales revenue (MP2) (Powell & Dent-Micallef, 1997; Spanos & Lioukas, 2001).

Third, we found that *human talent dimensions do not have a contingency role between capabilities enabled by CEA and competitive performance*. Our results show that users' IT-proficiency (H4) and human capital (H6) do not play any role between a firm's capabilities enabled by CEA and its impact on the firm's competitive performance, as those hypotheses (H4 and H6) are not confirmed. Eventually, these results may be caused by the context, as the organizations addressed in this study are mostly large enterprises in two countries with a high (above average) human capital index (Lim et al., 2018), and the dataset of these companies also reveals that the average values of human capital and users IT proficiency variables are in the upper quartile of the scale [5.428 and 5.296, respectively] (Table 6.2). As per our results, the sample is composed of at least 70% of enterprises in usually higher labor-intensive % activity sectors (manufacturing, construction, and commerce) (Table 6.1). So, with the usage of CEA, we might be led to conclude that capabilities related with sales,

marketing and offer innovation, which enables a company to address either new customer segments or differentiated offerings with more significant margins and revenues, are probably more influenced by the degree of automation provided to the processes necessary to fulfill those customer's needs, than by the quality of human resources execution.

Generally, in the context of large companies that use CEA and, most likely, in companies with some maturity, the contradictory results about the role of human talent, ends up giving us interesting findings. In fact, it takes time, and it is not an easy task to build up substantial human capital in a company (Kim, 2014) from a diverse mix of human resources. On the other hand, it is easier to build up and keep their IT usage skills updated, which are more and more relevant in a scenario of continuous availability of new functionalities of those applications, due to their cloud deployment model.

#### *6.6.1 Theoretical implications*

This study attempts to contribute to the ITBBV research in the area of cloud computing, regarding the mechanisms that influence the creation of competitive performance, represented as a second-order factor to provide a more parsimonious and interpretable model (Petter et al., 2007; Pedro Ruivo et al., 2020). This model focused on understanding the role of human talent, represented through the variable's human capital and users IT-proficiency, with the theoretical lens of a framework based on the dynamic capabilities theory, which is the most adequate to cloud technologies that enable continuously added functionalities, together with the human capital theory. Regarding the theoretical contributions, we highlight: **(i)** in a field of research on the value of IT, where human capital has been fundamentally analyzed from the point of view of specific human resources in the areas of IT, or in widespread technological contexts or qualitative studies (A. S. Bharadwaj, 2000; Chatfield & Bjørn-Andersen, 1997), this is the first work, as far as we know, that expands the existing

knowledge regarding value creation mechanisms in organizations using enterprise applications in cloud computing, considering the contribution of human capital; **(ii)** Empirical research of human capital and competitive performance has been mainly focused from an organizational side point of view, and only some studies also consider dynamic capabilities, but mainly as mediators (Inkinen, 2015). So, in the context of large enterprises using CEA, empirical research to explain what is the contingency/contributing role of human capital on the competitive performance combining dynamic capabilities and human capital theories, is also another contribution of this study.; **(iii)** this theoretical model opens several research opportunities, as it can be applied for empirical testing, to less-favorable contexts than the one tested in this study, which did not confirm all the hypotheses, probably due to a context that has higher levels of human talent available, and where the majority of the sample is related to labor-intensive industries.

#### *6.6.2 Practitioner implications*

The practical implications of the results from this research are mainly two: first, it shows that it is essential that enterprises invest in increasing the skills of their workforce so it can take full advantage of the software at its disposal, especially when it has new features available in ever shorter cycles. Strategic alignment between business and IT is sometimes a process that takes time to build, whereas increased users' IT-proficiency can be achieved in less time, through training, and should be part of a competences building culture which also contributes in part to the human capital of the organization. The second implication of this research is the demonstration that, at least in large organizations, cloud enterprise applications that increase process automation and enable customer-centric capabilities will result in increased revenue and profitability, regardless of the existing human talent in the organization.

Both human capital and business-IT strategic alignment take time to build, involving frequent changes in the organization and culture, which are also sometimes potentially painful. So, from a human resources point of view, in order to achieve a digitalized organization, it is advisable to invest in the IT literacy and readiness of the workforce to use technologies that are continuously evolving, such as cloud enterprise applications (CEA).

### *6.6.3 Limitations and suggestions for future research*

Because the scope of this work was limited to large enterprises, in two developed countries on the North American continent, we believe there is room to extend the usage of the proposed theoretical model in other contexts. It would be interesting to expose the model to a multidimensional sample of organizations empirically and in other regions such as in developing countries. One other suggestion for improvement would be to use objective measures of performance, in order to confirm subjectivity, which is also common in other works (Bourgeois, 1980; Gregory G. Dess & Robinson, 1984; Spanos & Lioukas, 2001; Venkatraman & Ramanujam, 1986), and could enhance the precision of the results. A further possibility for future work is to evaluate if there are potential differences in comparing companies using CEA and companies using "on-premise" enterprise applications.

## **6.7. Conclusions**

The growth of cloud computing technology has been an opportunity for enterprises to find new ways of improving their performance, but it also brings new challenges in the human resources field. So, does human talent play a role in the performance of an enterprise using cloud enterprise applications? The answer is: partially. Our study finds that whereas the role of human talent between business-IT strategic alignment and competitive performance is a critical contingency role, it is not the case between a firm's capabilities enabled by CEA and

competitive performance. Our research also highlights that human talent affects competitive performance differently, whether as a result of the variable human capital or the variable users' IT-proficiency. First, it is interesting to see that human capital is more important in supporting the implementation of business strategies that are aligned with IT investments than in reinforcing the dynamic capabilities that those technologies enable to develop, in order to create a greater competitive performance.

Nevertheless, the fact that, on the other hand, users IT-proficiency can overcome a lower alignment between business and IT, is an interesting conclusion as it means that enterprises should establish medium/long term programs that will allow them to develop an organizational culture of greater strategic alignment between their divisions and with good human capital. However, in the short term, they should forecast investments in increasing technology usage skills, through training programs, especially when using technologies that have shorter innovation cycles.

## CHAPTER 7 – CONCLUSIONS

### 7.1. Main findings

This work started with an initial literature review synthesis, addressing the research of software-as-a-service ITBBV. Despite its simplicity, it allowed evidencing how scarce was the research work in this area and some overview of the potential benefits and theoretical frameworks already used in similar contexts. So, it was necessary to go further, and the following qualitative work tried to understand which were the main factors and perceived benefits that lead organizations to adopt and use SaaS EA, from an organizations' point of view as opposed to the vision of the software vendors. This was done through a qualitative methodology based in case-studies of organizations that already used SaaS EA for some time. At the time, it helped us to confirm that *the first motivation that leads adoption of SaaS EA is the expected financial benefits*, and also that there was strong relevance given to trust in the partner of the software vendor, which jointly supports each of these organizations, and less relevance to aspects such as security, which at the time of research was always overvalued by software vendors.

However, following up this work, and starting to go deeper into the core of our research, which are the next stages of the lifecycle of Pastor (1999), it was necessary to clarify if in a company that uses SaaS EA, the impact on firm performance is a direct influence of the firm's capabilities or if it is a consequence of the operational benefits (business value) generated. This led us to the first empirical work, with a theoretical model based on the resource-based-view and competitive strategy theories. And there were some interesting findings, such as the fact that: *a. firm capabilities supported by SaaS EA do not directly impact firm performance, but operational benefits (business value) and these affect one of the*

*components of firm performance, which is market performance, but not profitability; b. business value is dependent on the chosen business strategy; and c. that both business value and business strategy mediate the relationship between the firm capabilities supported by SaaS EA and market performance.* It was also interesting to have as a finding that *profitability is only dependent on market performance* – neither firm capabilities, business strategy, or business value have a direct impact.

The following empirical work with a theoretical model based on the dynamic capabilities and human capital theories allowed us to explore the role of human capital and users IT-proficiency, in the performance impact of enterprises that use SaaS EA. This work brought us also some interesting findings, namely that: a. *the enablement of SaaS EA on dynamic firm capabilities is more impactful in firm performance than business-IT alignment, and those capabilities are not influenced by the contingency role of human talent*, probably because we studied a context of organizations with a high level of human capital index; and b. *human talent dimensions have a contingency role between business-IT alignment and firm performance*, but each of the dimensions has opposite effects. Higher human capital improves firm performance when there is a higher level of alignment, but when there is a low level of strategic alignment, it will be essential to have higher users IT-proficiency to improve performance.

Summarizing, and answering the initial research question (RQ1) of this dissertation, as stated in Chapter 1, we conclude that the capabilities supported by SaaS EA impact positively firm performance, but this can be a consequence of intermediate process-level performance, which we designate as business value, due to the nature of the applications under study. Regarding the answer to the second research question (RQ2) of this dissertation, as stated in chapter 1, the financial benefits, or level of firm performance created, is dependent on the

organizational maturity of factors such as business strategy and its alignment with IT, human capital, and users IT-proficiency.

## **7.2. Contributions**

The work illustrated through the four articles presented between Chapter 3 and 6 of this dissertation, as part of the research path described in the beginning made some academic and practical contributions, which are summarized here.

From the *academic point of view*, this research presents some significant contributions, in which we highlight: *First*, the fact that, from the methodologies point of view, the usage of qualitative and quantitative methods gives more substantial outcomes. Sometimes, there are aspects that organizations value as happened in the qualitative work of case studies, which could be neglected by the single application of quantitative methods, and this emphasizes the importance of using mixed methods. These allowed to identify factors of adoption of SaaS EA, and its importance, which until now had not been considered. However, it is important to note that, in this research, financial benefits are still the first motivation factor for the adoption of these type of business solutions in SaaS. *Secondly*, it is important to demonstrate that the quantitative work, through the application of questionnaires that mimic the theoretical frameworks, and the subsequent analysis with PLS-SEM, show robust results regarding the impact in firm performance. *Third*, it demonstrates, in the context of SaaS EA studies in the ITBBV area, the importance of distinguishing between the operational benefits (business value) and strategic benefits (firm performance), since the primary can be a potent mediator vis-à-vis the second, and also the mediation role of the business strategy, which makes the inclusion of these variables recommended for future studies. *Fourth*, the fact that expanding the research beyond the information systems area and exploiting the interaction

with the organizational and human resources theories should become more common. As the cycles of technology evolution and adoption become shorter, these complementarities should be taken more and more in consideration, such as we did in the latest research, demonstrating the influential role of human talent, composed of human capital and users IT-proficiency, in the creation of the firm performance. *Finally*, and to the best of our knowledge, this dissertation presents the first empirical work that combines a theoretical framework based in the RBV, DC, competitive strategy and human capital theories, demonstrating the importance of having a good alignment of the technological choices with the organization's strategy, in order to maximize both operational and strategic performance, and the quality of human resources and skills to take the best advantage of those choices.

From the *practitioner's point of view*, this dissertation gave some interesting contributions, from which we can highlight the following: *first*, that there are other factors for adoption of SaaS EA valued by the customers, on top of the financial aspects, such as the importance of trust in the implementation partners, other than in the software vendor, because this type of applications might need some level of customization and support. *Secondly*, both quantitative studies showed that firms that invest in SaaS EA could expect that their firm capabilities impact strategic performance, at the level of financial performance and profitability. However, this is often caused by the improvements to internal operations, greater innovation capabilities and customer-centric focus, resulting from the agility given by the SaaS EA at the internal level and intermediate-level processes, that creates operational benefits (business value). *Third*, in order to have the improvements and greater capabilities referred above, it is essential to have a proper alignment between the business and IT choices, so that the SaaS EA chosen serves a defined business strategy to obtain business value. And *finally*, that on top of an excellent business-IT alignment, organizations which invest in high levels of human

capital and users IT-proficiency will also have a positive contribution to firm performance. However, in the case of lower levels of alignment, users IT-proficiency will be very important, which means that upskilling the workforce in IT-proficiency is always fundamental.

### **7.3. Limitations and future work**

Among the limitations of the works done in the context of this research, we first identify the ones related to geographical location and organizations size, as they were applied in limited regions, two of them locally, in one European (small) country, the other in North America, so the conclusions have to be taken in caution regarding any extensions of the geographic context. On the other hand, also the fact that each of them was restricted regarding the size of the organizations sampled. So, it would be interesting to apply the models in broader regional contexts and greater diversity of organizations size, to see how the conclusions compare or differentiate.

The dissertation is based on a multi-methodological approach, with two qualitative and two quantitative works. However, when possible, we believe that each work might get more level of confidence in the results if we use a mixed approach, using, for instance, a Delphi approach to identify and rank the most relevant factors to evaluate as some other work did (Akkermans, Bogerd, Yücesan, & Van Wassenhove, 2003; Pedro Ruivo et al., 2020) and case studies, which will help to fine-tune the model and questionnaire to apply in data collection. In these quantitative works, one of the limitations is the fact that the organizations surveyed gave us subjective measures of performance, which is also very common in other works, as we mentioned previously. However, if it's possible to use also more objective measures, this might improve the reliability of the results and conclusions.

Regarding recommendations for future work, departing from this dissertation, where we studied the impact of software-as-a-service in the context of business applications, which support mainly business processes, we see several possibilities to be exploited from this point on, such as: *first*, to evaluate the potential differences of impact between organizations using SaaS EA “versus” on-premise enterprise applications; *second*, to extend the usage of the theoretical framework in research for specific industries; and, *third*, because software-as-a-service is also contributing to extend the functionalities possible with the dissemination of big data, such as big data analytics (Côrte-Real et al., 2016) and machine learning (Reis, Ruivo, Oliveira, & Faroleiro, 2020), it would be interesting to evaluate how the application of the proposed model in the context of capabilities supported by those other technologies could reflect value and performance impact to the organizations that have already adopted them.

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## APPENDIX

**Table 1 - Literature review theories usage**

Author(s)	Published in	Base theories	Main Contribution	Data & Context
(A. Bharadwaj et al., 1999)	Management Science	Dynamic capabilities (DC)	Conceptualizes IT capability as a multidimensional construct	Conceptual model; 1,120 medium to large U.S. firms
(Battleson et al., 2016)	European Journal of Information Systems	DC	Demonstrates how organizations respond to market dynamism by investing and using cloud computing	Qualitative multiple case-study; 14 organizations with a high level of maturity in adoption of cloud computing
(J. Barney, 1991)	Journal of Management	Resource-based view (RBV)	Examines the role of idiosyncratic, immobile firm resources in the creation of sustained competitive advantages	Theoretical model
(Becker, 1962)	The Journal of Political Economy	Human capital (HC)	Development of a theory of investment in human capital, with an emphasis on empirical implications	Theoretical development
(Coltman et al., 2015)	Journal of Information Technology	Contingency theory (CT)	Review on 25 years of research about strategic IT alignment	Literature review on strategic IT alignment
(Crook et al., 2011)	Journal of Applied Psychology	RBV	Improve understanding about how human capital shapes performance	Meta-analysis; 66 studies of the human capital–firm performance relationship and investigation of 3 moderators suggested by resource-based theory.
(Drnevich & Kriauciunas, 2011)	Strategic Management Journal	Dynamic capabilities (DC)	Understand conditions under which ordinary and dynamic capabilities contribute to firm performance	Conceptual model; 192 Chilean companies surveyed
(Y. H. Hsu & Fang, 2009)	Technological Forecasting & Social Change	Intellectual capital (IC); Organizational learning	Explain how intellectual capital and organizational learning capability affect new product development performance	Conceptual model; 123 integrated circuit design Taiwanese companies
(Hurwitz et al., 2002)	Journal of Intellectual Capital	-	Establishes the relationship between intangible factors, among which is human capital, and firm performance	Correlation models; Towers Perrin (aka Towers Watson) and other databases
(Karimi & Walter, 2015)	Journal of Management Information Systems	Disruptive innovation; DC	Empirical study examining the role of first-order dynamic capabilities in response to digital disruption (in newspaper industry context)	Conceptual model; 136 US newspapers
(L. M. Hitt & Brynjolfsson, 1997)	Journal of Management Information Systems	HC	Evaluates the impact of IT in the organizational architecture of a firm	Conceptual model; 275 large firms
(L. M. Hitt et al., 2002)	Journal of Management Information Systems	-	Studies impact of ERP adoption on firm performance based on data from a large variety of firms.	Secondary data from publicly traded firms

Author(s)	Published in	Base theories	Main Contribution	Data & Context
(Liang et al., 2007)	MIS Quarterly	Institutional theory	Studies the contribution to IT innovation assimilation theory, in the context of enterprise systems post-implementation	Conceptual model; 77 firms in China
(Palmer & Markus, 2000)	Information Systems Research	CT; strategic alignment theory	Discussion around the existence of higher benefits, or not, among choosing between higher IT strategic alignment, or more and higher levels of technology	Conceptual model; 80 specialty retailers
(Pavlou & El Sawy, 2006)	Information Systems Research	DC; absorptive capacity	Studies the impact of IT competences in the area of new product development (NPD)	Conceptual model; empirical data collected from 180 NPD managers
(Michael E. Porter, 1991)	Strategic Management Journal	Competitive advantage; RBV	Advances the competitive strategy theory, based on a discussion of the impact of dynamics in resource-based-view	Theory development
(Tallon & Pinsonneault, 2011)	MIS Quarterly	-	Extends the literature regarding the relationship between the strategic alignment of IT and agility	Conceptual model; 241 large firms
(Tan et al., 2017)	Information & Management	-	Proposal for a model of how firms achieve operational agility	Qualitative multiple case-study; 14 organizations in India
(D. J. Teece, 2014)	The Academy of Management Perspectives	DC; links with strategic management and economic theories	Explains how dynamic capabilities and strategy work together to shape competitive advantage at the level of the enterprise	Theoretical model
(Wingreen & Blanton, 2018)	Information Systems Journal	Concourse Theory; Social Cognitive Theory	Proposes and develops an integrated, coherent system of theory, methods, and measurement to support the investigation of the IT professionals Person–Organization fit with IT training and development	Q-methodology; 298 IT professionals.
(Venkatraman et al., 1993)	European Management Journal	Strategic alignment model	Analytical and administrative approaches to conceptualize and manage the emerging nexus between strategic management and information technology	Theoretical model
(Wu et al., 2008)	Computers in Human Behaviour	Hypercube of Innovation theory; DC	Development of a model to evaluate e-learning impact on the capabilities of learners, instructors, and education institutions	Exploratory research to develop a systemic model; comparative analysis of extant literature (secondary data)
(Youndt et al., 2004)	Journal of Management Studies	IC; HC	Empirical study examining how investments in human resource management (HRM), information technology (IT), and research and development (R&D) influence intellectual capital and financial returns	Regression models; 208 public organizations with an average of 4019 full-time employees, and mean annual revenues of \$771 million
(Z. Wang et al., 2014)	Management Decision	IC; HC; knowledge-sharing	Empirical study examining the impact of knowledge sharing on firm performance, with intellectual capital constructs, among which human capital (HC), as mediators	Conceptual model; 228 Chinese high-technology firms surveyed

**Table 2 - Survey questionnaire**

Construct	Items	Measures	Sources	
<b>Competitive Performance</b> (2 <sup>nd</sup> order Reflective-Reflective construct)	Please indicate for each of the following, your firm's performance relative to competition for the last three years (1: much below the average. . .7: much above the average)		(Powell & Dent-Micallef, 1997; Spanos & Lioukas, 2001)	
	Market Position	MP1		Sales Volume/Revenue
		MP2		Growth of Sales Volume/Revenue
		MP3		Market Share
		MP4		Growth on Market Share
	Profitability	PF1		Profit margin
PF2		Return on own capital		
PF3		Net profits (*)		
<b>Capabilities enabled by cloud enterprise applications</b> (1 <sup>st</sup> order Reflective construct)	Please indicate the degree to which, in the last three years, the use of cloud enterprise applications helped to: (1: the firm never uses cloud enterprise applications to this...7: the firm frequently uses cloud enterprise applications to this)		(Drnevich & Kriauciunas, 2011; Neirotti & Raguseo, 2017)	
		DC1		Develop new products/services
		DC2		Implement new business processes (*)
		DC3		Create new customer relationships
		DC4		Change the ways of doing business (*)
<b>Business-IT strategic alignment</b> (1 <sup>st</sup> order Reflective construct)	Please rate your firm's positioning on each item, relative to other firms in your industry (1: "poorer than most"... 7: "exceptionally well")		(A. Bharadwaj et al., 1999; Chen et al., 2014)	
		ST1		Clarity of vision regarding how IT contributes to business value
		ST2		Integration of strategic business planning and IT planning
		ST3		Management's ability to understand the value of IT investments (*)
<b>Human Capital</b> (1 <sup>st</sup> order Reflective construct)	Please state how do you assess the overall skills and expertise level of your organization employees (1: "strongly disagree"... 5: "strongly agree")		(Youndt et al., 2004)	
		HC1		Our employees are highly skilled
		HC2		Our employees are widely considered the best in our industry
		HC3		Our employees are creative and bright
		HC4		Our employees are experts in their particular jobs and functions
HC5		Our employees develop new ideas and knowledge		
<b>Users IT-proficiency</b> (1 <sup>st</sup> order Reflective construct)	Please state how effective is the usage of information technologies by your business staff (1: "strongly disagree"... 7: "strongly agree")		(N. Wang et al., 2012)	
		UC1		Our business staff knows little about the functionality of our IT applications. (reverse coded)
		UC2		Our business staff does not know when to use IT applications. (reverse coded)
		UC3		Our business staff is skilful in using IT applications effectively.
		UC4		Our business staff knows little about how to use IT applications. (reverse coded)
UC5		Our business staff understands the value of IT applications.		

**Notes:** (\*) The items "Net profits," "Implement new business processes," "Change the ways of doing business," and "Management's ability to understand the value of IT investments" were deleted due to weaknesses in the respective discriminant validity analysis and therefore were not included as measurement components of the "Capabilities enabled by CEA" construct in this study.





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PhD