Understanding the Perceptions of Brazilian Executives of Software Firms about Critical Success Factors

Compreendendo as Percepções de Executivos Brasileiros de Empresas de Software sobre os Fatores Críticos de Sucesso

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Abstract

Our objective is to understand the perceptions of the Brazilian executives about the CSFs to achieve superior organizational performance. We defined a qualitative and quantitative design composed of an Analytic Hierarchy Process and Content Analysis methods. We identified that Marketing and Innovation are the most important CSFs and the interviewed executives suggested three additional factors, i.e., Investment in Startups, Digital Marketing and National Culture, that were not previously identified in the literature review. We highlight the availability of a new framework of CSFs based on different sources and in-depth interviews with Information Technology (IT) executives. Our study also contributes to an overview of CSFs in the Brazilian IT industry.

Keywords: critical success factors; software industry; performance.

Resumo

Este trabalho objetiva compreender as percepções de executivos brasileiros sobre os FCS para atingir um desempenho organizacional superior. O estudo estabeleceu uma metodologia quali-quantitativa composta pela Análise Hierárquica de Processos (AHP) e Análise de Conteúdo. Os resultados identificaram Marketing e Inovação como os FCS mais importantes de acordo com os executivos e emergiram da pesquisa três novos FCS os quais não são identificados na revisão da literatura, a saber: Investimento em Startups, Marketing Digital e Cultura Nacional. Destaca-se a proposta de um novo framework de FCS baseado em múltiplas fontes e entrevistas em profundidade com executivos em Tecnologia da Informação (TI). O estudo também contribui com uma perspectiva original sobre os FCSs no setor de TI.

Palavras-chave: *fatores críticos de sucesso; indústria de software; desempenho.*

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1   INTRODUCTION

The competitive advantage has attracted attention from practitioners and academics during the past three decades. In this scenario, competitiveness becomes dependent on the suitability of the strategy regarding the competition. The dynamics of the competition produce a set of essential factors that must be closely tracked to ensure the organization's survival and success (Turban *et al.*, 2008). These factors are called Critical Success Factors (CSFs) and are defined as a "limited number of areas that, if they are satisfactory, ensure successful competitive performance for the organization" (Rockart, 1979). CSF is a management term for an element necessary for an organization or project to achieve its mission. Hence, CSFs may be defined as "those few things that must go well to ensure success for a manager or an organization, and, therefore, they represent those managerial or enterprise areas that must be given special and continual attention to bring about high performance" (Boynton and Zmud, 1984). Managers implicitly know and consider these factors when they set goals and direct operational activities and tasks that are important to achieve goals. When these crucial activities are made explicit, they provide a point of reference for the entire organization in terms of a purpose and vision (Caralli *et al.*, 2004).

CSFs may vary between different industries and, even within the same industry, as the competitive forces change (Hitt *et al.*, 2012). Indeed, the software development industry CSFs seemed to be a special one. Firstly, the software industry is affected by high competition due to its knowledge-intensive and technology-driven nature, as well as due to the shortened product and technology life cycles (Romijn and Albaladejo, 2002). Secondly, it is essential in this industry that a company achieves the product-market fit before its competitors to bring timely value to its customers (Sauvola *et al.*, 2015). These digital possibilities need to come together with skilled employees and executives to reveal their transformative power (Nadkarni and Prügl, 2021).

The Information Technology (IT) market, including hardware, software, services, and IT export, has a relevant role in the Brazilian economy. This issue has been pointed out as even more essential given the advance of digital transformation, which has fundamentally altered consumers' expectations and behaviors (Verhoef *et al.*, 2021). According to the Brazilian Association of Software Companies (ABES) report, the software and services market moved US$ 9.6 billion in 2006 (ABES, 2017). In 2016, ten years later, the IT market saw an increase of almost three times, moving up to US$ 39.6 billion, representing 2.1% of the Brazilian GDP and 1.9% of total IT investments worldwide. Of this value, US$ 8.475 billion came from the software market. More specifically worldwide, the IT sector grew by 5.0%, while Brazil (10th position in the world IT ranking) reached 10.5% and US$ 44.3 billion, considering the markets of software, services, hardware, and the segment of exports (ABES, 2020). However, the empirical studies addressing CSFs in the software industry generally tackle two independent perspectives: on the one hand, they focus on the practical aspects of software projects (Chow and Cao, 2008; Dal Forno and Muller, 2017; Nasir and Sahibuddin, 2011; Remus and Wiener, 2009), and on the other hand, they focus on the management and IT business activities (Bañales and Rodenes, 2007). Instead of selecting one of these approaches, this article takes the challenge of pursuing a broad view by integrating Non-IT and IT-related activities in an overall set of CSFs.

It is particularly relevant to clarify these crucial elements of success since it may assist the firms in getting closer to accomplishing their missions (Caralli *et al.*, 2004). This assumption justifies the relevance of this study since it may help other software organizations that are developing their competitive strategies. However, there is a lack of studies concerned to study and understand CSFs from the software firms' perspective through the lens of top executives. Therefore, our research question is: what are the perceptions of the Brazilian executives about the CSFs to achieve superior organizational performance? Our main objective derives from this question and aims to understand the perceptions of the Brazilian executives about the CSFs to achieve superior organizational performance.

2   RESEARCH DESIGN

Our study is characterized as exploratory-descriptive with a qualitative and quantitative design. The population for this research is composed of top IT executives currently working in the Brazilian software industry. As one can see in Figure 1, our methodological plan was organized into five major stages. Initially, we accomplished a comprehensive literature review based on academic, executive, and government sources to develop a theoretical framework that derives an initial set of success factors. After consolidating our initial framework, the data were collected through in-depth interviews with top executives of three software development firms to determine, from their perspective, i) what the perceptions about the proposed framework are and ii) which specific factors are more critical to reaching superior organizational performance. Instead of a survey, we adopted a semi-structured interview schedule, encouraging extensive and descriptive answers. Alongside the interview, the AHP was accomplished to quantitatively and descriptively define a hierarchical list of the most relevant CSFs according to the executives. Next, the interview content was also analyzed through the Content Analysis (CA) method aiming to inductively and qualitatively comprehend the narratives about the phenomena. Finally, we developed a validated and summarized version of our framework based on the insights achieved throughout the previous stages. Each one of these stages is properly detailed in the following subsections.
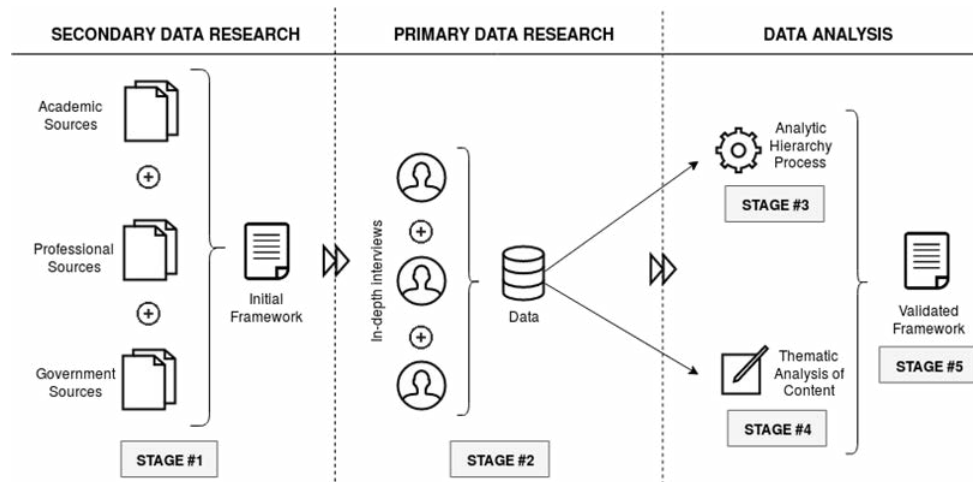
Figure 1. Methodological plan.
Source: the authors.

2.1   Stage 1: Framework Development

At this first stage, we focused on the theoretical framework development that summarizes the drivers usually highlighted as successful in the software development industry. In addition to the scientific literature, we considered the most recent reports written by the Brazilian Association of Software Companies (ABES) about the scenario and trends in the Brazilian software sector (ABES, 2019) in 2018 as well as the widely recognized IT Trends Study provided by the Society for Information Management (SIM) (Kappelman *et al.*, 2017). Moreover, we also analyzed the government report on the Brazilian software market provided by the 'Conselho de Altos Estudos e Avaliação Tecnológica da Câmara dos Deputados' (CAEAT) which is a Brazilian advisory board concerned with the strategic formulation of IT public policies and laws (Gadelha *et al.*, 2007). We consider this wide coverage and combination of academic sources to IT public policies and executive reports as one of the contributions of our work. As far as we notice, most of the literature reviews up to date did not explore different sources as this study.

The first stage of our methodology focused on deriving a priori a set of factors that have a relevant role in strategic planning since managers generally recognize their CSFs when they see or hear them, even though they may be unable to clearly articulate them or appreciate their importance (Caralli *et al.*, 2004). Thus, our goal in this step is to synthesize a primary and overall set of representative factors able to be evaluated by the executives. After a careful literature analysis, we evaluated several studies' references to develop our framework. The motivation and relevance of each of them are properly discussed in the next paragraphs. Our initial inspiration was Thompson Jr and Strickland III's (2000) study. The authors provided a list of 22 generic CSFs related to different categories: technology, production, distribution, commercialization, and organizational capability.

To complement these initial CSFs, we analyzed two other studies specifically focused on business and Non-IT activities. The first is an empirical-exploratory study and investigates the relationship between CSFs and strategic business orientation in the Mexican software industry (Bañales and Rodenes, 2007). First, they conducted a literature review in which they recognized 5 CSFs namely government support, quality, human resources, marketing, and innovation. Then, they surveyed 68 companies regarding the five CFSs required to consolidate the Mexican software market. The answers were classified in a final list of 26 CSFs. The top five CFSs most mentioned were human resources, government support, product quality, financial access, and partnerships. The second study investigates the factors that influence software outsourcing clients in the selection of offshore software outsourcing vendors (Khan *et al.*, 2010). They have performed questionnaire surveys with 53 experts from 20 different countries in the US, UK, and Canada. They asked the participants to rank each CSF on a five-point scale to determine the perceived importance of each one. The results suggest that out of 22 CSFs identified, 18 factors have greater than 50% of occurrences, whereas the remaining 4 have greater than 30% occurrences in the positive list. The top 5 significant CSFs addressed by the participants are cost-saving, skilled human resources, facilities, quality of products/services, and efficient outsourcing relationship management. These conclusions seemed relevant since Brazilian software development companies are often ranked as one of the most mature outsourcing destinations (Melo *et al.*, 2016).

There is a comprehensive classification of studies specifically targeted at CSFs in software project management. Since the following studies are based on literature reviews, we were able to take a snowball view of practical CSFs usually discussed by the research community. Kasayu *et al.* (2017) explored the AHP method aiming to evaluate 36 CSFs of software development projects in Indonesia. Their top 10 CSFs were mainly related to project management issues, such as scope, time, and quality management. Chow & Cao (2008) identified and compiled a preliminary list of CSFs in agile software projects based on existing literature, which was later submitted to reliability and factor

analyses to consolidate them into a final set of 12 CSFs, such as team environment, customer involvement, project management process, delivery strategy, and project schedule.

Nasir and Sahibuddin (2011) have also conducted a literature review using content and frequency analyses. 26 CSFs were found and classified into people, process, and technical factors. With a percentage of frequency of more than 50%, the five top CSFs to drive towards project success were: clear requirements and specifications, clear objectives and goals, a realistic schedule, effective project management skills, and support from top management. Dal Forno and Muller (2017) mapped a set of 32 CSFs through a literature review and applied an Exploratory Factor Analysis to summarize a smaller number of factors. The identified factors were team characteristics, project planning, development methodology, organizational efforts, user/client attitudes, resource management, project characteristics, and software quality. To the best of our knowledge, this is the only study that deals with the Brazilian software industry context. However, they are strictly focused on the project's success instead of the firm's perspective as it is our principal intent. As one can see, in most of the previous proposals, there is a gap in the literature on IT-related activities. Nevertheless, people have the appropriate balance of technical, business/management, industry, and interpersonal skills are the keys to IT organizations positioning themselves at the heart of corporate strategy (Luftman *et al.*, 2015). This claim seems to be reasonable since a software design process is not purely a technical task, but a complex psycho-socio-technical process (Damasevicius, 2009).

Despite having no ideal software development process, we assume that it would be valuable if specific IT-related activities evaluated by the companies as critical could be shared and assessed between them. This conclusion is motivated by the fact that organizations need to sharpen their software development capabilities and practices as well as enhance collaboration throughout the software life-cycle (Lesser and Ban, 2016). Moreover, people often should adopt a mature software process so that it is more appropriate for the products that they build and the demands of their marketplace.

Thus, we also investigated IT-related CSFs based on two comprehensive executive reports: the SIM IT Trends Study and the ABES report. The SIM IT Trends Study has been conducting extensive surveys since the 1980s aiming to provide a valuable snapshot of the current state of IT and IT leadership (Kappelman *et al.*, 2017). The latest study refers to 2016, in which it obtained 1,213 questionnaire responses by high-ranking IT leaders. Our major insight from this study is the list of "How CIOs Spend Their Time". The complete list is composed of 23 activities categorized into Non-IT related business and organizational activities, IT-related activities, and other job-related and work-related activities. Examples of IT-related activities are IT governance, IT operations management, IT strategy, IT architecture, IT vendor management, and innovation for IT. Regarding the ABES (2019) report, it has been conducted since 2004, and its main objective is to provide a broad view of the Brazilian software market, including possible scenarios and trends. Moreover, we have identified three specific factors to be included in our framework, licensing, segmentation, and technological innovation types. As discussed at the beginning of this section, we also considered the report provided by a Brazilian advisory board responsible for the strategic formulation of IT public policies and laws which discuss the national software market (Gadelha *et al.*, 2007). One of the sections is dedicated to summarizing strategic factors in the software industry, such as government policies and views, regulatory framework, infrastructure, local market, human capital, innovation, enterprises, capital, and support to export. This report was useful to our methodology since it demonstrated the government's intentions to stimulate competitive environments through the design of public policies.

It is worth noting that our framework is based on ten studies from different sources (academic, executive, and government) which also encompass IT and non-IT related activities. To the best of our knowledge, no empirical work has integrated all these aspects up to this date. Hence, we had organized all the collected CFSs in a useful framework that represents the top activities, concerns, strategies, and goals of executive-level management, given that we are focused on the CSFs for organizational performance. Initially, we followed the Content Analysis (CA) method to categorize the factors which are repeated or similar among all the studied publications. Lastly, we conducted a crucial step that was the classification of the final list of factors according to five Thematic Groups:

1) **Innovation**: refers to the application of relevant knowledge to the attainment of market value, which represents the successful implementation of creative ideas within an organization (Zhao *et al.*, 2005). Innovation capability is considered an asset to the firms to provide competitive advantage and implement strategies (Rajapathirana and Hui, 2017).

2) **Operations**: related to the capability to use resources cost-effectively (Miller and Cardinal, 1994). Operational efficiency creates value that cannot be easily substituted (Li *et al.*, 2010). Winter (2003) defines an operational capability as "a high-level routine (or collection of routines) that, together with its implementing input flows, confers upon an organization's management a set of decision options for producing significant outputs of a particular type".

3) **Marketing**: corresponds to the capability of identifying customer needs and understanding consumer preferences (Day, 1994). Firms with superior marketing are better at promoting and selling products and building more effective relationships with customers (Deshpande *et al.*, 1993). Marketing is considered a very important factor for success in a competitive high-tech industry (Dutta *et al.*, 2005), such as software development one.

4) **Organizational**: concerns the capability of a firm to perform a coordinated task, utilizing organizational resources to achieve a particular outcome (O'Regan and Ghobadian, 2004). To establish organizational capability, the core business

must adapt to changing customer and strategic needs by establishing internal structures that influence its members to create organization-specific competencies (Ulrich and Lake, 1991).

5) **External**: outside aspects that can impact a business over which a manager has very little control (Caralli *et al.*, 2004). According to Chen *et al.* (2014), a match between a firm's IT capability and the external environment demands is expected to improve performance, while a mismatch is unfavorable to its competitive position. Therefore, our initial framework is composed of 50 CSFs grouped into 5 major Thematic Groups.

2.2   Stage 2: In-depth Interviews

After consolidating the initial version of our framework, the primary data were collected through in-depth interviews (Boyce and Neale, 2006) with three top executives from three different software development firms in Brazil. We opted for in-depth interviews because, alongside being a primary tool for data collection, in-depth interviewing is useful to clarify or triangulate data obtained through other means (Legard, Keegan, & Ward, 2003). We approached a purposeful sampling to ensure information-rich cases for study in-depth and provided detailed information about the participants, contexts, and settings. Thus, we do not seek a representative sample but rather one suitable for illuminating the phenomenon (Corbin and Strauss, 2014). Three core criteria guided the firm's choice: i) it explores software development as a strategic value, ii) it should have an internally articulated strategic aim of achieving superior organizational performance; and iii) in-depth access had to be possible.

The interview schedule was semi-structured and composed of four principal steps. The first step was concerned with briefly introducing the research to the interviewees and collecting confidentiality and non-disclosure agreements. In the second step, we asked questions focused on the participant's background and firm. The third step was focused on the AHP accomplishment and the discussion about the CSFs by combining structure with flexibility (Ritchie et al., 2013). To proceed with the AHP, we asked the participants the first closed question: "How important is CSF A compared to CSF B in reaching a superior organizational performance?". The answer to this question follows the scale perception introduced by Saaty (2008). Alongside this closed question, we asked a second open-ended question: "What reasons have motivated you to choose this CSF as more important under this Thematic Group?". Finally, the fourth step was designed to clarify possible doubts and collect overall feedback about the interview process. All three interviews were conducted before the Covid-19 lockdown. They occurred separately and were authorized to be audio-recorded and transcribed into text. On average, the interviews lasted 3.8 hours each.

2.3   Stage 3: Analytic Hierarchy Process (AHP)

The AHP is a measurement theory for dealing with quantifiable and intangible criteria, which has emerged as an important approach to multi-criteria decision-making problems of choice and prioritization (Saaty, 2013). We decided on AHP due to its capability of reducing complex decisions to a series of pairwise comparisons, followed by a synthesis of the results; the AHP captures both subjective and objective aspects of a decision (Ho, 2008). AHP has been successfully applied in several fields, such as IT Management (Mota *et al.*, 2012). Moreover, AHP has also proven to be feasible for identifying CSFs (Garg *et al.*, 2012).

2.4   Stage 4: Content Analysis

Content Analysis (CA) is one of the classical qualitative procedures for analyzing textual material (Bauer and Gaskell, 2000). This method is based on the assumption that both the documents' content and context: themes are identified, and the researcher focuses on how the theme is treated as well as the frequency of its occurrence (Ritchie *et al.*, 2013). Indeed, we opted for CA to complement the AHP for its inductive capability to enable the emergence of categories from the data and to reveal structures we have not recognized in our literature review. Regarding the development procedure, we have based our CA trajectory following Bardin (1979). We moved towards the elaboration of an interpretive synthesis of the phenomenon enhanced by considering the wide meanings that translate the logic behind the material (Minayo *et al.*, 2009). Given the identified codings, we could accomplish the data analysis through inferential and interpretative meanings.

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3   RESULTS AND ANALYSIS

In this section, we initially characterize the interviewees by presenting their background information. Then, we analyze the results by AHP and Content Analysis (CA) methods.

3.1   Subjects Characterization

The three participants in our study were Executive 1, Executive 2, and Executive 3 (we replaced their names for confidentiality reasons). They are the founders and top executives of their respective software companies. The subjects of our investigation demonstrated to fit the representative criteria previously defined, that is, top executives currently working in the Brazilian software industry. All of them have shown to be experienced in the software industry. On average, their experience level accounts for more than 23 years. From a different perspective, Firm 1 represents one of the largest IT companies in Brazil. Firm 1 was founded in 1996 and currently has branches in other two other capital cities in Brazil, the United States, and Portugal. Moreover, Firm 1 has different quality certifications such as CMMI SVC, CMMI, and MPS.BR and ISO 9001, as well as it was several times acknowledged as one of the best firms to work in Brazil according to the Great Place to Work ®. Differently, both executives 2 and 3 have a core product. While the first works with an application development tool, the second develops an Enterprise Resource Planning (ERP) system. Executive 2 presents software companies with their market niche, while Executive 3 claims their product is customizable to the client's needs and, therefore, does not have a niche.

3.2   AHP Model Synthesis

After finishing the AHP, we may initially analyze the overall priority for each CSF; that is, priorities that consider not only the executive's preference of CSFs for each Thematic Group but also the fact that each group has a different weight. The overall priority weights for each CSF according to each respondent are in Table 1. We included a fourth column on the right side of the table representing the respective average priority value. To highlight key observations, we distinguish the highest values (in bold) from the lowest ones (underscored). Although we have focused our analysis on these terms, we consider it insightful to perceive the inter-relation between the values reached by other factors that compose each Thematic Group. Moreover, in the next section, we triangulated the results which are presented above with the ones obtained through the CA method.

Table 1

Overall priority weights for each CSF

Thematic Groups	Critical Success Factors	Overall Priority Weights			
		Exec. 1	Exec. 2	Exec. 3	Avg.
Innovation	1) Scientific and technical research	<u>0.1145</u>	<u>0.0271</u>	**0.0392**	0.0603
	2) Industry-university linkage	<u>0.1145</u>	0.0766	0.0188	0.0700
	3) Innovation capability	**0.2840**	**0.0874**	0.0350	**0.1355**
	4) Innovation for IT	0.0277	0.0357	<u>0.0140</u>	<u>0.0258</u>
Operations	5) Maturity model certification	0.0153	<u>0.0033</u>	0.0034	0.0073
	6) Proper management of knowledge areas	**0.0278**	0.0087	0.0030	0.0132
	7) Project characteristics	0.0212	0.0094	0.0063	0.0123
	8) Clear and realistic specifications	0.0142	**0.0176**	0.0040	0.0119
	9) Organization's track record of successful projects	0.0142	0.0049	0.0028	0.0073
	10) Appropriate dev. processes/methodologies	0.0252	0.0108	0.0058	**0.0139**
	11) Effective change management and flexibility to development process	0.0138	0.0125	0.0062	0.0108
	12) Product/Service delivery strategy	0.0245	0.0131	0.0021	0.0132
	13) Knowing the needs of internal IT customers	0.0135	0.0136	**0.0093**	0.0121
	14) IT operations/facilities management and supporting tools	0.0135	0.0059	<u>0.0012</u>	0.0069
	15) QA of product/services and processes improvement	0.0135	0.0124	0.0060	0.0106
	16) Cost-saving activities	0.0232	0.0069	0.0034	0.0112
	17) Expertise in design and technology	0.0135	0.0100	0.0056	0.0097
	18) End-user training	<u>0.0075</u>	0.0041	0.0036	<u>0.0051</u>
	19) Outsourcing and nearshore management	0.0232	0.0047	0.0021	0.0100

Table 1

Overall priority weights for each CSF (continuation)

Thematic Groups	Critical Success Factors	Overall Priority Weights			
		Exec. 1	Exec. 2	Exec. 3	Avg.
Marketing	20) Efficient sales force and negotiation skills	**0.0338**	0.0605	**0.2071**	**0.1005**
	21) After-sales commitment	**0.0338**	0.0422	0.1089	0.0616
	22) Product-market strategy	0.0159	0.0407	0.0451	0.0339
	23) Licensing models	<u>0.0025</u>	0.0294	0.1250	0.0523
	24) Knowledge of the client's language, culture and needs	0.0156	0.0627	0.0555	0.0446
	25) Relationship with customers	0.0119	**0.0694**	0.0964	0.0592
	26) Image creation and attractive advertisements	0.0042	0.0197	0.0166	0.0135
	27) Internationalization strategy	0.0030	<u>0.0191</u>	<u>0.0081</u>	<u>0.0101</u>
Organizational	28) HR development and talent management	**0.0050**	0.0105	0.0049	0.0068
	29) Team capability	**0.0050**	0.0172	0.0127	0.0116
	30) Organizational culture and environment	**0.0050**	0.0221	0.0043	0.0105
	31) Organization strategy	**0.0050**	0.0154	0.0053	0.0086
	32) Organization structure	0.0025	0.0079	0.0033	0.0046
	33) Managing organizational change	0.0015	0.0088	0.0030	0.0044
	34) IT governance and strategy	0.0015	0.0189	0.0034	0.0079
	35) Resource management	0.0024	0.0103	0.0071	0.0066
	36) Effective communication, feedback and knowledge management	0.0046	0.0151	0.0049	0.0082
	37) Ability to respond quickly to changing market conditions	0.0023	0.0167	0.0179	0.0123
	38) Good leadership and top management commitment	0.0044	**0.0241**	0.0141	0.0142
	39) Professional networking management	0.0023	0.0066	0.0104	0.0064
	40) Customer involvement	0.0023	0.0175	**0.0182**	0.0127
	41) Support to free software	<u>0.0007</u>	<u>0.0063</u>	<u>0.0012</u>	<u>0.0027</u>
External	42) Political stability	**0.0064**	0.0169	0.0064	0.0099
	43) Anti-piracy actions and IT public policies	<u>0.0013</u>	<u>0.0048</u>	<u>0.0006</u>	<u>0.0022</u>
	44) Financial access	0.0013	<u>0.0175</u>	0.0040	0.0076
	45) Government support	0.0044	**0.0197**	0.0015	0.0085
	46) Good performance and commitment by vendors	0.0025	0.0085	0.0019	0.0043
	47) User/customer attitudes	0.0025	0.0062	0.0063	0.0050
	48) IT infrastructure	0.0014	0.0064	**0.0163**	0.0080
	49) Local market size	0.0050	0.0072	0.0052	0.0058
	50) Competitiveness	0.0050	0.0070	0.0118	0.0079

After accomplishing the individual analysis of the CSFs, we proceeded to a discussion about the priority weights reached by each Thematic Group to identify the ones considered relevant. Table 2 presents the priority weights of each Thematic Group by considering the evaluation of all the participants in the Thematic Groups instead of the CSFs.

It sheds light on a relevant perspective about different strategies adopted by the executives depending on their companies' life cycles. While Executive 1 represents a well-consolidated firm that needs to innovate to stay competitive, Executives 2 and 3 have decided to get more exposure to their companies by Marketing and, consequently, increase the customer base. On average terms, Marketing (0.3757) was the Thematic Group with the highest value followed by Innovation (0.2917), Operations (0.1557), Organization (0.1176), and External (0.0594), respectively. As one can see, there was a mutual consensus among all participants that External poses as the less important Thematic Group.

Table 2

Overall priority weights for each Thematic Group.

Thematic Groups	Priority Weights				Ranking
	Executive 1	Executive 2	Executive 3	Average	
Innovation	**0.5407**	0.2268	0.1076	0.2917	2nd
Operations	0.2641	0.1380	0.0649	0.1557	3rd
Marketing	0.1209	**0.3437**	**0.6626**	**0.3757**	1st
Organizational	0.0446	0.1974	0.1107	0.1176	5th
External	0.0298	0.0942	0.0541	0.0594	4th

Source: the authors.

3.3   Content Analysis Inferences and Interpretation

The following Content Analysis was divided into Thematic Groups, where we discuss each of the core meanings that emerged from thvai e themes (CSFs) during the interviews.

3.3.1   Innovation

The discussion about Innovation has evoked speeches related to their relevance to business decisions as well as the role and relationship with universities. In addition, we observed a consensus among the interviewees about the relevance of Innovation as a Thematic Group. As depicted in Figure 2, three themes and their respective meanings, summarized by coding, compose the Innovation Thematic Group.
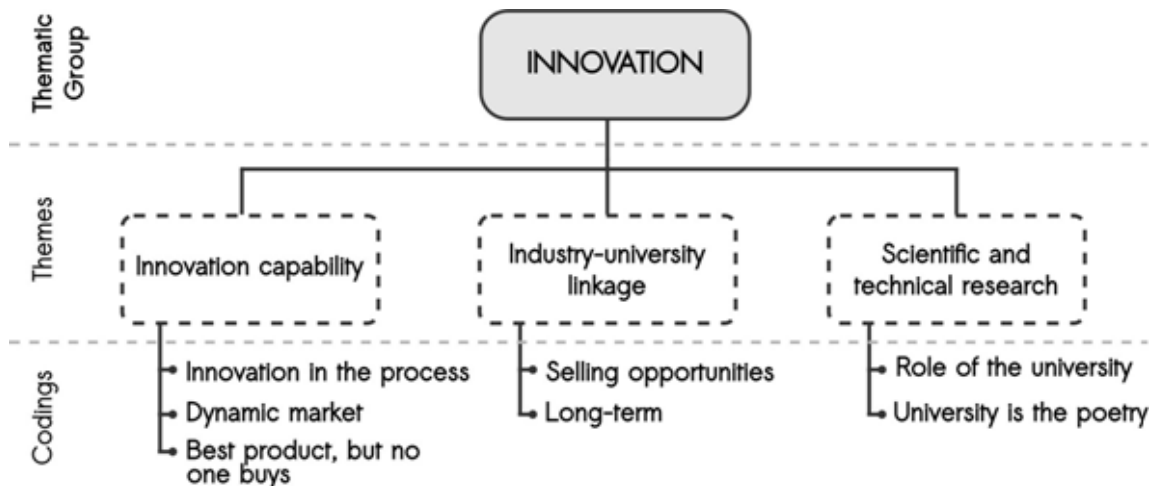
Figure 2. Content Analysis: Innovation.
Source: the authors.

For Innovation, Executive 1 and Executive 2 clarified their importance to reach superior organizational performance. Executive 1 commented on the relevance of innovating in the process, instead of only in the technical tasks, as the following context unit exemplifies: "It is more important to innovate in my process, the way that I listen to my client, the way that I can quickly recruit, that I can better interview him, that I can be more assertive in hiring, than, for example, in the scientific and technical part" (Executive 1). Executive 2 has also mentioned the dynamic aspect of the market, especially the technological one. He underlined the challenge of constantly reinventing itself to keep strong in the market, including the different ways of innovation, as the interviewee mentioned: "it is useless to have the best product, but no one buys it". Regarding the relationship with the university, Executive 2 emphasized its role as a source of opportunities for further sales. He implied that "there are a lot of things that we may take from the university and sell". He also mentioned the long-term spectrum of the research that is currently happening.

3.3.2   Operations

As one can see in Figure 3, most of the discussions about the Operations were related to technical aspects that address the processes or the projects that need to be aligned to aid in understanding what the client wants. For the Innovation capability, Executive 1 and Executive 2 clarified their importance to reach superior organizational

performance. Executive 1 commented on the relevance of innovating in the process, instead of only in the technical tasks, as the following context can be depicted below:
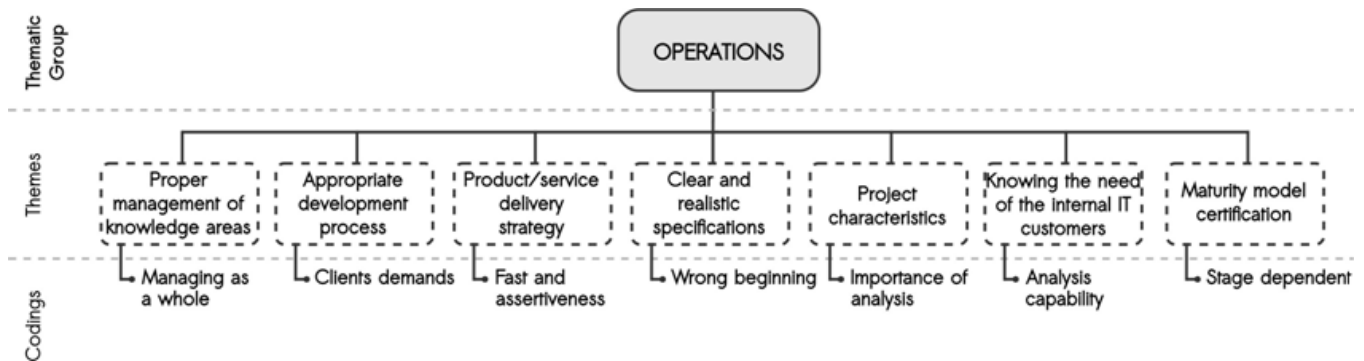

Figure 3. Content Analysis: Operations.

Source: the authors.

Executive 1 related the importance of proper management, appropriate development process, and product/ service delivery. This perception is significant since it demonstrates an integrated view encompassing the different stages of a project lifecycle. He added: "The management part is fundamental. When I refer to management, I mean management as a whole". He also emphasized the importance of a well-defined development process as sometimes the client has a process you must adjust, and there are other scenarios in which you provide a methodology. Under this aspect, he elucidated that the delivery strategy is very close to the capability of how fast and assertive he may be in understanding the client's needs. In addition, Executives 2 and 3 have demonstrated concerns about the necessity of clear specifications and characteristics of a project, including knowing the needs of internal IT customers to assist in their work. Executive 2, for instance, declared: "If this part is not very clear, what the client wants and how it will be done and everything else (...) there is a high chance of the project starting in the wrong way" (Executive 2).

3.3.3 Marketing

Overall, the core meanings that emerged from the narratives about Marketing factors were related to speeches addressing the impact on sales and the good imperative relationship with customers. Figure 4 summarizes the meanings and their respective themes.
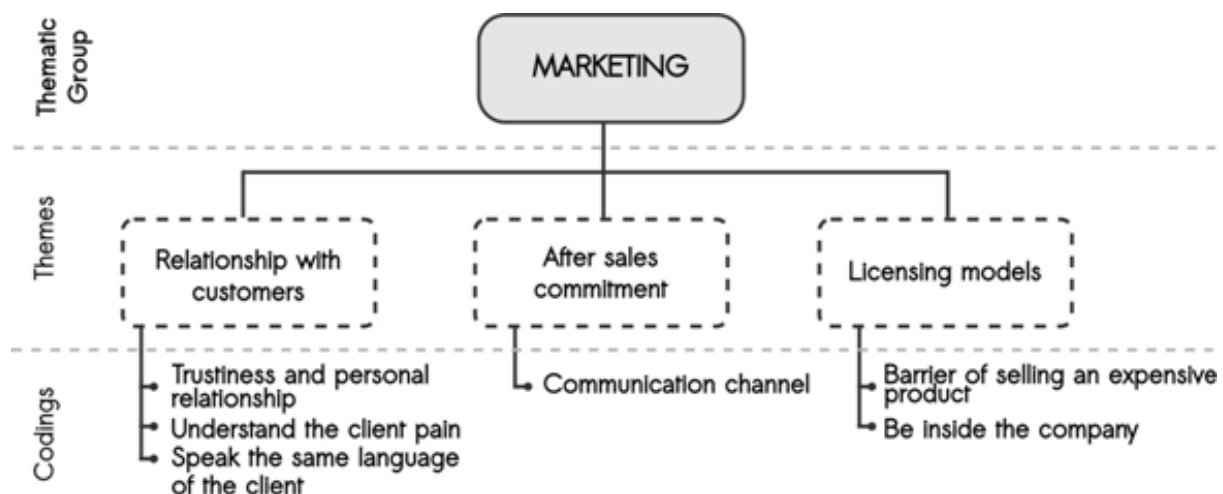

Figure 4. Content Analysis: Marketing.

Source: the authors.

According to Executive 3, Marketing is preponderant to the companies and leads the customer's decisions. However, he also discerned that in scenarios under economic crisis, customer decisions tend to be cost-oriented. In a critical commentary, he stated: "You live in a world of illusion. If you do not look good, you are lost" (Executive 3).

Executives 1 and 2 were emphatic on how important it is to construct a good relationship with the clients. Executive 2 made an interesting speech regarding the challenge of selling a product: "You need to speak the same language as the client to sell (...) understanding the pains the client feels. If you cannot relate to the client, and you do not know, indeed, who your clients are, it will be very difficult to sell" (Executive 2). In line with this perspective of

recognizing who your client is, Executive 1 added by establishing the necessity of generating trustworthiness for the client as well as building a fruitful relationship with him/her, in professional and personal terms. He stated: "sometimes, you need to know a little bit about what the client likes to do. If he likes to run, to take care of dogs (...) The relationship happens between people". He also provided an important insight into how to generate trustworthiness. According to him, "the way to generate trustworthiness is to be presented by someone that says: 'Look, these guys are nice!'".

Moreover, Executive 3 affirmed that after-sales commitment is very close to a relationship with the client. He contextualized that an important mechanism to avoid the misconceptions and problems that arise alongside the project lifecycle is to establish a communication channel with the client. Regarding licensing models, Executive 3 exemplified his core business where the ERP of his firm is not sold but rented through subscriptions. He told that this strategy is usually a consequence of the high prices associated with ERPs, which ends up excluding potential clients and becoming a barrier.

3.3.4 Organizational

The Organizational factors were the ones that attracted more discussion by the participants. As observed in Figure 5, we extracted concerns with the social aspects, such as HR management, the culture of firms, leadership, and professional networking.

Figure 5. Content Analysis: Marketing.

Source: the authors.

Executive 1 weighted that HR development and talent management are crucial. He said they have decentralized HR, assigning this responsibility to the Services Manager instead of a classical HR department. Furthermore, they have a "Personnel Department" that only deals with bureaucratic issues such as vacation, benefits, discounts, etc. According to him, that was a decision to make Firm 1's hierarchy flatter and, consequently, approximate the managers to their employees. Through this closeness, he expects that managers will better understand the personal and professional issues of their collaborators.

Executive 1 has also linked the importance of HR to the team capability by highlighting that, in addition to the technical capability, personal principles and values are fundamental to their recruiting process. As personal principles, he mentions ethics, commitment, and trustworthiness. As stated by him: "Technical questions are relevant. However, you can train technical aspects (..) personal values, forget. If the guy is unethical and has no commitment, he will not change immediately. He may change, but it is hard." As for team capability, Executive 3 declared to be worried about the quality of the current workforce. For him, despite the software industry being less problematic, the workforce shows to be weak overall. He said he often sees promising graduate students; however, "they do not know what to do with their abilities".

The organizational culture and environment theme have evoked equally valuable comments. For Executive 2, "Culture is everything. It is the culture that determines if you will succeed or if you will fail." When asked about what he understands as a culture, he defined: When asked how he develops a culture in practice, Executive 2 said that "a determinant factor is how the people behave in a critical situation or facing problems. If they end up finding guilty people. If they manage to evolve the process. If they stand idly by." He also distinguished that "each firm has its own culture. It is very difficult to impose a culture or change a culture. Thus, it is very dependent on how the leader behaves".

3.3.5 External

The narrative raised by the External factors has reflected a serious concern of the participants with the current Brazilian instability. As summarized in Figure 6, this perception can be seen by the emerged meanings related to tributes, crisis, lack of financial access and government support, as well as IT facilities challenges.
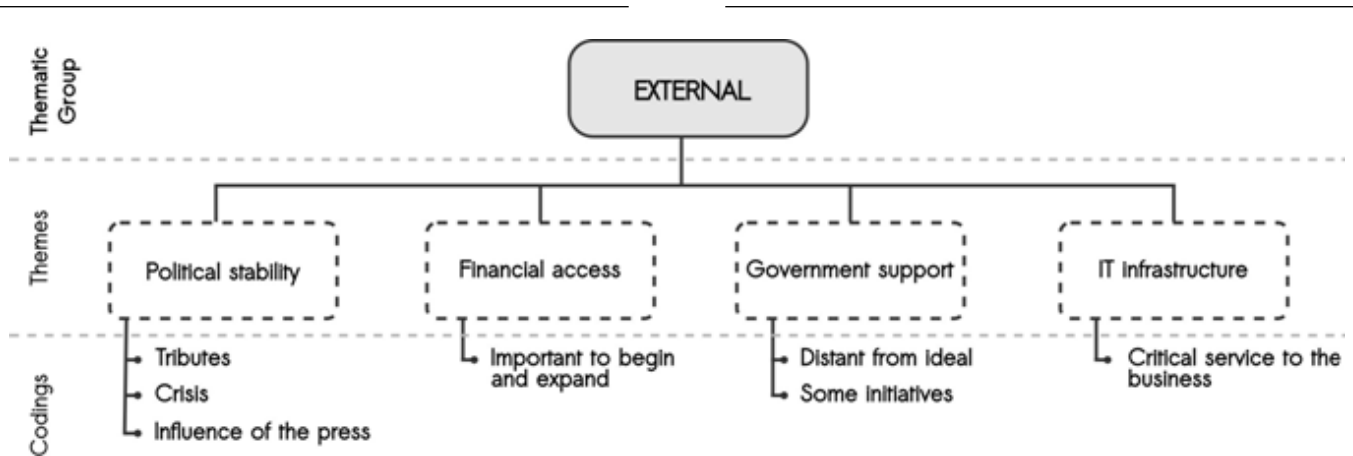
Figure 6. Content Analysis: External.

Source: the authors

According to Executive 1, if there is political instability and crisis, potential clients end up producing less, minimizing costs and, consequently, reducing the number of services to be acquired. He added that "political instability also generates problems regarding tributary questions and other additional issues that are important to the business". Adding another perspective, Executive 3 provided a particular view about the influence of the press in the market by saying that "for many times media said the world was terrible and, for me, it was not. Other times, the media said that everything was good, but it was not for me".

3.3.6 *Suggested Factors*

As clarified in the in-depth interview protocol, we also asked the participants which other CSFs would be included for each Thematic Group. We named these CSFs as Suggested Factors. Overall, all the interviewees have demonstrated to be satisfied, and a few additional factors were suggested. When we discussed with Executive 1 the Innovation Factors, he provided an insightful factor that is investing in other startups as business model innovation. According to him, "(...) sometimes, instead of innovating from the inside out, it is better to look outside and notice that exist fifteen, twenty companies developing innovations, products, etc." However, he argues that such a factor depends on how consolidated and capitalized the firm is to make these investments. He also reinforced that it is better to occasionally acquire another firm or part of another firm than internally develop a similar solution from a scratch book. Regarding new possibilities for the Marketing Thematic Group, Executive 1 pointed out the use of innovative tools to specifically explore Digital Marketing. He explained that nowadays, companies have been using digital marketing to generate relationships or contact possible customers. In turn, Executive 3 has suggested the country's culture as an External Factor to be included in our framework. He exemplified this perception through cultural calendar issues. According to him, "(..) usually, you do not do business - in Brazil - until the Holy Week concludes. Every year this happens. Nothing occurs at the beginning of the year". Executive 2 did not suggest any other new CSF. Finally, Figure 7 summarizes the core meanings with their respective themes related to the Suggested Factors.
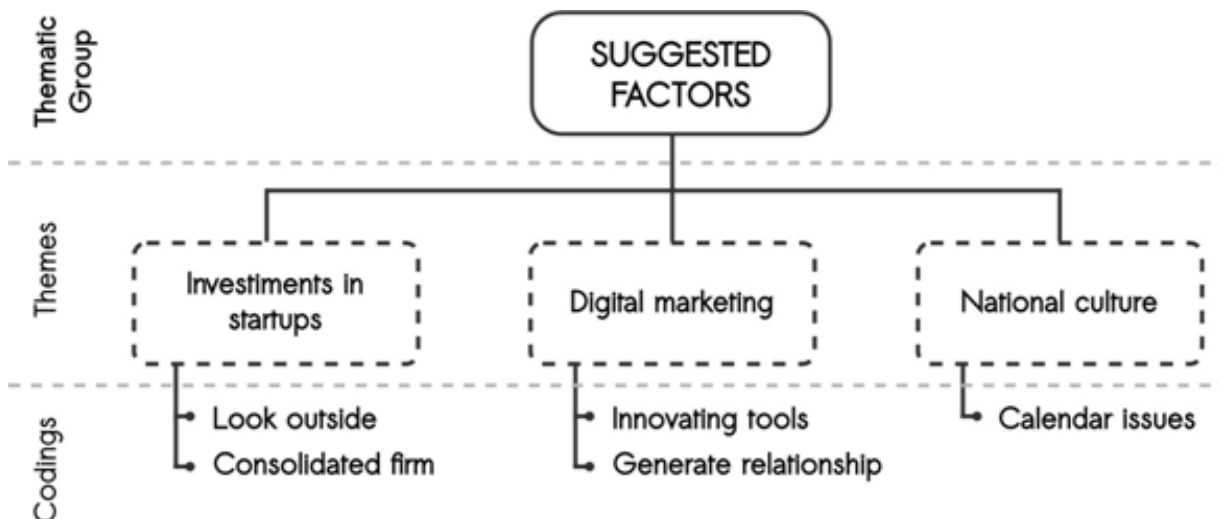

Figure 7. Content Analysis: Suggested Factors.

Source: the authors.

4   PROPOSED FRAMEWORK

The purpose of CSFs is to identify the activities more relevant for managers to achieve an organization's mission. Based on this assumption and following the last stage of our methodological plan, we developed a validated and summarized version of our framework based on the insights achieved throughout the previous stages. Aiming to reach this objective, we picked up: i) the CSFs defined as the most important by each participant for each Thematic Group and ii) the CSFs with the highest priority averages. These results can be verified in Table 2 by the values in bold. The quantitative results have been demonstrated to be congruent to the qualitative results obtained by using Content Analysis, which endorses our findings. As one can notice in Figure 8, some Thematic Groups have only two CSFs (Innovation and Marketing), and other ones that present four different CSFs (Operations).
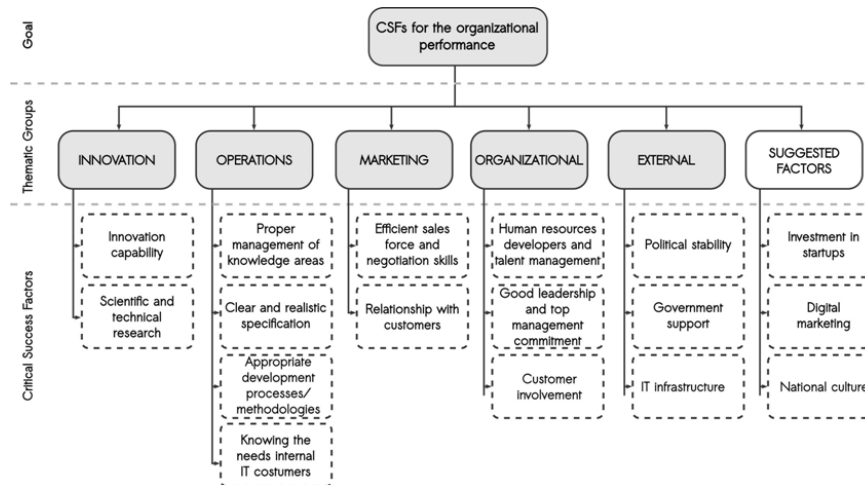
Figure 8. Validated Framework.
Source: the authors.

We derived from the initial Framework composed of 50 CSFs a final list of 17 CSFs, 3 of them suggested by the participants. Our aim is not to provide a "definitive" list of CSFs, but to make explicit a list of CSFs validated through the lens of both executives and theory, which may enlighten other organizations that are developing their competitive strategies. Due to the number of pages restriction, a supplementary discussion about the validated framework according to the theory is available from (Araújo *et al.*, 2022).

5   FINAL REMARKS

CSFs have been demonstrated to be useful in clarifying to organizations a few key areas that are unique to their mission and the industry in which it operates (Caralli *et al.*, 2004). The identification of CSFs and their internalization by the firm are ways to formulate and implement strategies. As a relevant sector, the software and services markets have an important role in the Brazilian economy, yet it faces several challenges. However, Brazilian studies addressing CSFs are usually associated with the level of software project management (Dal Forno and Muller, 2017; Toledo *et al.*, 2008), and consequently, there is a lack of studies approaching the software firm's perspective. In this sense, our intent is not only to provide a 'definitive list' of CSFs but to enable an in-depth comprehension of CSFs through the lens of top executives of Brazilian software firms based on revisiting the theory.

In addition to a novel framework of CSFs based on extensive prior literature, we gathered top executives' perceptions and experiences about their software companies through a rigorous qualitative and quantitative process. Despite managers implicitly knowing these factors, when they are explicit, they assume a common point of reference for the entire organization (Caralli *et al.*, 2004). In terms of managerial and theoretical implications, we hopefully expect that our findings contribute 1) to enlighten other software organizations that are developing their competitive strategies and 2) to strengthen the academic debate concerned with improving the software development ecosystem in Brazil.

Our contributions are summarized as follows: our qualitative and quantitative research design enabled us to triangulate the data and to get a reliable understanding of the investigated phenomenon. As far as we know, there is no empirical work that explored the AHP and Content Analysis (CA) in a complementary way as we conducted our research design. Our initial framework was developed based on multiple academic, executive, and government sources. Moreover, we aligned Non-IT and IT-related activities in an overall set of representative CSFs. Such an integrated review was not presented in the literature; As a result of the AHP process, we derived a selected list of the CSFs considered by our executives as the most important. From the initial 50 CSFs, we portrayed a validated framework composed of 17 CSFs, being 3 of them suggested by the participants. Besides the most valuable ones,

we also discussed the CSFs evaluated as less important; we categorized the CSFs into 5 Thematic Groups that represented another level of analysis. For instance, we identified Marketing and Innovation as the most important and External groups as the least important; The interviewees suggested three additional factors (Investment in startups, Digital Marketing and National Culture) that were not previously identified in our literature review. We consider these suggestions valuable findings since they point out new research directions. Our study provided in-depth qualitative comprehension by analyzing the speeches of three IT top executives with their valuable experience in the software industry. There is a great subjective value, and it is acknowledged as challenging to the research community; Despite considering the Brazilian scenario, we believe that scholars and practitioners may also replicate our method and/or framework to develop CSFs in different countries and industries.

This paper also presents limitations. There is a small number of subjects, which may affect the external validity. In this sense, we do not seek a representative sample but rather one suitable for illuminating the phenomenon under study (Corbin and Strauss, 2014). We also assume our participants as representative personas of different market segments: micro and small companies (Firm 2 and Firm 3) and large software firms (Firm 1). Additionally, the participants may have a different understanding of the CSFs regarding the framework under evaluation, which impacts the construct validity. As detailed in Section 2.2, we accomplished a rigorous interview process aiming at mitigating this threat. Lastly, our results demonstrated to be reliable given the congruent findings obtained through the AHP and CA methods.

Concerning future studies, one can highlight the opportunity of i) addressing other quantitative methods and examining which items of our framework add more value to organizational performance; ii) investigating the suggested factors in the context of software companies, and iii) contrasting the perspectives of our framework with the CSFs identified by different countries that are emergent in terms of worldwide software development.

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