KnE Social Sciences
EBEEC
Economies of the Balkan and Eastern European Countries
Volume 2023

Research Article

Leverage the COBIT 2019 Design Toolkit in an SME Context: A Multiple Case Study

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Abstract.
Organizations today exploit IT to achieve business value and competitive advantages; it is the disruptive effect of digital transformation. However, investing in IT without proper control and governance over enterprise IT (GEIT) can expose organizations to cyber-risks and IT project failures. This problem affects both multinationals and small organizations. In particular, small and medium-sized enterprises (SMEs) struggle to implement IT-governance also due to the complexity of the standard IT-governance frameworks. In this study, five case studies were conducted with five manufacturing companies in Italy whose headquarters are located in the Lombardy region to investigate the potential benefits for IT practitioners of using the COBIT 2019 Design Toolkit, an Excel spreadsheet that facilitates the development of a governance system. The results are encouraging, the IT practitioners appreciated the COBIT 2019 Design Toolkit to map the IT resources and issues, prioritize the most important governance and management objectives, and align business and IT strategy. However, some criticalities emerged, for instance, the limited prescriptive power of the tool and the language, which is sometimes difficult to understand for IT practitioners. It should also be noted that current IT-governance implementation in Italian manufacturing SMEs appears to be very limited. Further, it should be highlighted that this study was using COBIT 2019 before ISACA issued "COBIT for Small and Medium Enterprises Using COBIT 2019" which could already have a positive impact on the level of comprehension.

Keywords: COBIT 2019, IT-governance, IT-governance frameworks, multiple case study

jel CLASSIFICATION codes
O30, G30, O16

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Published: 1 February 2023

Publishing services provided by Knowledge E

Selection and Peer-review under the responsibility of the EBEEC Conference Committee.

1. INTRODUCTION

In recent years, digital technologies have become more and more pervasive in our daily life and at the core of the business for many organizations [1]. The health emergency has been a catalyst for digital transformation [2]: information technology (IT) worldwide spending has increased by 8.6% from 2020 [3]. In parallel, cybersecurity has become

a serious concern for organizations as the number of malware attacks has significantly risen from the start of the pandemic [4].

Any organization, large or small, cannot afford to waste IT investments and overlook the strategic value of information technology [5]. Policies and IT decision-making need to be discussed at a higher level than the IT function, the executives' involvement is key [6]. In literature, this has been referred to as "IT-Governance"(ITG), to indicate the responsibility of the board in technological decisions with a high strategic impact, as opposed to IT Management, which focuses on the day-to-day internal supply of IT services [7].

A company that aims to implement Enterprise Governance of IT (EGIT) can adopt several reference frameworks, the most famous and widely used is COBIT, which stands for Control Objectives for Information & Technology. COBIT provides a set of guidelines and tools to help companies align IT strategy and business strategy so that IT resources can contribute to business performance. However, most businesses still struggle to govern IT [8] and COBIT empirical research is rather scarce [9]. In this paper, the authors will provide an overview of the ITG existing literature and will discuss, through five case studies, how COBIT could be implemented in small-medium enterprises. Section 2 covers the problem statement and elaborates on the research question of this paper. Section 3 presents the necessary literature and the theoretical background of enterprise governance, IT-governance, IT-governance for small and medium sized enterprises, and the COBIT2019 framework. Subsequently, section 4 provide insight in the research methodology: quality criteria, case study selection, COBIT 2019 Design Toolkit, and data collection. Section 5 provides the five case descriptions and case narratives. Section 6 presents the findings of this paper separated in five subsections: COBIT2019 Design Toolkit as a mapping tool, COBIT2019 Design Toolkit as a prioritization tool, COBIT Design Toolkit as an IT-business alignment tool, COBIT Design Toolkit dark sides, implementing IT-governance in SMEs. Section 7 concludes based on the discussed findings. Section 8 discusses the limitations of this study and potential improvements.

2. Problem setting and research question

IT-Governance should be implemented in both large and small companies[10] but the approach cannot be the same. In fact, frameworks such as COBIT are too vast and complex to be applied in a small to medium enterprise context. The problem of the lack of a reference framework for IT-Governance in SMEs (small-medium enterprises) remains

unresolved even in the studies that have criticized the use of traditional frameworks [11, 12].

In the meantime, ISACA (Information Systems Audit and Control Association), the association that publishes and updates COBIT, has released a new version of the framework (COBIT2019), stating that each organization will be able to tailor a COBIT2019-compliant governance system according to its business needs. This new framework could become a reference point for all SMEs that do not yet apply any IT-governance principle, which is the vast majority [13]. To investigate this possibility, the authors state the following research question:

"How can IT practitioners leverage the COBIT2019 Design Toolkit in a SME context?"

The objective is to provide insights into COBIT2019 implementation projects, starting from an overview of the existing empirical research and then conducting interviews with IT managers to build meaningful case studies for practitioners operating in a SME context.

It should be highlighted that this study was using COBIT 2019 before ISACA issued "COBIT for Small and Medium Enterprises Using COBIT 2019" which could already have a positive impact on the level of comprehension.

3. Theoretical background

Since the 90s, many scholars have contributed to enlarge the theoretical background in support to IT governance practices. The key ITG dimensions and mechanisms have been identified, as well as the business value in aligning IT and Business strategy. This research aims to contribute to the understanding of which ITG theories and frameworks are still valid or suitable in a SME context.

3.1. Enterprise Governance

Enterprise Governance (EG) is defined as "the set of responsibilities and practices exercised by the board and executive management with the goal of providing strategic direction, ensuring that objectives are achieved, ascertaining that risks are managed appropriately and verifying that the organization's resources are used responsibly"[14].

From this definition emerge two firm dimensions, performance and conformance, the objective of the EG framework is to maintain the balance between them [15].

While in corporate governance (i.e., Conformance) the point of view is risk-averse and reactive, because the aim is to verify if what happened has been compliant, performance is risk-taking and forward-looking, because the objective is to achieve strategic goals in the future [16].

A key feature of enterprise governance is to be a comprehensive and holistic framework [17], not only limited to the board and executive suite. Indeed, governance processes should be monitored by managers at every functional level and not relegated to the business unit of corporate accountancy [18].

As a representation of this approach, we refer to Hamaker and Hutton's "Umbrella" visualization (Figure 1) where enterprise governance is seen as "an aggregation of managerial components, the management of management and a higher standard of organizational discipline" [19].

According to Hoogervorst [20], enterprise governance has to rely on a considerable part of the company's IT systems for data management, identity management and security management. Information technology supports enterprise governance implementation and on a governance level, IT-governance is included in the EG holistic framework.

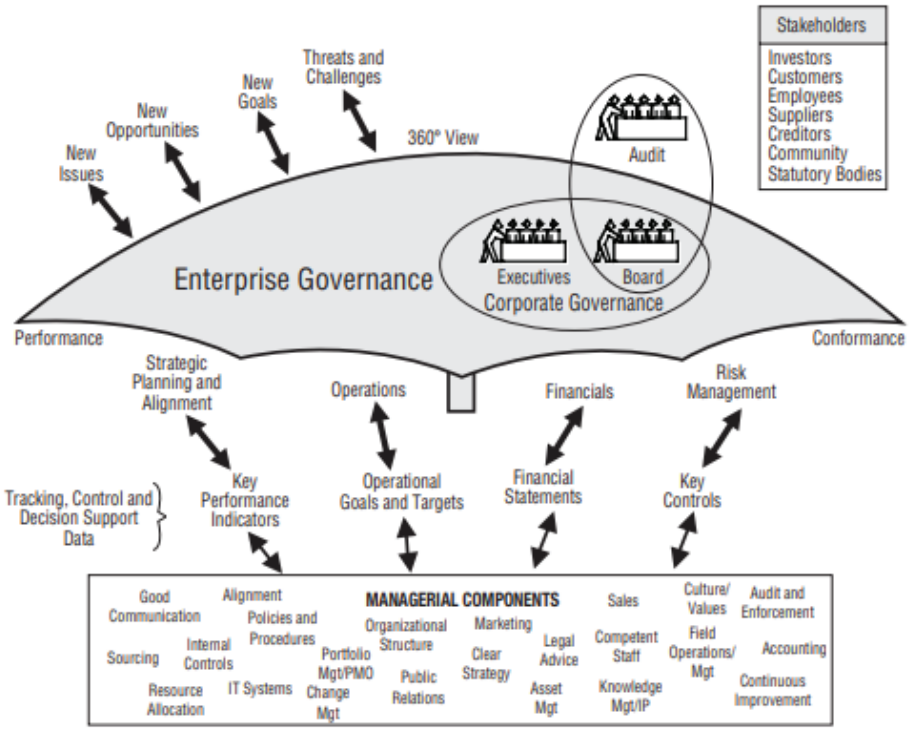

Figure 1: Enterprise Governance "Umbrella", retrieved from Hamaker and Hutton [19].

3.2. IT-Governance

A good starting point for an understanding of an IT-Governance domain is provided by Symons [21], where the IT-Governance dimensions are presented as:

IT Value and Alignment, with the objective of approving and prioritizing IT investments aligned with business goals.

Risk Management, with the objective to deal with risks linked with IT, including cybersecurity, privacy and IS project failures.

Accountability, with the objective to hold IT executives and managers accountable for the return on IT investments.

Performance Measurement, with the objective of monitoring IT from different perspectives, usually with the IT Balanced Scorecard.

Figure 2: IT-Governance domain according to Symons [21].

Several definitions of IT-governance have emerged in the literature; however, no single definition has prevailed. Furthermore, some studies tend to skip a proper definition because the authors believe that IT-governance is already commonly defined [22]. Other studies tend to search for similarities in the definitions, like Chong and Tan [23] stating specific IT-governance perspectives: ”(1) the allocation of IT related decision making rights and accountabilities within the organization, (2) strategic alignment between IT and organizational strategy and objectives and (3) the organizational structure of relationships.”

For this research, the authors chose to relate to the definition by De Haes and Van Grembergen [24] because it seems the most comprehensive and it is the latest result during the literature review. This definition conceptualizes the IT-governance objective as IT business value, with the business/IT alignment as the main enabler [24]. In the following paragraphs, the IT/Business alignment and the IT Business value concepts will be explained, below (Figure 3) schematized the relation of the two terms/concepts with Enterprise Governance of IT.

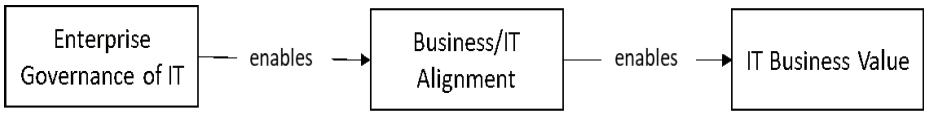

Figure 3: The objectives of Enterprise Governance of IT retrieved from De Haes and Van Grembergen [24].

Research is also addressing the mitigation of risk as mentioned in Figure 2, e.g. Plant et al. [25]. The authors adopted a design science approach reviewing companies in different DevOps-environment stages. Their results suggest a situational control framework including practices to mitigate risk. Another important view is the inter-organizational factor of IT-governance: Chong and Tan [23] focused on socio-technical factors of IT-governance in collaborative networks. Their focus lies on structure, process and relational mechanism. Important is to stress out that the authors propose main results in inter-organizational IT-governance like identification off a focal organization fostering structure, coordination of all communication. In addition, asynchronous facilitating amongst all stakeholders and relational culture and attitudinal commitment have to be encouraged.

3.2.1. Business/IT Alignment

The concept of strategic alignment is not originally derived from De Haes and Van Grembergen's [24] research; it was described in the Strategic Alignment Model (SAM) proposed by Henderson and Venkatraman [26]. This approach underlines the importance to articulate the IT strategy to have a positioning in the IT marketplace coherent with the firm's information system requirements, configuration and management.

Further studies have addressed the alignment of systems like Taskin et al. [27] where the authors examine alignment as matching approach and emphasize in their conclusion that adopting flexible ERP systems is a way to reach strategic alignment from a systems perspective. Others tackle the importance of IT architecture and their role for IT-business alignment like Gellweiler [28] who identified eight different types of IT-architects that work on the two main levels of the corporation: strategy/business level and project/solution level. Further, he found in all examined papers of his literature review support for the strategic orientation of the enterprise architects.

Sieber et al. [29] study addresses, under the assumption that organizational culture is beneficial for business-IT alignment, quantitative (bibliometrics) and qualitative literature review methods. Some evidence in the full-text analysis was found that relationship

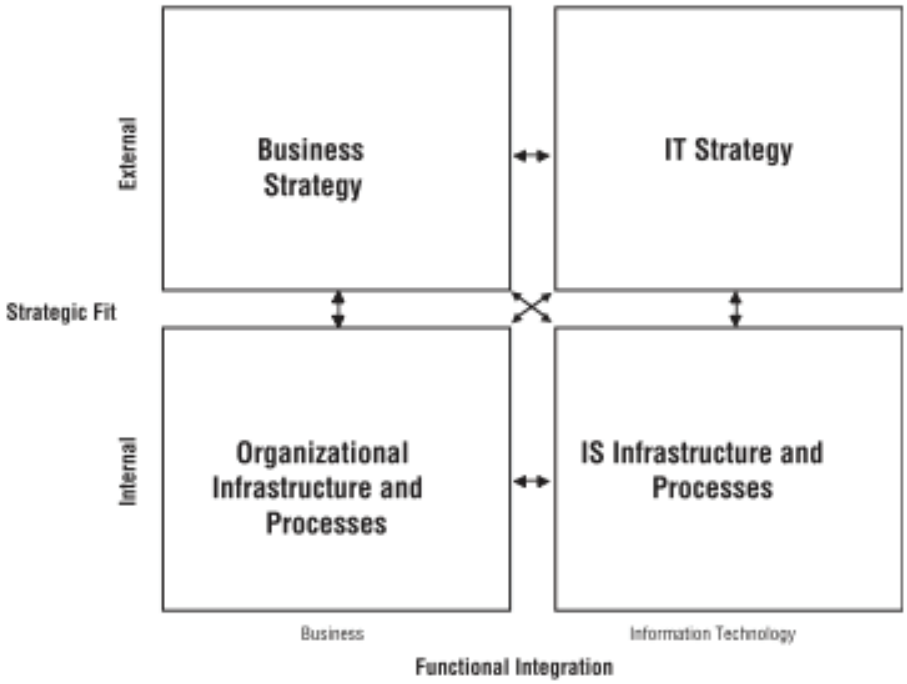

Figure 4: Strategic Alignment Model (SAM) by Henderson and Venkatraman [26].

between IT-management culture and business-IT alignment exists. In several studies (case and survey studies) IT-staff perceive themselves as “belonging to an extended family” [29].

3.2.2. IT-Governance Business Value

IT-governance researchers have been investigating the impact of IT-Governance on firm performance and the effects of successful IT-Governance initiatives [30]. For instance, Zhang and Le Fever [31] argued that IT-Governance has a positive effect on building superior IT capability, which indirectly contributes to the creation of competitive advantage. Similarly, Lazic et al. [30] found that the more mature ITG is, the more capabilities are available for IT decision-making and that the creation of value is possible through ITG impact on IT relatedness and business process relatedness.

Buchwald et al. [32] chose to investigate not only the outcomes of IT-governance but also the determinants for ITG success, integrating them in a single model (Figure 5). This research brought empirical evidence about the positive impact of IT-governance on IT efficiency, IT effectiveness, IT risk mitigation, IT compliance and readiness for IT changes.

Gregory et al. [33] tackle in their research IT-consumerization and its transformative power on IT-governance. This phenomenon-driven theory developed study driven

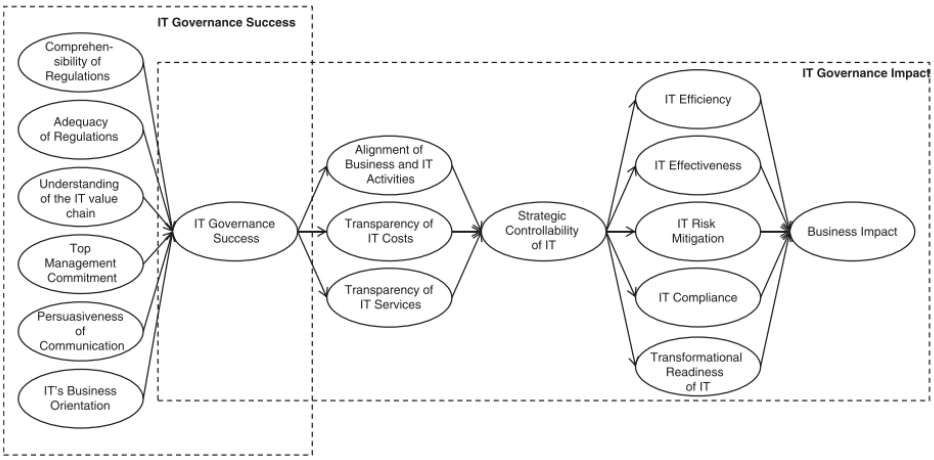

Figure 5: Success determinants for IT-Governance and outcomes for the organization, retrieved from Buchwald et al. [32].

by case analysis of an incumbent bank states that IT-function in the context of IT-consumerization is changing towards a coordination function instead of a provider function and interesting is that “a radical transformation in the IT-governance framework is typically accompanied by a broader organizational transformation” [33]. Another important point is the clear linkage of IT-governance with the process view of an entity. Joshi et al. [34] found support for their research model using a dataset from 881 global companies that their construct IT governance process capability has a positive effect on business performance by increasing IT-performance. This linkage has been theoretically drawn, by stating that companies, which address processes in the area of IT e.g. IT-decision making or IT-planning firmly address their IT-goals like IT-business alignment and thus reach to a higher degree enterprise goals resulting in an improvement of business performance [34].

Further, information systems are an integral part of today’s businesses. COVID-19 and other global crisis have shown the downside of information systems’ misalignment Llamzon et al. [35] reviewed in their hermeneutic study the importance of information systems alignment inter- and intra-entity wise. According to the authors, the alignment triad consisting of strategy, structure and surroundings shall be in the focus of future research in pluralistic organizations. Alignment could therefore make use of IT-governance mechanisms.

Peterson [36] stated that the elements to be considered by organizations to implement IT-governance are structures, processes and relational mechanisms. The task of putting in practice ITG is complex because there is not a standard solution; each

company will need a tailored set of IT-governance mechanisms, a combination of structures, processes and relational mechanisms [37].

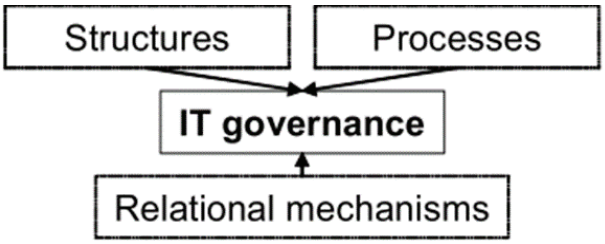

Figure 6: Peterson's Model for IT-Governance mechanisms [36, 38].

Years later Almeida et al. [39] extended literature review on IT-governance mechanisms showing Peterson's classification remained a common ground for scholars in this field. Even though, it lacks consensus among scholars on a complete list of the ITG mechanisms adopted by practitioners [40]. Nevertheless, still today Bianchi and Sousa [41] stressed out in their article about IT-governance in higher education that "The process of identifying the right mechanisms to a specific context is a complex endeavor".

3.3. IT-Governance in small-medium enterprises

The widespread conviction that a "one fits all" set of IT-governance practices or structures does not exist brought scholars to open a research stream aimed to investigate the best IT-governance options for each organization [42].

Huygh and de Haes [10] grouped all the elements, which characterize a small-medium enterprise and call for ad hoc ITG mechanisms. According to them, these specificities are:

1. Organizational processes simpler and businesses view more operational than strategic.
2. Flatter organizational structure.
3. Decision-making centralized with the owner-manager.
4. Overlap of management and ownership.
5. Scarce resources (financials and IT skills).
6. Frequent use of outsourcing for IT resources.
7. More informal culture, with high flexibility and high transparency.

The different nature of small businesses has brought scholars to evaluate the applicability in this context of the theories usually adopted in IT-governance research. Devos et al. [43] stated, “theories which explain IT-governance in large organizations and methodologies used by practitioners cannot be extrapolated to SMEs”. Building on Devos et al. [43], Bergeron et al. [44] distinguished, among the theories applied in ITG research, the ones with low and high applicability in SMEs.

Acknowledging that ITG implementation is not common in SMEs, Vogt et al. [45] investigated the main barriers that SMEs have to overcome: lack of financial resources, unclear IT-governance value, lack of IT skills, the complexity of existing frameworks and low awareness of the tools available on the market.

Huygh and De Haes [10] did not find in their literature review any evidence of an SME-specific governance framework and encouraged scholars in the field to focus their future research efforts in this direction. De facto, for years only COBIT5 claimed to be a framework generically applicable for all organizations, regardless of size and industry. However, it was perceived by SMEs as too descriptive and very complex [46].

The IT-Governance Institute tried to address this criticality with the release of COBIT Quickstart, which was expressly “designed for the need of IT managers of smaller organizations for a simple-to-use tool that will speed up the implementation of key IT control objectives” [47]. This simplified version of COBIT has been widely criticized and the results were rather disappointing [12, 48].

Aiming to overcome Cobit Quickstart, Bartens et al. [49] proposed tailoring COBIT5 to decrease the perceived complexity of this framework. In particular, they sided in favor of a minimum baseline of IT-governance processes, from which any company could start. In their study, the suggested processes for the baseline are listed, taking into consideration the degree of relevance and the ease of implementation.

Concerning the opportunity to design a new ITG framework specifically for SMEs, Lee [50] pointed out a set of rules which should be taken into consideration.

In 2021, according to the literature review performed by the authors, an IT-Governance framework specific to SMEs is still missing. Only Bergeron et al. [51] have developed a conceptual framework for ITG in SMEs, nonetheless, their research study is still theoretical and in an initial phase and the framework will need to be validated by case studies and tests. The second element of novelty is the release of a new version of the COBIT framework, COBIT2019, which ISACA claimed to be less complex and more suitable for tailoring to the company’s needs. Some scholars already welcomed positively COBIT2019 as a more flexible and intuitive framework [52] and as a way for being aligned with the latest IT standards and compliance regulations [53].

3.4. The Framework COBIT2019

COBIT stands for “Control Objectives for Information and Related Technology” and is a framework developed by ISACA (Information Systems Audit and Control Association). As “Related Technology” is meant every technology that supports the processes and uses to achieve the company goals. The foundation of the framework is the set of “Control Objectives”, which provides guidance and good practices about what should be accomplished in the enterprise.

COBIT is acknowledged as an IT control framework [54], which is defined as “a recognized system of control categories that covers all internal controls expected in an organization” [55]. Following the classification proposed by Nicho [56], COBIT is a control framework focused on business-IT alignment.

The idea behind COBIT is that to enable I&T contribution to the enterprise goals, a number of governance and management objectives should be achieved [57].

In COBIT2019 forty governance and management objectives are present, grouped in five different domains [58]:

Evaluate, Direct and Monitor (EDM): in this domain, the governance objectives are grouped, they are concerned with strategic choices and guidance for executives to direct senior managers.

Align, Plan and Organize (APO): this domain addresses the overall organization and the supporting activities for I&T.

Build, Acquire and Implement (BAI): this domain deals with the acquisition and implementation of I&T services and their integration with business processes.

Deliver, Service and Support (DSS): this domain treats the operational delivery of I&T services.

Monitor, Evaluate and Assess (MEA): this domain addresses performance monitoring and compliance with internal control objectives and external requirements.

All the objectives are intrinsically equivalent, but each enterprise will have to prioritize some of them to build a governance system tailored for its needs [57]. The design factors (Figure 8) are the elements, together with the focus area, that can help the firm to identify the most relevant objectives for its governance system. Each design factor can be evaluated through the COBIT Design Toolkit, following the process described in the Methodology chapter (Section 4).

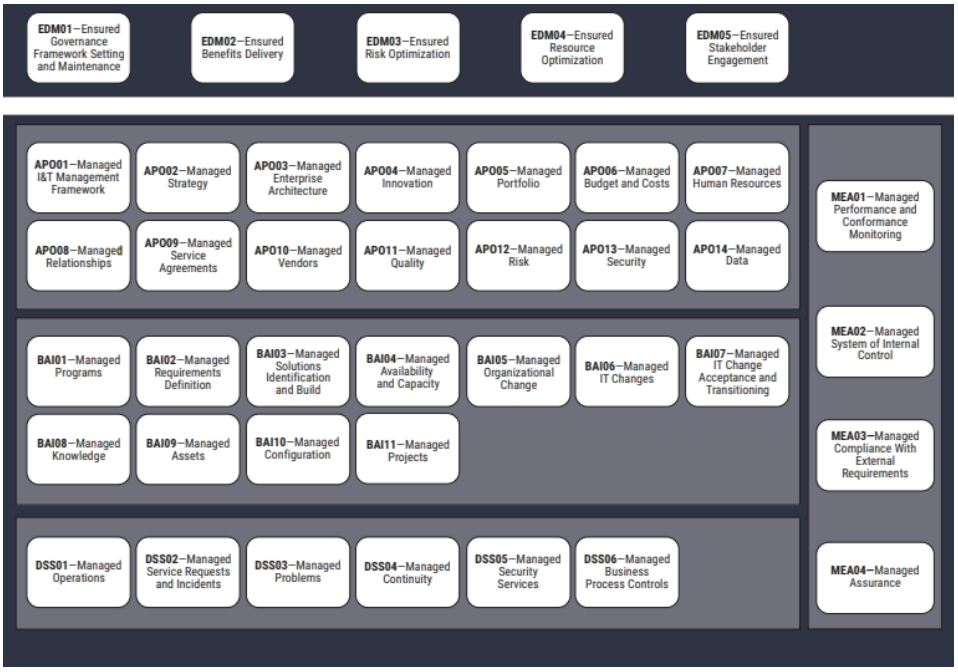

Figure 7: COBIT2019 control objectives [57, 58].

Figure 8: COBIT2019 design factors [59].

4. methodology

The existing IT-governance research appeared more focused on large enterprises than small-medium sized [6, 44]. In addition, the literature available on COBIT2019 is still scarce since the release of the new update of the framework has been recent (November 2018). On these premises, the study had an explorative nature: the authors aim to enlarge the knowledge base for future research in IT-governance.

The authors chose to conduct qualitative case studies accordingly to Yin [60], who stated this kind of research is preferable under certain conditions: (i) there is a “how”

or “why” research question, (ii) the study focuses on contemporary events, (iii) the researcher has little or no control on the subjects and events.

4.1. Research Quality

Addressing the quality of research may result in richer insights and may improve the legitimacy of the case research, potentially increasing the impact on the study field [61].

The authors have considered the design test proposed by Yin [60] for the case research:

Construct validity: to secure that the correct operational measures for the concepts have been established, it has been sent the draft of the case and the results obtained to the interviewees after fourteen days, to receive approval for publication and further feedback. In addition, the reader may check the chain of evidence in the case by consulting the cross-case tables provided.

Internal validity: as explained above, issues about internal validity have been tackled limiting the research scope and carefully selecting the SMEs involved in the case research.

External validity: the findings can be generalized since the authors carefully specified the population of interest and the replication logic of the multiple case studies.

Reliability: the authors described the interview process in detail and provided access to the primary data collected (transcripts and Excel spreadsheet). In this way, the case studies can be potentially replicated.

4.2. Case studies selection process

Firstly, the authors limited the scope of research along three dimensions:

Size: the research has involved firms with no more than 250 employees and a turnover not higher than 50 million, according to the definition of small-medium enterprise provided by the European Commission (May 2003)

Geography: the research has been conducted in Italy. Since important cultural and industrial differences exist among different Italian regions, the scope of research has been additionally restricted to SMEs with headquarters situated in Lombardia. The whole region has an important industrial tradition in the sectors of mechanics, electronics, chemicals and textile and it is the area with higher concentration of small-medium enterprises in Italy [62].

Industry: the authors decided to conduct the workshops only with the manufacturing companies to avoid contingency effects derived from different industries. Manufacturing is considered the domain in which the use of information technology is more mature and empirical research more interesting [63]. Additionally, in light of the increasing investments and transformations brought by Industry 4.0, (sensors on machinery, new infrastructural solutions, and new information technologies) manufacturing is facing new IT-governance challenges and requirements [64].

Following the approach used in Ponelis [65], the authors collected potential case studies using their personal network, the word of mouth and the contacts of the companies which often collaborate with the university. This first sample has been filtered considering the delimitations to the research scope (size, geography and industry). Then, the selection criteria was to have access to IT managers for an interview. At the end of the selection process, five cases were identified (Table 1).

Table 1: Companies selected to conduct the case studies.

Company	Size	Headquarter	Industry	Interviewee
SME #1	94 employees	Lecco, IT	Manufacturing	IT Manager
SME #2	184 employees	Milano, IT	Manufacturing	IT Manager
SME #3	35 employees	Milano, IT	Manufacturing	IT Manager
SME #4	115 employees	Lecco, IT	Manufacturing	IT Manager
SME #5	140 employees	Sondrio, IT	Manufacturing	IT Manager

4.3. Data Collection

The IT managers that agreed to participate in the study have been invited by e-mail to a Skype interview. Each interview starts with some questions regarding the profile of the interviewee and an overview of the company. Then, the researcher presents the objectives of the study and introduces the COBIT framework. The central part of the interview is conducted using the COBIT2019 Design Toolkit, the authors and the interviewee take the design steps described in COBIT2019 for the definition of a tailored governance system. When the excel spreadsheet is completed with all the necessary information, the interview enters the last section. The researchers ask the IT managers for their opinions about IT-governance in the context of the small-medium enterprises and some feedback about the COBIT framework, as a formal mechanism for IT-governance implementation. The duration of the interviews has been on average one hour, the language adopted has been Italian.

4.4. The COBIT Design Toolkit

ISACA, as a companion of the COBIT2019 Design Guide, has released the COBIT Design Toolkit. It consists of an excel spreadsheet that enables the firm to select governance and management objectives priorities with a quantitative approach [59].

In each case study, the researchers observe how the IT manager applies the COBIT Design Toolkit along the COBIT2019 design process. All the design factors will be considered and evaluated to conclude the governance system design (Figure 9)

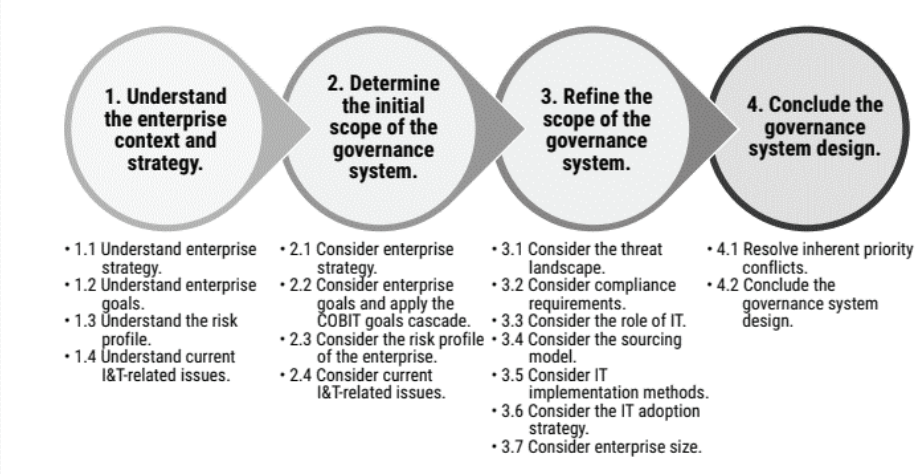

Figure 9: COBIT2019 Design process for the governance system [59].

In the end, the Design Toolkit formulas will provide a score for each control and management objective present in COBIT2019: the higher the score, the more relevant the objective will be for the company governance system.

5. Case study narratives

At the end of the selection process, the five cases selected are presented subsequently.

5.1. Case study 1

SME#1 is a manufacturing company specializing in the production of electric motors. Founded in 1948 in Lecco (Lombardy, Italy) today it employs about 170 people.

The company culture is open to innovation, thanks to some collaborations with universities in the region, such as the Polytechnic of Milan.

From the IT point of view, the production of the different plants is supported by a central ERP system (AS400), which is managed by an external consultant, who also

develops the customization necessary for SME#1's specific needs. The ERP is the key IT resource for the company, it supports both the offices and the production in the different factories, failures and errors in this software can heavily affect the operations. The enterprise IT architecture is managed by the IT manager with the support of another external consultant, always present in the company. One open matter remains the management of data lifecycle, in particular, in these weeks the IT function is evaluating improvements in the backup systems. The company does not allocate an annual budget for the IT function; decisions are left to the judgment and experience of the IT manager (who has been with the company for more than twenty years).

5.2. Case study 2

SME#2 is an Italian manufacturing company that produces industrial compressors used in the field of refrigeration and air conditioning. Founded in 1936, the corporation has seen important industrial growth in the '80s that brought it to operate not only in Italy but also in international markets. Today it employs 185 people, most of them in the production departments, and has a turnover of about 50 million. Production takes place in Italy, in the Rescaldina and Legnano plants, located in Lombardy, a region in the North of Italy

The company is in the middle of a generational turnover, with new young managers that are joining the company to take the place of experienced managers, who are going to retire soon. Even the IT function is currently involved in this renewal process, now is composed of Luigi, a senior IT manager that has been working in SME#2 for almost 20 years, and Pierluigi, a younger professional that joined the company in 2020. The main task handled by the IT function is to support production lines and machinery connectivity, IT failures need to be limited as much as possible because can affect the operations of the company. Besides this, the two IT professionals are asked to analyze data and provide reports to internal clients such as administration, production managers, purchase office and the board of directors. As in many small-medium enterprises, the IT function has extensive autonomy in the decision-making about IT-related investments.

Pierluigi and Luigi are evaluating potential investments to increase the company's cyber-security capabilities after one of their colleagues fell victim to a phishing attack.

5.3. Case study 3

SME#3 is a manufacturing company based in Cusago, in the province of Varese (Lombardy). Its core business is the production of soundproofing systems, which can be used in many different contexts, from the soundproofing of energy plants to the soundproofing of large machinery or engines, for example in cruise ships.

The company is growing, currently, there are 35 employees but for next year, there will be more hirings. In addition to the Cusago plant, the company has commercial partners in Massa Carrara (Tuscany), where most of the panels are assembled and then shipped worldwide by ship.

In the company's organizational chart, there is an IT function, however, consisting solely of IT manager Luca. Luca is actually a consultant who has been working with SME#3 for many years and although he is treated as an employee of SME#3, he follows the IT issues of two other companies. In the last two years, Luca's main task has been the development of the job management software, which SME#3 wanted totally customized and configured ad hoc for its processes. In addition, he deals with the maintenance of the server room, backup management, and disaster recovery and network infrastructure in the offices. In the last few years, SME#3's IT investments have increased, e-mails have been migrated to Office365, machines have been virtualized and the network infrastructure has been optimized. The challenge that is currently still open is that of data management. With the multiplication of projects, which are always different from each other, a huge amount of data is generated that the company struggles to manage and store.

5.4. Case study 4

SME#4 is a company founded in 2016, based in the province of Lecco (Lombardy), which deals with industrial coating and enameling systems. The company was created through the merger of two historic local companies, ITEP and Colora. The former produced liquid coating systems, while the latter specialized in powder coating. INTERNATIONAL, a German multinational and market leader in coating systems, bought the two companies. Following the acquisition, they were merged together to create SME#4. Since the merger, the company has had 115 employees. The market in which SME#4 operates is B2B, on an international scale. Customers rely on SME#4 for the high degree of specialization of the products and for the possibility of making custom plants

The processes of the two companies after the merger have been completely re-engineered and an SAP management system has been adopted. Some IT services, such as e-mail or VPN, are centralized and managed by the IT team in Germany. Everything else, however, is the responsibility of the IT manager of the local office.

At SME#4, Luca, the IT manager, is in charge of both routine maintenances of the IT resources and process digitalization and optimization. Among the main challenges this company is facing, certainly, there is integrating the Italian and German corporate cultures, as well as aligning the group's strategy with that of the companies in the different countries, which often enjoy a great deal of independence. This is also evident in the IT function, where the manager reports to the Italian general manager.

5.5. Case study 5

SME#5 is an Italian manufacturing company operating in the packaging sector, in particular, cardboard packaging for the food industry. It was founded in 1952 in the province of Sondrio (Lombardia) and the production plant, which today covers 32000 square meters and employs 170 people, is still located there.

This small company has managed to compete in international markets thanks to the investments made in the latest technologies and innovations brought by the research and development department.

These innovations in the printing cycle led to competitive advantages in faster production time and time to market. Always intending to bring the best innovations to the company, SME#5 collaborates actively with universities, in particular with the Polytechnic of Milan. The warehouse is managed in real-time thanks to the QR codes placed on the packaging, which then ensure traceability even outside the plant. IT supports both the production and logistics processes and is monitored by three people, one of whom is exclusively dedicated to the company's ERP system. Despite an IT function of a certain "weight" for the size of the company, IT does not always play a central role in projects, which are usually born and developed within a single area of the company, such as production or the research and development department. In the past, it has happened that this lack of integration and alignment has led to the purchase of machinery or sensors that were difficult to integrate with the existing IT infrastructure. One of the main challenges for the future will be to consider IT from a strategic point of view, perhaps sensitizing top management to the centrality of IT resources and improving internal communication between departments.

6. Findings

The authors opened this paper by introducing the following research question: "How IT practitioners can leverage the COBIT2019 Design Toolkit in a SME context?"

Five case studies have been conducted to investigate this topic and the findings pointed out at least three important ways to leverage the Design Toolkit in a small organization:

1. Mapping IT resources, issues and risks, that in SMEs are often overlooked[66] using simple tools (spreadsheets) as suggested by Lee [50].
2. Prioritization of the most important processes to be monitored to not waste human and financial resources, that in SMEs can be scarce [48].
3. Different stakeholders' involvement in the definition of the IT strategy. This practice can facilitate the understanding of the value in business-IT alignment, one of the barriers to ITG presented in Vogt [45].

6.1. COBIT2019 Design Toolkit as a mapping tool

The IT practitioners involved in the study acknowledged that during the design process all the most important aspects of IT are covered. From IT strategy to IT security, from the sourcing model to the role of IT, the COBIT2019 design factors perform well in providing an overview of the current state of IT in the company. Sometimes, the design factors address topics that the IT manager had overlooked in the past or that are not explicit in the company strategy; the Design Toolkit becomes an occasion to reflect on them. It's a phenomenon well described in the literature, that the IT manager of a small organization, being involved in many day-to-day activities, can lose sight of the big picture [66]. The design factors can guide him/her in mapping the main IT issues and risk and thinking the IT more strategically; ITManager#3 proposes to use the toolkit as a yearly internal assessment (Transcript 2, line 179).

6.2. COBIT2019 Design Toolkit as a prioritization tool

The second way that emerged for IT practitioners to leverage the COBIT2019 Design Toolkit is as a tool for prioritization. It is well known that in small companies the resources, both human and financial, are limited [48]. Thanks to the final canvas, the IT manager has immediately an indication for allocating the company resources to the

processes that required higher capability levels. As the authors reported in the section on the cross-case results, in each case the Design Toolkit highlighted a set of different control objectives, even if the organizations in the sample were very similar to each other. Indeed, this research work can support the claim made by ISACA that this new version of COBIT provides precise tailoring of the governance system according to each company's needs [57]. Another interesting finding to discuss is the cross-case distribution in the different domains of the prioritized control objectives. Figure 10 shows that control objectives in the EDM (Evaluate, Direct, Monitor) domain have been never prioritized by the Design Toolkit. This is not surprising because this domain grouped the control objectives linked to the actual governance of IT, while the other four domains have management control objectives [58]. In small-medium enterprises that do not have formal governance bodies, EDM control objectives are probably not relevant. In addition, MEA (Monitor, Evaluate and Assess) control objectives appear less important for manufacturing SMEs, compared to other domains like BAI (Build, Acquire and Implement) and DSS (Deliver, Service and Support). This may reflect the attitude of the respondents, that, as IT practitioners tend to be more oriented to IT implementation projects and to IT service delivery, than to internal controls monitoring or performance assessment. ISACA [57] argue that this bias can be limited by involving more stakeholders in the design process and not only the IT managers that will assign the scores to the design factors always assuming their own perspective.

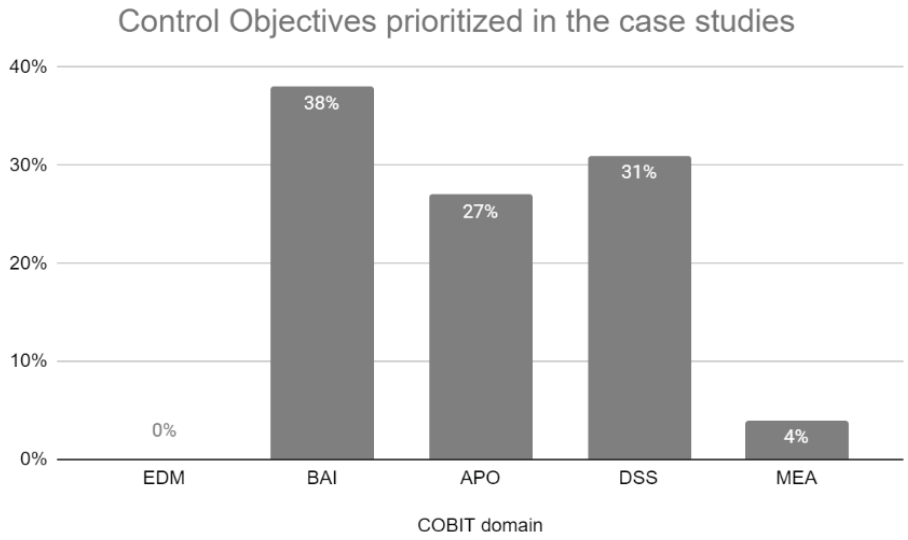

Figure 10: Control Objectives prioritized in the case studies.

Finally, Table 2 illustrates the set of control objectives that results to be more important to prioritize in manufacturing SMEs. Following the same approach adopted in Bartens et al. [49] this set could become a COBIT minimum baseline for SMEs with similar characteristics.

Table 2: Most frequently prioritized control objectives across the 5 cases studies.

Control Objective ID	Process
APO11	Managed Quality
APO13	Managed Security
BAI04	Managed Availability & Capacity
BAI05	Managed Organizational Change
BAI08	Managed Knowledge
BAI11	Managed Projects
DSS04	Managed Continuity
DSS05	Managed Security Services

6.3. COBIT Design Toolkit as an IT-Business alignment tool

During the governance system design process, the IT Manager is “forced” to adopt a governance perspective and to evaluate if the business strategy of the firm (DF1 and DF2) is aligned with the remaining design factors concerning Information & Technology. A common observation, made by the IT practitioners during the case studies has been that they weren’t fully aware of the company strategy and they struggled to compile DF1 and DF2 (Transcript 2, line 7, Case 5 notes). This issue suggests that the Design Toolkit in an SME context should be compiled together by the entrepreneur and the IT manager. In this way, the alignment between business and IT strategy can be achieved. The Design Toolkit can be a key element to capture the attention of an entrepreneur who is not concerned by IT potential issues or that considers IT only as a support to the operations. The claims of the IT manager for IT initiatives can in fact be supported by the Design Toolkit outputs, which are validated by a framework internationally recognized and can be helpful to convince the entrepreneur. As stated also in theory [67], the entrepreneur has huge decision-making power in an SME and implementing IT-Governance practices will need his support.

6.4. COBIT Design Toolkit dark sides

COBIT2019 resulted in a framework that can be approached also by IT practitioners in a SME context, thanks mainly to the introduction of Excel spreadsheets like the Design

Toolkit, which help the implementation of the framework. In fact, the case studies have shown that the IT Manager is comfortable with this tool, even if he has scarce knowledge about the rest of the framework. This observation gets along with Lee [50] who, among the suggestions for the design of a new ITG framework for SMEs, cited the adoption of general end-user software packages.

However, the authors noticed different elements that can limit small organizations in achieving value through COBIT2019 and the Design Toolkit:

1) The Design Toolkit (but in general the framework) fails to be prescriptive for a small-medium enterprise. ISACA [57] claims that COBIT2019 should be perceived as a prescription for a governance system but, at least for SMEs, the IT practitioner can achieve more mapping than a prescription of what to do. The prescriptive part of the framework still remains too abstract and generalist in an SME context.

2) The Design Toolkit is an easy-to-use tool but the language and the vocabulary adopted is not easy to be understood for an IT practitioner, even more for an entrepreneur with no IT background. In addition, some design factors implicitly refer to theoretical models that are not explained in the framework and probably are unknown to the IT Manager. An example that emerged in the case studies has been the design factor number seven, which deals with the role of IT in the organization refers to the Strategic Grid by Nolan and McFarlan [68].

3) The Design Toolkit output may not be completely clear for the IT practitioner. While the meaning of the relevance scores for the control objectives resulted clear at the end of the design process, the capability levels have been difficult to interpret for the interviewees. Reflecting on this, the target capability level suggested by the Design Toolkit is a piece of insightful information when it is possible to compare it with the current capability of the same process. ISACA [57, 59] argue that the capability levels help the alignment with CMMI (Capability Maturity Model), but this framework is rarely adopted in a small-medium enterprise.

6.5. Implementing IT-Governance in SMEs

Conducting the case studies the authors had the opportunity to investigate the IT-governance maturity in a sample of Italian manufacturing small-medium enterprises.

IT-Governance in SMEs resulted poorly adopted, in line with other previous studies [69]. In the transcripts, there is evidence of the central role of the entrepreneur in decision making, especially for strategic issues (Transcript 4, line 55). Besides, the difficulties in managing scarce resources in the IT function emerged (Transcript 4, line

131). Both these elements were already well described in Huygh and De Haes [10]. A slight difference with prior studies can be noticed about the kind of resource scarcity, according to the IT manager interviewed it is not a problem of IT budget but more about IT leadership and IT skills of the human resources.

This study confirms different barriers to the implementation of IT-Governance in SMEs that were presented in Chapter 3, such as the frequent adoption of IT outsourcing, the reactive decision making, the lack of IT practitioners' education and awareness of IT-Governance value.

About the IT-Governance implementation mechanisms, the authors noticed a presence of relational mechanisms (even unconscious) and the complete absence of formal structural mechanisms. A finding already pointed out by Devos [12].

Lastly, it is important to highlight the concerns in SMEs about IT security. Two SMEs out of five have suffered cyber-attacks recently, as observed by Lallie et al. [4]; these episodes are more frequent after the COVID-19 pandemic. This study seems to confirm the observation of Lee [50], in which the author stressed that an IT-Governance framework for SMEs should focus on IT security.

7. Conclusions

The objective of this research work was to provide insights into COBIT2019 implementation projects and to fill the gap of a tailor made ITG framework for SMEs. The cases studies have highlighted three ways to leverage COBIT in SMEs: to map the IT resources, to prioritize the most important processes to be monitored and to align business and IT strategy. IT practitioners can treasure these findings to start the governance journey in their organization, even if a small one. The authors have also discussed the criticalities that the IT practitioner can encounter while facing the COBIT framework for the first time. These criticalities should not be underestimated when a small-medium enterprise decided to adopt the Design Toolkit and the COBIT2019 framework. Probably, there will pass many years before good IT-Governance practices will be spread in the Italian SMEs. Empirical research work can help to raise awareness among IT practitioners about the potential benefits of IT-Governance. From the academic point of view, this paper will not close the gap of a missing ITG framework for SMEs but can contribute to enriching the research stream of IT-Governance in SMEs and the COBIT2019 literature, which is still in the early days.

8. Limitations

This research work is not free of limitations. The nature of this paper is explorative, the findings presented should not be interpreted as a conclusive judgement about the COBIT framework adoption in an SME context, and further research will be needed. The sample size is relatively small and generalization to other companies should be performed carefully. The limited sample size has originated from time constraints and from difficulties in reaching out to the IT practitioners. An important limitation regards the scarce availability of academic studies about COBIT2019 due to the recent release of the framework. Besides, ISACA has not released yet the COBIT focus area dedicated to small and medium enterprises. The authors considered the standard COBIT framework.

Another limitation involves the data collection; the authors had not the opportunity to conduct face-to-face interviews due to COVID-19 pandemic restrictions. In addition, not all the participants had given the consensus to register for the interview, forcing the researcher to take hand notes, more subjected to mistakes. The author may be affected by subjectivity bias while collecting and analyzing data. The authors may have influenced the interviewees' opinions by presenting the COBIT framework at the beginning of the case studies.

Experts in the fields have not validated the findings or by different sources than the IT practitioners; the absence of data triangulation may affect the construct validity.

Additional empirical research is needed in the future to investigate the potential adoption of the COBIT framework in an SME context, potentially using the newly issued COBIT for Small and Medium Enterprises Using COBIT 2019. In the future case studies should be involved not only the IT manager but also the top management to have both the business and IT perspectives. In addition, future research should investigate the potentiality of the COBIT framework for SMEs operating in different fields, not only manufacturing, to come to more generalized conclusions. Lastly, scholars should reflect on how to spread the IT-Governance value proposition among small organizations, the entrepreneurs' and IT practitioners' awareness of these topics is still low.

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