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Assessing a Business Software Application using Strategic IT Alignment Factors: A New Way for IS Evaluation?

(Full Paper)

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ABSTRACT

The alignment between the business strategy of an organization and its related information technology (IT) strategy, infrastructure and processes remains important for both research and practice. Prior studies have shown that effective strategic IT alignment (SITA) leads to effective business value. When measuring the SITA, these studies focused on the overall information system (IS) of an organization. However, it would be useful for practitioners to evaluate, not only a global alignment, but also the alignment of a specific business software application, which could lead to business value as well. Previous investigations in the IS evaluation field, such as studies related to the Information Systems Success Model (ISSM), do not include strategic alignment factors. In this contribution, we address the issue of how to evaluate a business software application using SITA factors. To identify SITA factors, we selected a set of scientific papers and documents from practitioners related to strategic alignment and we used them as input for a coding process. We followed the thematic analysis method for coding and we obtained a hierarchical structure of SITA factors. From this structure, and based on the Strategic Alignment Model (SAM), we built an emergent alignment model that clarifies relations between a business software application and first the organization's strategies (business and IT), second the organizational structure, and third the processes and operations of the IT department. The model reveals that all relations, except those between business strategy, organizational structure and business operations, are appropriate for evaluating the strategic alignment of a business software application.

Keywords: strategic alignment, information system, IT strategy, IS evaluation, business application, strategic alignment model

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INTRODUCTION

The literature suggests that organizations must have their business and information technology (IT) strategies aligned if they want to be competitive. A meta-analysis of previous studies in strategic IT alignment (SITA) reports a positive impact of SITA on firm performance (Gerow et al., 2014). More recently, this impact has been confirmed, especially when the alignment is considered as a state of congruence (Sabherwal et al., 2019). The importance of SITA has been reported many times as highlighted in a bibliometric study (Renaud, Walsh, & Kalika, 2016).

Through the years, organizations have built up an enormous number of software applications in their portfolio, but they do not need all of them (Riempp & Gieffers-Ankel, 2007). Moreover, a significant proportion of IT budgets is simply used to keep the current application portfolio running in organizations (Dedrick, Gurbaxani, & Kraemer, 2003). Considering these aspects and the accelerating digital transformation which together increase business change needs, IT managers need more than ever to take decisions on their existing applications: keeping or killing each of them.

The research field of information system (IS) evaluation provides different ways to evaluate an IS (DeLone & McLean, 2016; Smithson & Hirschheim, 1998). In practice, an IS evaluation could lead to a decision about keeping or discontinuing it. Most iconic models in that field – such as the Information System Success Model (ISSM) (DeLone & McLean, 1992, 2003, 2016) or the Technology Acceptance Model (TAM) (Davis, 1989) – can be used to evaluate some aspects of a business software application (shortened to *business application* in this text). However, despite all the different aspects of evaluating an IS in that field, strategic alignment is something that is missing.

Taking into account, firstly, that information systems could contribute to a firm's performance (Chan et al., 1997) or could provide net benefit (DeLone & McLean, 2016) and, secondly, that a lack of business value provided by information systems is partly due to a lack of strategic alignment (Henderson & Venkatraman, 1993), we argue that IT managers should be able to evaluate the strategic alignment of each of their existing business applications. This evaluation could help managers identify which applications are likely to provide a high level of business value or benefit, and therefore be able to take decisions about keeping or discontinuing them. This process is likely to improve the firm's performance. However, in the field of strategic alignment, existing research actually focuses on the strategic alignment of the organization's overall information system and not on alignment of a specific business application. Hence IS is considered as a subsystem of the firm, as defined preliminarily by Boulding (1956). This focus on the overall subsystem is clearly noticeable in all contributions identified in a study

comparing strategic alignment models (El-Mekawy, Rusu, & Perjons, 2015) and in another study that identifies contributions that address strategic alignment in the field of IS evaluation (Michel & Cocula, 2014).

Although there is no strategic alignment study focusing on business application evaluation, and no IS evaluation study focusing on strategic alignment, the need to consider the link between organization's strategic objectives and IS evaluation has already been stated (Smithson & Hirschheim, 1998). In this contribution, we want to address the issue of assessing an IS through the strategic alignment focus, by using strategic alignment factors. We formulate the following research question: *How can we evaluate a business software application using strategic IT alignment factors?*

Smithson and Hirschheim (1998) stated that there are unquantifiable and hidden commercial advantages behind information systems. However, they also claimed that, in the future, it will no longer be acceptable for the benefits provided by an IS not to be quantifiable and well formalized. By proposing a way of evaluating a business application using SITA factors, we address this issue of quantifying and formalizing benefits or impacts provided by an IS.

In this study, we review the literature in the research fields of IS evaluation and strategic alignment, and we demonstrate the existing gap at the intersection of these two fields. We explain our theoretical framework, which reflects our expectations about how strategic alignment of a business software application should be conceptualized. Then we detail the methodology we employed firstly to select a panel of scientific papers and practitioners' public documents, secondly to code them using thematic analysis, and finally to bring out a strategic alignment model that will provide understanding of the strategic alignment of a business application. Then we present and discuss the obtained model. We argue why this model is likely to be generalized and subsequently to be used as a framework to evaluate this alignment. Finally, we point out some managerial implications and give directions for future research.

THEORITICAL BACKGROUND

Information system scope

The real underlying definition of IS is not exactly the same, whether we are in the IS evaluation research field or in that of strategic alignment. In the literature, IS can be defined as a subsystem of the an organization, which is situated between the control and the operational organization's subsystems (Boulding, 1956; Le Moigne, 1977). With this definition, IS is unique in the organization and may therefore include several business applications. Yet it is also defined as a system which collects, memorizes, transforms, and provides information through the use of information technologies and operating methods (Laudon & Laudon, 2013, p. 20). In this way, IS is not necessarily considered as a unique system existing in the organization. These authors explain that IS can be classified according to its scope of use: individual, organizational, inter-organizational, or extra-organizational (Reix et al., 2016, p. 5), while others suggest classifying IS evaluation in five levels: macro, industrial sector, firm, application, stakeholder (Smithson & Hirschheim, 1998). According to them, the *application* level is "the focus of most of the literature" (Smithson & Hirschheim, 1998, p. 161). In this study we consider two types of IS: one that is a subsystem of a firm (large scope) and one considered to be a software application (small scope).

What kind of IS scope do researchers refer to when they work in the strategic alignment and IS evaluation fields? We have rarely seen authors explicitly defining this scope in published contributions. However, we notice that, in most cases, there is an implicit scope, depending on the research field. By examining a meta-analysis of past research in strategic alignment (Gerow et al., 2014), we state that, in this field, IS is undoubtedly considered as a subsystem of the organization; one strategic alignment evaluation seems to always refer to one IT and one business strategy specific to one firm. Our statement may be confirmed by another study, a bibliometric analysis of literature on strategic alignment (Bennani, Beldi, & Baile, 2004). In this study, authors classified contributions by level of analysis and determined that 77% of them are focused on the firm level, 13% on the inter-organizational one, 6% for business units and 4% for groups and others. There are no criteria about a scope such as software application.

In the IS evaluation field, as in IS success studies (DeLone & McLean, 1992, 2003, 2016; Petter, DeLone, & McLean, 2013), IS is not restricted to the subsystem of a firm and is, in most cases, considered to be an application (Smithson & Hirschheim, 1998). Indeed, measurable factors of system quality dimension of the ISSM, such as usability, availability, reliability, adaptability, or response time (DeLone & McLean, 2003), are more designed to evaluate an application than an overall firm's IS. As a result, we state that the meaning of IS is different depending on the research field: it is usually a unique subsystem of the firm in strategic alignment, and mostly an application in IS evaluation.

IS evaluation

Evaluation is unavoidable and prolific and is the first or second most covered topic in the field of information systems (Michel & Cocula, 2014). It has been reported for many years that the need for IS evaluation is increasing (Smithson & Hirschheim, 1998). A lot of reasons for evaluating IS have already been given, as have a lot difficulties in evaluation (Smithson & Hirschheim, 1998). One of the given reasons to evaluate is to support a decision between maintaining or redeveloping an old or inherited system (Smithson & Hirschheim, 1998). Our contribution matches with this reason: by understanding the relations between business/IT strategies and a business application, we come one step nearer to new method of IS evaluation that should help managers deciding if a system should be maintained, based on the fact that the better the alignment, the better the firm's performance should be.

As reported by DeLone and McLean (2003, 2016), the most important previous studies in IS evaluation have shown that a greater quality of IS involves a higher intention to use it, a higher effective use and a higher user satisfaction, and this finally has impacts on the firm that are usually net benefits. The quality of IS could be decomposed into information, system and service quality (DeLone & McLean, 2003, 2016), or even into performance and effort expectancy, social influence and facilitating conditions if we consider the context of use of IS (Venkatesh et al., 2003).

The literature in IS evaluation does not seem to consider a factor of IS quality like the application's alignment with business and IT strategies. Petter, DeLone, and McLean (2013) reviewed the literature to search independent variables of IS success, and identified 43. None of them were directly related to strategic alignment. They do consider the variable *type of IS*, which classifies an IS between strategic IS and transactional IS. However, as reported by their study, the influence of the *type of IS* on a firm's net benefits appears to be sometimes consistent and sometimes not. We think that we should consider the strategic alignment of an IS instead of its type. In the light of this study (Petter et al., 2013), we postulate that strategic alignment factors have not really been included yet in IS evaluation models such as ISSM.

Strategic IT alignment

There is no universal definition of strategic IT alignment (SITA; also shortened to *strategic alignment* in this text). The concept of SITA is recognized as ambiguous (Maes et al., 2000). Different names that refer to strategic alignment are reported to be used: fit, congruence, harmony, integration, link, bridge (Cumps et al., 2009), consistency (Walsh, Renaud, & Kalika, 2013), and adjustment (Rebai, 2013). Reich and Benbasat (2000, p. 82) said that "although there has been much attention paid to alignment, no comprehensive model is commonly used".

Strategic alignment is considered as a process by some authors, and as a state of congruence by others (Walsh et al., 2013). More recently, Sabherwal et al. (2019) revealed that strategic alignment is both a state of congruence and a reflecting capability over IT investment.

Authors have different views about what exactly strategic alignment is. In many cases, strategic alignment is considered as an alignment between a firm's business and IT strategies (Bergeron & Raymond, 1995; Chan et al., 1997; Sabherwal et al., 2019). For instance, authors explain it as "how well the content of the realized business strategy matches the content of the realized IT strategy" (Wu, Straub, & Liang, 2015, p. 503). Nevertheless, earlier researchers have examined alignment between four business and IT components: business strategy, IT strategy, business infrastructure and processes, and IT infrastructure and processes (Henderson & Venkatraman, 1993). Hence, "strategic alignment refers to the fit between two or more of these components" (Gerow et al., 2014, p. 1160). Studies often deal with the fit of two components over the four mentioned. For instance, some authors focused specifically on the harmony between business and IT in terms of management, excluding strategies aspects (Chan & Reich, 2007; Luftman, 2000), but we think that we can't exclude any of the four components from the strategic alignment definition. The importance of each link between the four components differs from one context to another. For example, a recent study highlighted that government officials in the public sector think that it is strategic fit that enhances performance, while managers in the private sector think that performance comes from functional integration (Hung & Lin, 2018).

As the strategic alignment model (SAM) remains the most well-known and the most widely used model in the strategic alignment field (Gerow et al., 2014; Renaud et al., 2016), and considering that SAM has practical and conceptual value and that frameworks have been created to help managers determine, monitor, and achieve alignment (Avison et al., 2004), we have decided to define strategic alignment as the fit between the four components of the SAM. This means that we define strategic alignment as the state of congruence and as the two links of strategic fit – alignment between business strategy and business infrastructure and processes; and alignment between IT strategy and IT infrastructure and processes – and the two links of functional integration – alignment between business and IT strategies; and alignment between business and IT infrastructure and processes.

Why should companies align their IT with their business strategy? It is well recognized that strategic alignment is about measuring the effect on a firm's performance. Previous investigations have shown that alignment between business and IT strategies, as a state of congruence, has a positive impact on a firm's performance (Bergeron & Raymond, 1995; Chan et al., 1997; Sabherwal et al., 2019). Others have demonstrated that alignment between business and IT (functional integration) also affects a firm's performance positively too (Chan & Reich, 2007; Sledgianowski, Luftman, & Reilly, 2006). This is even true for the harmony between executive and information system management teams (Croteau, Bergeron, & Raymond, 2001). Strategic alignment is also the most important determinant for success of IT investments (Hu & Huang, 2006). The recent study of Sabherwal et al. (2019) also revealed that alignment between business and IT strategies reflects a capability to improve the positive effect of IT investments on a firm's performance, when the firm is in a dynamic, complex, or hostile environment, but reflects a rigidity that reduces the positive effect when it is in a stable or simple environment. There were some studies that brought a paradox with their inconsistent findings on the effect of alignment on business value. However, according to a meta-analysis of the literature on strategic alignment, "the existent evidence suggests there is not much of an alignment paradox, which suggests alignment should lead to higher levels of performance" (Gerow et al., 2014, p. 1178). Thus, we can confirm the real benefits of improving strategic alignment in firms. Furthermore, considering that alignment between strategies, and alignment between business and IT processes, are both positively impacted by IT Governance (De Haes & Van

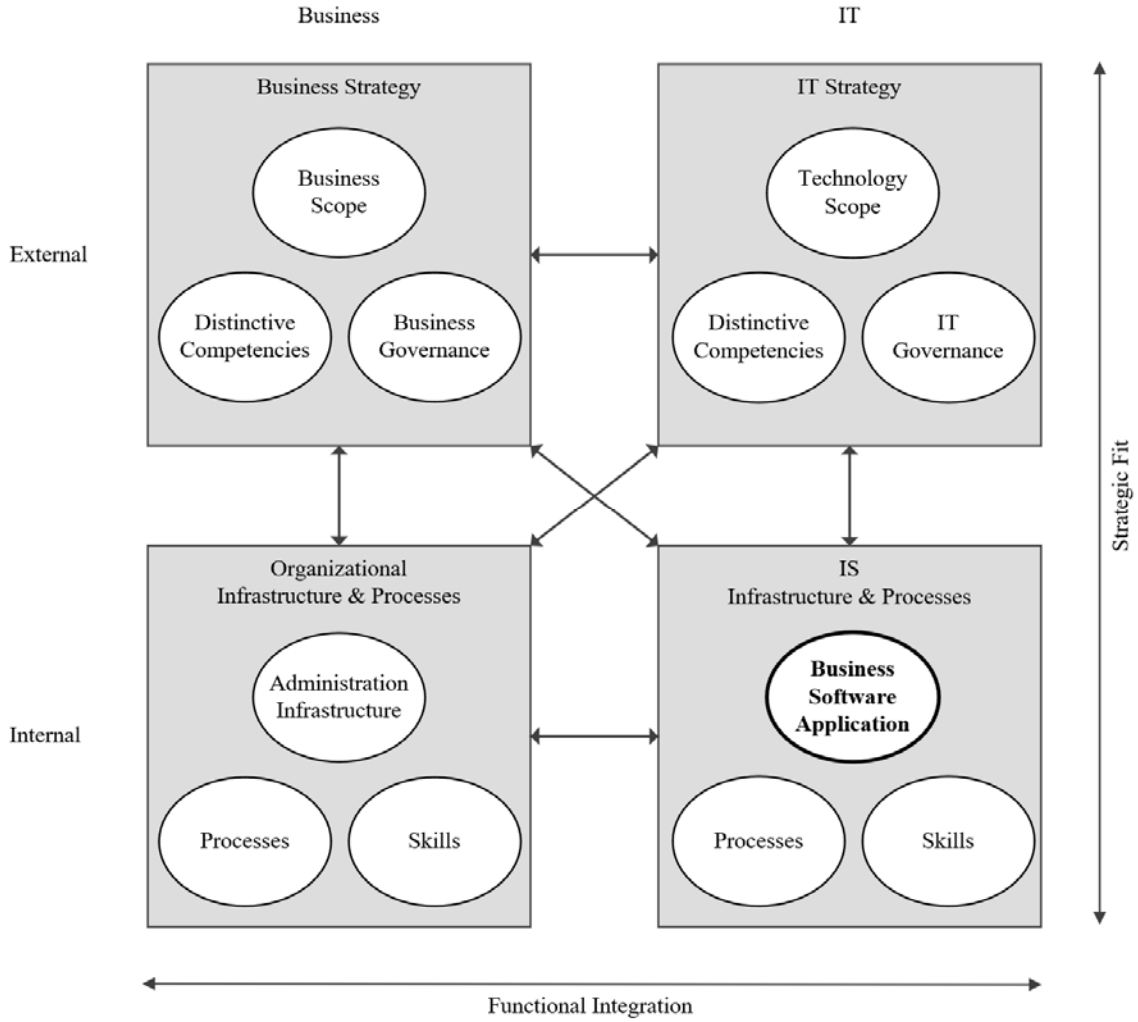
Grembergen, 2009; Wu et al., 2015), we also confirm the need to provide new knowledge and tools to managers in order to help them improve IT governance because that should consequently lead to better strategic alignment and then to better firm's performance.

Between IS evaluation and strategic alignment

As we have highlighted already, an information system is mostly considered as an application in the research field of IS evaluation and as an overall and unique subsystem of a firm in the field of strategic alignment. Consequently, strategic alignment models are not suitable for evaluating a specific business application. Furthermore, according to our literature review, there is no strategic alignment factor or concept that actually exists in IS evaluation models such as ISSM. Yet, in both fields, the targeted effect is a business value such as net benefit or more specifically firm's performance. It seems that no study has yet mixed these two fields, and this is what we aim to address with our contribution.

THEORITICAL FRAMEWORK

Given that, as we know, there are no existing alignment factors in IS evaluation models such as ISSM (Petter et al., 2013), we think that the best way to evaluate a strategic alignment of a business application is to take a strategic alignment model and then position the business application within it. To outline our research intention, we select the most widely used model, SAM (Henderson & Venkatraman, 1993), and adapt it by replacing *Architectures* located in the *IS Infrastructure & Processes* by *Business Software Application* (as represented in Figure 1). From this perspective, the *business software application* could be considered as a strategic information system, that was defined as an "information system used to support or shape an organization's competitive strategy" (Rackoff, Wiseman, & Ullrich, 1985, p. 285).



Source: Strategic Alignment Model (Henderson & Venkatraman, 1993) adapted for this study

Figure 1: Theoretical framework

The theoretical framework presented here is not intended to be a final model able to reflect strategic alignment of a business application. Rather, it should help to give direction to our research. It suggests firstly that a business application should be located in the IS infrastructure and processes, meaning that a business application is something IT and internal to the firm. Secondly, as we put the business application in the place of IS architecture, we consider that this application is mainly a software issue. From this perspective, skills and processes located in IS infrastructure and processes domain are only

considered as human things (that is human skills and processes that require people). The business application could contain processes as well, but only embedded automated processes. Thirdly, the theoretical framework exhibits only one business application, whereas a lot of different business applications usually exist in a firm. This means that the model focuses only on one business application alignment. When more than one application is required to be evaluated, the model must be used several times, more precisely once for each application to be evaluated.

The presented theoretical framework does not detail relations between the business application and other specific components of the SAM, such as business administration or internal business processes. We are convinced that a brand-new model is necessary to more effectively address the issue of business application strategic alignment: a model that embraces, in detail, the links around the business application. The presented framework helps then to give an intention and a direction for designing a new and more detailed model.

METHODOLOGY

Creating a new theoretical model is about creating a new theory. Hence, we use the grounded theory principles (Glaser & Strauss, 1967) in order to code a selected qualitative data set and to obtain a hierarchical structure of alignments factors. From the resulting codes located at the top of the structure, we propose a new business application strategic alignment model. Coding qualitative data such as scientific papers has already been achieved in previous meta-analyses on strategic alignment and this usually gives meaningful outcomes (Gerow et al., 2014; Renaud et al., 2016).

Source of data

To code qualitative data, we selected a data set of articles and documents where each of them had addressed the subject of strategic alignment. We decided to select both scientific articles and public documents coming from practitioners. Although strategic alignment models elaborated by researchers appear to be theoretically justified, there is a lack of enthusiasm on the part of firms to adopt them, which demonstrates the existence of a gap between theory and practice in this area, as has already been highlighted (Renaud et al., 2016; Smithson & Hirschheim, 1998). Using this dual approach, we attempted to reflect, as well as possible, the entire picture of strategic alignment.

To select scientific articles, we chose tree studies that review the literature and show or compare a range of strategic alignment models (El-Mekawy et al., 2015; Michel & Cocula, 2014; Thevenet, 2009). Then we selected the references that authors mostly used in theses tree studies. We gathered and prioritized all the selected references in one data set (Table 1). To allow the first important codes to be created, priority is given to the article of Henderson and Venkatraman (1993). Afterwards, priority is set using the average of citations per year, which is calculated from the number of citations given by Google Scholar and then divided by the number of years old of each article. This method introduced a bias for the article of Osterwalder et al. (2005), because the main subject of this article is not strategic alignment but business model and this article is well known in the business model research field. We corrected this bias by reducing its priority.

Table 1: Selected scientific articles for coding

Priority	Reference	Citations / year
1	Henderson and Venkatraman (1993)	181.6
5	Reich and Benbasat (2000)	85.8
2	Sabherwal and Chan (2001)	75.1
8	Chan et al. (1997)	70.2
3	Luftman (2000)	64.5
6	Maes et al. (2000)	13.4
7	Osterwalder et al. (2005)	212.3
9	Hu and Huang (2006)	7.9
4	Cumps et al. (2009)	4.6
10	Bergeron and Raymond (1995)	4.4
11	Walsh et al. (2013)	1.3
12	Bennani et al. (2004)	0.2

Source: This study

We did not proceed in the same way when selecting public documents coming from practitioners. To identify these documents, we used the public search engines of Google and retained websites that published documents for firms free of charge. The search allowed us to find relevant documents on the websites of the *Club informatique des grandes entreprises françaises* (Cigref), the *Information Systems Audit and Control Association* (ISACA) and the *Strategic ICT Institute*. Then we browsed each of these websites in depth in order to identify documents where strategic alignment is addressed and we finally retained five relevant documents for coding (Table 2).

Table 2: Selected public documents for coding

Priority	Authors	Document Title	Publisher	Retrieved from
1	Phelizon and	Alignement stratégique du système d'information:	Cigref	www.cigref.fr

	Rouhier (2002)	Comment faire du système d'information un atout pour l'entreprise?		
2	Phelizon (2007)	Baromètre Gouvernance Systèmes d'Information: Cadre d'évaluation d'une démarche de gouvernance du système d'information	Cigref	www.cigref.fr
3	Dhugga and Addison (2011)	Strategic ICT Toolkit for institutional self-analysis	StrategicICT	www.nottingham.ac.uk
4	AFAI (2006)	Maturité des entreprises en matière d'IT Governance	ISACA	www.isaca.org
5	Williams (2005)	IT Alignment: Who is in Charge?	ISACA	www.isaca.org

Source: This study

Coding

We used the selected articles and documents as qualitative data to code. We started by coding scientific articles and ended with public documents that come from practitioners. While we were coding, we endeavored to create codes that reflected potential strategic alignment factors. This process allowed us to form a hierarchical structure of strategic alignment factors.

The coding method used to develop a theory was first suggested by Glaser and Strauss (1967). Various different methods have since been proposed. To carry out our coding, we followed the thematic analysis method initially suggested by Boyatzis (1998) and more recently described by Paillé and Mucchielli (2012). Given that this method allows its user to extract a set of hierarchically structured themes (Boyatzis, 1998), it fully meets our needs. Thus, each theme corresponds to a potential strategic alignment factor.

Thematic analysis allows its user to answer the following question about a qualitative data set: *what is fundamental in this text and what exactly is it stating?* (Paillé & Mucchielli, 2012, p. 231). Before starting the thematic analysis, the users of this method have to make decisions about three issues (Paillé & Mucchielli, 2012): the nature of the material (paper or software), the location of written themes (in the margin of the document, within the text lines or on separate cards), and the type of approach (continuous or sequential). For our study, we chose the software NVivo 11.4.1, we wrote themes on separate cards and we opted for a continuous approach. The continuous approach means that new themes have to be identified for each new source processed, as opposed to the sequential approach which implies selecting only a sample of sources from the corpus to identify new themes and then only classifying into existing ones (Paillé & Mucchielli, 2012).

Before any thematic analysis, it is necessary to define the parameters of the study, as well as the researcher's stance (Paillé & Mucchielli, 2012). Parameters of the study provide guidance during identification of themes. The most important parameter is to define an objective to be achieved during the analysis. For our case, we fixed this objective by formulating the question: w*hat factors can influence strategic alignment in this text?* The researcher's stance is the mindset that the analyst must choose to carry out the retrieval of themes. For this study, we adopted the following stance: *be attentive to the elements that can be measured*. This was intended to extract strategic alignment factors that could be evaluated later.

Thematic analysis is carried out in two phases (Paillé & Mucchielli, 2012): themes identification and construction of the tree of themes. The first phase, themes identification, consists of reading the source text, page by page, and identifying units of meaning. These units are sentences or paragraphs that convey a meaning or idea. A theme must be assigned to each identified unit. Creating a theme is an inference process. In other words, by creating a theme, the analyst creates a more generic element compared to what is written in the text, and avoids, as far as possible, any interpretation. The second phase, construction of the tree of themes, is about comparing and finding connections between identified themes (Paillé & Mucchielli, 2012). For each connection, the analyst has a choice between four options: (1) merging themes if they are synonyms, (2) grouping them under a new parent theme if they concern the same matter, (3) hierarchizing them if one could be the parent theme of the other, and (4) subdividing a theme if it covers more than one concept. Paillé and Mucchielli underline the importance of grouping, which really helps in creating the hierarchical structure. According to them, analysts should strive to detect the same axes between themes in order to group them.

In this study, we went through the two phases of thematic analysis for each article or document of our data set. Paillé and Mucchielli (2012) qualified this approach as *progressive*. We stopped coding when we reached a stability in the emerged themes, that is when coding no longer brought new themes or restructure others.

At the end of the coding – thematic analysis in our case – we obtained a hierarchical structure of strategic alignment factors.

Creating the emerging model

Not all of the strategic alignment factors that we have obtained had the same importance. Furthermore, some of them weren't suitable for representing a factor of strategic alignment for a business application specifically, because IS is mostly considered as a subsystem of the firm in this research field. For these reasons, we applied a filter to eliminate, first, the factors that don't definitely reflect the alignment of a business application specifically and, second, those that came from only one text unit after

the coding. In the end, we obtained a tree structure of factors that were relevant for specifically reflecting what can be the alignment of a business application.

We designed the new model by taking the strategic alignment factors that were located closest to the root of the tree and using our theoretical framework as a guide. We took the first nodes of the tree to define the axes of the model and the second and third to define alignment links between domains. We established domains by being inspired by the four main components of our theoretical framework. In the end, we obtained a strategic alignment model that includes the business application surrounded by alignment links that are more detailed than in our initial theoretical framework.

RESULT

Strategic alignment factors

The coding process that we have applied on our qualitative data set, which was composed of scientific articles and public documents for practitioners, results in a hierarchical structure of strategic alignment factors. The final structure obtained after filtering less important and unsuitable factors is presented in Table 3 in the appendix.

In regard to this emerged structure, it appears that all factors of strategic alignment are classified either in the *managerial strategic fit* factor or in the *functional integration* one. This is in adequation with the SAM (Henderson & Venkatraman, 1993). However, we found that there were not just two alignment links under the *functional integration* factor as in the SAM, but three. Instead of functional integrations between business and IT strategies and between business and IS infrastructure, processes and skills, the three factors that we found were strategic integration, structural integration, and operational integration. Strategic integration represents the alignment between the business and IT strategies, and structural integration the alignment between business or organizational structure and the IS architecture. Finally, operational integration reflects how the IS enables business processes to be executed. These three alignment factors came while we were coding the article of Maes (1999), and they were relevant right through all the coding process. Thus, we confirmed the interest for "extending the vertical dimension" (Maes, 1999, p. 6) that Maes suggested. However, we can't suggest "extending the horizontal dimension" (Maes, 1999, p. 7), because our coding process results only in factors related to links between business and IT and almost never exactly between business and information and between information and technology.

Business application strategic alignment model

The literature review of this study basically highlights two points. First, existing strategic alignment models are not suitable for evaluating a specific business application, and, second, that IS evaluation models such as ISSM do not incorporate strategic alignment factors or concepts. As we mentioned, we are convinced that a new model is necessary to more effectively address the issue of business application strategic alignment: a model that embraces, in detail, the links around the business application.

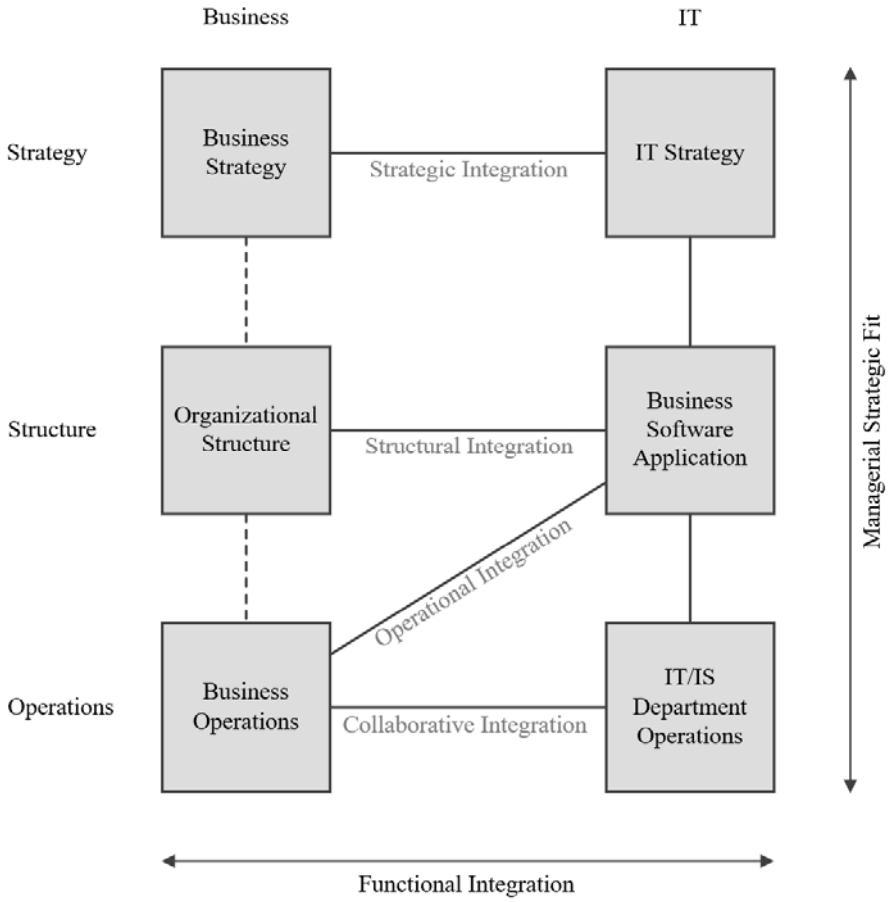
Through a process of coding and based on our theoritical framework, we propose a model that should help to understand the alignment links between a business application and (1) business and IT strategies, (2) organizational structure and (3) business and IT operations. This business application strategic alignment model (BASAM) is represented in Figure 2.

The horizontal axis, functional integration, comes from the SAM (Henderson & Venkatraman, 1993), while the vertical axis, managerial strategic fit, has emerged by coding two sources: the contribution of Henderson and Venkatraman (1993) for the strategic fit, and the model of Maes (1999) for the managerial aspect. Maes considers the managerial dimension as a compound of the three levels that are strategy, structure, and operations (1999) and this has also been incorporated in the model. Strategic integration and operational integration also arose from the SAM. The concepts of structural integration and collaborative integrations did not come from a particular model. We propose using these labels as they have been established in the tree structure of factors and as they seem meaningful.

The six domains

The six squares in Figure 2 are called *domains*, each encompassing specific aspects of a firm. Business strategy is the element that defines the firm's business scope such as the choices of products or services and market positioning. This domain also defines the firm's core competencies and what make it different from competitors. Also, business strategy includes aspects of business governance, such as decision-making on strategic alliances, partner selection, purchasing decisions, and merger decisions.

IT strategy defines the technological scope, which consists of taking decisions about using or not using existing technologies or new technologies available on the market in order to make the firm different from competitors. This also includes decisions about what competencies are required from IT employees, and also governance matters, such as decisions about alliances with IT service providers, choices between developing IT services internally or outsourcing and, finally, decisions about what IT standards to follow.



Source: This study

Figure 2: Business application strategic alignment model

The organizational structure includes the organization chart, the models of an organization's key processes, and the detailed framework or structure set in order to operationalize the business model of the firm.

The business software application is the IS as we have defined it in this study and from which we expect an alignment with other related domains such as business and IT strategies. It represents the structure of the business application: internal architecture, implemented software services, automated processes and embedded data structures.

Business operations include all business processes and tasks, from the design stage to execution and monitoring, as well as the acquisition and development of collaborators' skills related to the firm's core business, by offering trainings, courses, or cross-learning.

IT/IS department operations include all processes and tasks undertaken by IT/IS department staff, such as selection, development, configuration, deployment, and maintenance of software applications. This domain also includes setting up the management of a department's operations, such as providing a technical support service to users or adopting and deploying methods such as *Information Technology Infrastructure Library* (ITIL).

Six relevant alignment links

Strategic alignment is not evaluable by measuring these six domains, but rather by assessing the links between these domains. In regards to our model, there are eight links that were identified. We have found that two of them are not representative for evaluating the alignment of a business application: the relations between business strategy and organizational structure, and between organization structure and business operations. The other six turned out to be relevant for representing the strategic alignment of a business application.

The link between business and IT strategies, represented at the top of the model shown in Figure 2, is the most prevalent one in literature on strategic alignment. This alignment aims to determine how good the coherence between these two strategies is. It ensures that business matters are well considered when the IT strategy is established and that IT concerns and opportunities are well considered when the business strategy is drafted. This alignment is also about IT investments. It checks that IT investments are made in coherence with business strategy and that both businesses and IT managers have approved these investments.

Structural integration ensures that the application is integrated and managed in a common and centralized way for the entire organization, regardless of the departments involved. The existence, in a firm, of isolated business applications, such as *silos*, is an example of a poor structural integration. Structural integration is also the alignment between the business application and key business processes. Thus, an application that directly helps key business processes to be realized thereby improves the alignment level of this application.

Operational integration ensures that the application is useful to employees and efficient when they carry out their operations. The application must therefore correctly support all business processes. Business value provided by the application must also be formally demonstrated.

Collaborative integration is the level of collaboration between the users of the application and their IT/IS department colleagues who are in charge of the application. For effective collaborative integration, people must be able to communicate, to know each other, to have trust, and to show commitment to the collaboration.

Alignment between IT strategy and business application verifies whether choices made about technologies used for the application are consistent with existing technologies on the market. This alignment also concerns the relevance of alliances with external partners, and checks whether the application was something formally planned in the IT strategy or not.

Alignment between the business application and IT/IS department operations measures the ability of the IT/IS department to maintain and upgrade the application.

The resulting model shown in Figure 2 suggests that the six alignment links of a business application must be well appraised in order to consider this application as strategically well aligned.

Discussions

The emerged model of business application strategic alignment confirms that, first of all, IS evaluation is not only about evaluating the success (DeLone & McLean, 2003, 2016) or the technology acceptance (Venkatesh et al., 2003) but should also include alignment with strategies, organizational structure, and the IT/IS department's operations. This is important, because it could explain why the expected net benefit is sometimes not consistently achieved by the use of IS and sometimes not by its related user satisfaction either.

Secondly, results show that existing strategic alignment models are unlike the model that has emerged in this study. This confirms the need to develop a new strategic alignment model that is able to evaluate a specific business software application.

Thirdly, our study emphasizes the need to evaluate strategic alignment between all the components involved rather than only two of them such as alignment between business and IT strategies. This suggests that a business application could have some degree of alignment, even if the application is not specifically considered as a strategic information system. A business application that doesn't support business strategy, but has good structural, operational and collaborative integrations, may therefore be considered as a well-aligned application, without specifically being a strategic information system.

Considering that the emerged model was built through coding that used several scientific papers and public documents, it should not be specific to a particular context and should rather be generalized to various situations. Since Cumps et al. (2006) has highlighted that strategic alignment is not dependent on country, company size or turnover, the model should not be affected by any of these factors.

CONCLUSION

Assuming that there was no existing model capable of addressing the issue of evaluating a business software application through strategic alignment factors, we have designed a new strategic alignment model specifically suited to that purpose. Our research question was: *How can we evaluate a business software application using strategic IT alignment factors?* According to the results we have obtained, we can now answer that a business software application can be evaluated through an assessment of the following six alignments: (1) strategic integration, (2) structural integration, (3) operational integration, (4) collaborative integration, (5) fit between IT strategy and the business application, and (6) fit between the business application and the operations of IT/IS department. These six alignments are represented as links between the business application and the other domains shown on the emergent model. Thus, this model should help researchers to better understand relations between a business application and the strategies of a firm, its business structure and its business and IT operations.

Scientific implications

This study has highlighted a clear ambiguity with the concept of IS and more specifically with its scope. Indeed, IS is sometimes considered as a unique subsystem of a firm – which is specifically seen in the strategic alignment literature – and sometimes it is considered more as a software package or a business application – which is more the case in the IS evaluation field. For researchers, that means that we have to be careful about the meaning of IS and more specifically its scope.

For researchers working on strategic alignment, this study has highlighted that existing strategic alignment models focus mostly on the overall and unique IS of a firm. For researchers working on IS evaluation, we have concluded that existing models such as ISSM do not consider strategic alignment as a success factor. Thus, we call for further research studies that combine these two fields. The model that has emerged in this study gives a first framework to help in understanding the overall issue.

Managerial implications

The accelerating digital transformation requires firms, more than ever, to keep competitiveness and to ensure an effective business strategy and an effective strategic alignment. It is important for firms to have IS aligned with the strategy. For them, if each IS is well aligned, the global performance should be ensured.

Limitations and directions for future research

The first and most important limit of our study is the selected set of scientific papers and public documents for coding, which could be insufficient to represent the wider aspects of strategic alignment. However, since we didn't extract any important new code while coding the last documents, from all those we have selected, we think that we have reached a saturation. Thus, we think that coding new sources wouldn't have brought any further aspects into the emerged model.

The business application strategic alignment model is not yet validated and must be operationalized. Each link should be tested, and the impact of each one should be measured over the net benefits. This also involves the need for developing a method to evaluate a business application through strategic alignment, based on the emerged model. In future research, the level of a business application strategic alignment has to be used as a factor in IS success and should determine whether strategic alignment influences the intention to use, the effective use, and the user satisfaction.

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APPENDIX: Strategic alignment factors

Table 3 presents the strategic alignment factors obtained after the coding and filtering process. Explanations about acronyms used in the *Source* column are described in

Table 4. The source informs the reader about the article(s) or document(s) from which each factor has been extracted during the coding.

Table 3: Hierarchical structure of strategic alignment factors

Strategic alignment factor	Source
Managerial strategic fit (external-internal)	HV, MA
IT strategic fit	HV
Alignment between IT strategy and IS architecture	HV, MA
Consistency of technological choices	HV, C1, IC
Consistency of IS with IT strategy	CU
Existence of external strategic alliances	HV, C1
Existence of policies and IT standards	C3, IC
Existence of IT strategy	HV, C1, IC
Architecture agility	HV, LU, IC
Alignment between IS architecture and operations	HV, MA
Functional integration (business-IT)	HV, LU
Operational integration	HV, MA
Alignment between business operations and IS architecture	
Alignments of IS with business processes	LU, CU, C3, IC
IS flexibility leveraging responsiveness to business needs	LU, C1
Maturity of business value created by information systems	HV, LU, CU, C1, IC
Maturity of relations between IT department and business collaborators	
Ability to minimize resistance to change	LU, CU, CI
Maturity of communications	LU, CU, RB
Mutual understanding	
Business collaborators' understanding of IT and its impacts	LU, CU, C1, IC
IT collaborators' understanding of business operations	LU, C1, IC
Common language between IT and business collaborators	CU, OS, C1
Existence of means of communication	LU, RB, C1, C2
Existence of direct communication	RB, C1
Knowledge sharing	LU, RB
Partnership maturity	LU, CU
Trust between IT and business collaborators	LU, RB
Existence of programs that encourage the relationship	LU, CU, RB, C1
Perception of IT as a contributor of value	LU, CU, IC
Willingness and shared commitment	C1
Existence of a commitment to collaboration	LU, IC
Existence of incentives for willingness to collaborate	CU, IC
Strategic integration	HV, SC
Existence of a governance structure	LU, CU, RB, C1, C3, IC
Relevance in prioritizing IT investments	HV, LU, C1, IC
Prioritizations are approved both by IT and business	LU, C3, IC
Prioritizations are made according to the creation of value or competitive advantage	LU, C1, C3
Prioritizations consider business and IT strategies	CU, IC
Business line takes IT into account	
Consideration of IT in business strategy	
Consideration of IT constraints in business strategy	C1
Consideration of the potential of ICT in business strategy	HV, CU, C1, C2, IC
IT/IS department take business line into account	
Understanding of business strategy by the IT department collaborators	LU, C1, C2
Participation of business collaborators in IT strategy planning	LU, IC
Consideration of the business in the IT strategy	RB, CU, C1, IC
Structural integration	HV, CU, MA
Existence of a unique and centralized IT department all over the company	CU
Integration of information systems between departments	LU, IC

Source: This study

Table 4: Caption

Identifiant	Reference
HV	Henderson et Venkatraman (1993)
SC	Sabherwal et Chan (2001)
LU	Luftman (2000)
CU	Cumps et al. (2009)
RB	Reich et Benbasat (2000)
MA	Maes et al. (2000)
OS	Osterwalder et al. (2005)
C1	Phelizon et Rouhier (2002) (Cigref)
C2	Phelizon (2007) (Cigref)
C3	AFAI (2006) (Cigref)
IC	Dhugga et Addison (2011) (Strategic ICT)

Source: This study

For more information about these sources, please refer to Tables 1 and 2.