The effect of information technology assimilation on firm performance in B2B scenarios

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1. Introduction

Many organisations have turned to the use of information technologies (IT) in an attempt to cope better with the challenges associated to operating in turbulent environments (Sigala, 2003). Utilising and managing technology effectively are important qualities for a firm, widely accepted as means for creating a sustainable competitive advantage (Barney, 1991; Chen and Liaw, 2001; Sakas et al., 2014). The spread of the Internet in the business world has led to the development of e-business strategies based on new business models defined by the relationships between companies, their administration and customers. Such relationships range from business-to-business (B2B) to business-to-consumers (B2C) to business-to-administration (B2A), among other various combinations. B2B commerce includes a broad range of intercompany transactions, including wholesale trade as well as company purchases of services, resources, technology, manufactured parts and components, and capital equipment (Lucking-Reiley and Spulber, 2001).

B2B relationships have emerged as a significant area of managerial practice and academic inquiry (Ulaga and Eggert, 2004). From a managerial perspective, firms need to understand how they can create and deliver value beyond merely selling products and services. From an academic perspective, there is a rich and growing body of research focusing on relationships in e-business markets (for example, Barac et al., 2017; Hunter, 2019). There seems to be agreement in both research and practice communities that B2B solutions help reduce costs, facilitate greater access to buyers and sellers, improve marketplace liquidity, and enable a whole new array of efficient and flexible online transaction methods. However, if the benefits are clear, the path to achieving them is anything but obvious (Wise and Morrison, 2000).

The relationship between IT and performance has been a matter of debate for decades. The productivity paradox, first exposed by Brynjolfsson (1993), states that IT may have negligible or even a negative effect on a firm's performance. However, the digital era raises new questions about how technologies can improve organisational performance. Even for firms within the same industry, the impact of B2B activity tends to vary widely (Hsu et al., 2006). Different companies in different sectors exhibit varying payoffs, despite having made similar investments in IT (Dhar and Sundararajan, 2007). This phenomenon has reignited the perennial IT productivity paradox debate and has created a new wave of scepticism about the B2B value (Carr, 2003). Today more than ever, researchers face great pressure to demonstrate that B2B activity has a consistently positive impact on organisational performance (Tan et al., 2010).

Previous research has questioned the direct effect of IT on firm performance by arguing that such effects are mediated by other assets and capabilities (Mithas et al., 2011). While firms continue to invest in IT with the aim to adapt to B2B models, a considerable percentage of those IT systems have failed to sustain any competitive advantage (Ranganathan et al., 2011). One of the reasons behind their failure consists of management focus on the IT infrastructure, often losing sight of its integration in the strategy of the organisation. In this regard, IT must become a routinised element of the firms' value-chain activities and business strategies before they can exhibit any significant business value. The concept of IT assimilation then emerges as the ability to diffuse and routinise IT applications (Wade and Hulland, 2004). IT assimilation becomes an important way to improve and preserve enterprise task performance but, upon successful assimilation, organisations expect that IT systems enable competitiveness and hence becoming one of the most important resources of the enterprise (Yoon, 2011). IT has been traditionally considered as an important enabler for knowledge sharing in much of the available literature (Davenport, 1997). Whereas tangible resources such as an IT infrastructure can be replicated by competitors, IT assimilation could generate new knowledge but also leverage such knowledge based on the absorptive capacity of the firm (Chakravarty et al., 2013; Roberts et al., 2012). Absorptive capacity is understood as the ability to recognise the value of new information, to assimilate it, and apply it to commercial ends (Cohen and Levinthal,1990). Zahra and George (2002) argued that absorptive capacity is a dynamic capability with two subsets: potential absorptive capacity that refers to external knowledge acquisition and assimilation, and realised absorptive capacity that consists of a firm's ability to transform and exploit newly assimilated knowledge. Absorptive capacity enables businesses to apply external knowledge to respond effectively to constantly changing situations (Cegarra-Navarro et al., 2015; Xie et al., 2018). Thus, the absorptive capacity of the firm represents an issue of considerable importance for its ability to renew itself and succeed in rapidly changing, ambiguous and turbulent environments. In other words, absorptive capacity can facilitate the organisational agility (Chakravarty et al., 2013), that is, the ability of firms to sense environmental change and respond readily (Overby et al., 2006).

The diverse relationships between IT, absorptive capacity and agility have been the focus of research in different settings, including ERP systems (Liang et al. 2007; Saraf et al., 2013), the real estate industry (Iyengar et al., 2015), social media (Schlagwein and Hu, 2017), and supply chain studies (Shiranifar et al., 2019). Some researchers have focused on the relationship between IT and absorptive capacity (e.g. Wu et al., 2019; Bolívar-Ramos et al., 2013; Cepeda-Carrión et al., 2012b), while others have focused on the relationship between IT and agility (e.g. Chakravarty, 2013; Overby et al., 2006; Lu and Ramamurthy, 2011). However, the literature that analyses the relationship between IT, absorptive capacity and agility is very scarce and generally focused on the supply chain management domain (Liu et al, 2013).

In addition to the above gap in the literature, previous research on the subject has used analysis methods such as regression analysis (e.g. Chakravarty, 2013; Lu and Ramamurthy, 2011), qualitative approaches (e.g. Schlagwein and Hu, 2017) or covariance-based structural equation modelling (e.g. Liu et al., 2013; Wu et al., 2019). There are, however, other advanced techniques available that can broaden the understanding of the relationship between the three concepts and they are more suitable to the type of variable selected for this study, therefore avoiding specification problems due to fail given the nature of the constructs used (Hair and Sarsted, 2019). Thus, we adopt PLS-SEM as data analysis technique because of the epistemological nature of the constructs representing our theoretical concepts (Rigdon, 2012). We decided to use composites as latent variables since we consider –in line with the literature on the subject (Sarstedt al., 2016; Cepeda et al., 2019; Hair et al., 2019b) that PLS-SEM is the most suitable data analysis technique to avoid potential estimation bias when this kind of latent variables are used. Although composites could be the best way for operationalising those concepts (Hair et al., 2019b; Henseler, 2017), few researches have used composites or used PLS-SEM to model these theoretical constructs in the past.

This study aims to further our understanding and forecasting through the theoretical development and empirical investigation of the role of IT assimilation on firm performance in a B2B scenario by: (a) examining the link between IT and the firm's absorptive capacity and, more specifically, with the two subsets of potential and realised absorptive capacity, which have not received much attention from previous literature (Bolívar-Ramos et al., 2013); and (b) exploring how an improvement in potential and realised absorptive capacity may place firms in a better position to develop their organisational agility. To this aim, advanced analytical methods of PLS-SEM as fit measures and prediction procedure recently developed by Shmueli et al. (2019) will be used. The remainder of this paper has been organised as follows: Section 2 presents the theoretical background and the hypotheses development of this research. Section 3 describes the methodology used for data collection and analysis. Section 4 presents the results. Finally, the paper concludes with a discussion of these results.

2. Conceptual Background

2.1. Information technology assimilation and the absorptive capacity

Traditionally, both academic researchers and business managers have shown significant interest in understanding how corporate value can be created through the use of IT. It seems logical to consider that IT must become a routinised element of the firms' value-chain activities and business strategies before they can exhibit any significant business value (Amstrong and Sambamurthy, 1999). For Purvis et al. (2001) IT assimilation is the extent to which the use of technology diffuses across the organisational projects or work processes and becomes routinised in the activities of those projects and processes. In addition, Armstrong and Sambamurthy (1999) argued that IT assimilation implies the effective application of IT in supporting, shaping, and enabling firms' business strategies. Hence, we use the concept of IT assimilation to refer not only to the extent to which IT has been infused into specific B2B activities, that is, to bring together a large number of suppliers and corporate customers and automate business transactions in electronic hubs (Kaplan and Sawhney, 2000). Our perception of IT assimilation goes beyond this to also refer to how effective such IT resources are being in enabling the conduct of those activities.

According to the resource-based theory perspective of IT, IT assimilation is a form of IT competency that is valuable and difficult to replicate (Ko and Liu, 2019). However, an increasing number of managers have frequently stated that they have not obtained significant business value from IT assimilation (Gao et al. 2019). Indeed, although IT competency helps companies to develop value-activities that improve business, the possession of IT competency does not automatically allow firms to carry out such value-activities (Nevo and Wade, 2010). The true value of IT competency is that it facilitates other firm-level capabilities that enable firms to perform value-activities effectively (Kohli and Grover, 2008). From the point of view of a B2B context, IT is inherent to the creation of B2B electronic marketplaces, as well as to driving transactions within an intricate web of buyers and sellers. That is, IT is necessary for the very existence of these marketplaces. IT supports the all-in process of B2B transactions from initial contacts and negotiation through to settlement (Dai and Kauffman, 2002). However, simply possessing a base of IT competencies may not be enough for superior performance in B2B (Chakravarty et al., 2013). Following this approach, previous research has analysed the role of IT assimilation in the improvement of various firm-level capabilities which in turn facilitate performance improvement (Gao et al., 2017; Kim et al., 2019; Wang et al., 2019).

A review of the literature suggests that IT scholars and practitioners have shown an interest in absorptive capacity. Absorptive capacity is an organisational capability (Lane et al. 2006) that takes into account the routines and processes that firms use to identify, assimilate, transform, and apply external knowledge (Roberts et al., 2012). Cohen and Levinthal (2006) noted that a firm's IT assimilation efforts not only generate new knowledge, but also create capabilities that enhance the firm's ability to absorb and exploit existing knowledge.

Researchers have been attracted to the absorptive capacity construct for its potential relevance to a variety of IT research problems, such as IT assimilation. However, the role of absorptive capacity in the process of IT assimilation has not been undertaken (Roberts et al., 2012; Bolívar-Ramos et al., 2013). Absorptive capacity has been found to exist as two subsets, namely potential and realised absorptive capacities (Zahra and George, 2002). Potential absorptive capacity (PACAP) includes knowledge acquisition and assimilation. It captures efforts expended in identifying and acquiring new external knowledge and in assimilating knowledge obtained from external sources, such us the multiple stakeholders in B2B relationships. On the other hand, realised absorptive capacity (RACAP) includes knowledge transformation and exploitation. It encompasses deriving new insights and consequences from the combination of existing and newly acquired knowledge, and incorporating transformed knowledge into operations. The split of absorptive capacity into RACAP and PACAP has become widely used by scholars (e.g. Ben-Oz and Greve, 2015; Lowik et al., 2016; Martelo-Landroguez and Cegarra-Navarro, 2014). Since RACAP and PACAP are fundamentally different concepts that require very different strategies and structures, this division is an important task for any organisation (Cepeda-Carrion et al., 2012b). While a firm may have the capability to acquire and assimilate the external knowledge, this capability does not guarantee the transformation and exploitation of such knowledge (Ali and Park, 2016). Those firms focusing on acquisition and assimilation of new external knowledge (i.e. PACAP) are likely to be able to continually renew their knowledge stocks, though they may need to assume the costs of knowledge acquisition without benefitting from its exploitation. Conversely, firms focusing on transformation and exploitation (i.e. RACAP) may achieve short-term profits through exploitation, though they may fall into a competence trap and may not be able to respond to environmental changes (Zahra and George, 2002). It seems intuitively clear that PACAP provides support for RACAP (Cepeda-Carrión et al., 2012b). Zahra and George (2002) state that PACAP and RACAP have separate but complementary roles. RACAP depends on PACAP, since a firm must necessarily have the ability to acquire knowledge and assimilate it to exploit the knowledge from the external environment. In other words, firms cannot possibly exploit knowledge without first being able to acquire it. The PACAP-enhancing activities provide access to a wider knowledge base which enables the company to deliver more effective solutions, thus improving the efficiency of RACAP for innovation (Cohen and Levinthal, 2006). B2B firms are characterised as knowledge-intensive organisations, where the ability to use and transform knowledge into innovative services or products becomes the key to explain their performance variations (Heirati and Siahtiri, 2019). Collaboration with both customers and suppliers fosters learning as firms receive feedback and information from external collaborators (PACAP). This is key in a B2B context because customers' complex needs are often rigid, and transferring them to firms is difficult and costly (Siahtiri, 2017). Promoting PACAP capabilities in B2B contexts means enabling firms to explore further innovation opportunities (RACAP).

Several researchers have pointed out that absorptive capacity is an IT-driven capability (Ettlie and Pavlou, 2006; Malhotra et al., 2005). IT assimilation can facilitate information acquisition and assimilation, and thus increase firm's absorptive capacity (Jean et al., 2008; Chang et al., 2019). It must be considered that B2B electronic markets are, above all, markets whose central role is to facilitate information store and exchange business partners (Dotzel and Shankar, 2019). For example, IT assimilation supports that demand and supply information can be aggregated and disseminated, and suppliers and customers can be matched in electronic markets (Dai and Kauffman, 2002). In fact, IT assimilation can facilitate absorptive capacity through different mechanisms. Advanced IT applications could therefore be used to support interorganisational communication and information processing (Ko and Liu, 2019). Employees and teams within enterprises are conduits for knowledge creation and sharing. Their diverse cognitive needs require the assimilation of IT that are able to represent knowledge in multiple ways and allow dynamic configuration of interpretation. Use of IT-based interpretation systems enables external knowledge to be organised, rearranged, and processed to create new knowledge (Malhotra et al., 2005). For example, a virtual community of corporative buyers and sellers allows for a B2B firm to develop external relationships and collect vast amount of information from community members (for example, information about products offered and their features). However, simply collecting information is unlikely to have a significant impact on the firm and its ability to identify and recognise what information might be valuable (Roberts et al., 2012). The firm will suffer from information overload and will require the application of IT to deal with this information chaos in the digital world (Sadasivan and Unnithan, 2017). Indeed, B2B companies could use other IT tools such as e-business interface or data analysis and mining software that help them identify and acquire valuable knowledge. For example, these tools can help corporative buyers to search for desired products or services and discover attractive prices. On the other hand, with the use of knowledge management systems a firm could enable storing, archiving, retrieving, sharing, and thereby, enhancing external knowledge assimilation. On this basis, we suggest that IT assimilation facilitates a B2B firm's knowledge acquisition and assimilation capacity, thus enhancing their PACAP.

On a similar note, new knowledge created through assimilation has an impact only when it is incorporated into the enterprise's way of doing business and thus enables innovation and strategic flexibility (Barney, 1991). Firms apply their newly assimilated knowledge to create knowledge outputs and commercial outputs. IT assimilation hence helps bridge the traditional relationship gaps that exist between functions within the firm. It also helps departments work together to transform and commercialise newly acquired external knowledge (Malhotra et al., 2005). For example, knowledge exploitation can ultimately become tangible in the form of new products and services, process innovations or organisational innovations, such us innovative procurement transactions between a B2B company and its many suppliers or mass personalisation (Alfert and Baaken, 2017). In the B2B model, the efforts that must be invested to be able to close new projects are much greater, since the market share is considerably less than that existing in B2C contexts. A B2B firm must respond to the demands of a professional audience (Hein et al, 2019). Hence, the knowledge acquired could be exploited to develop new services addressed to corporative customers' demands or to develop new products based on the needs of other businesses, but knowing that in the end, the demand for the products made by them, will end up being used by retail consumers at home (Ordanini, 2014; Stock et al., 2015; Hierati and Siahtiri, 2019).

IT tools could provide mechanisms for quickly reporting and sharing new knowledge across functional boundaries increasing the flow of knowledge throughout the entire organisation (Davenport, 2000). This knowledge flow sustained by IT systems that support communication, trust and cooperation of cohesive units, will enhance the firm's ability to apply new knowledge to products, services, or other innovative activities (Roberts et al., 2012). With that aim firms could use, for example, IT systems such as e-procurement, supply chain integration, or product lifecycle management systems. Therefore, IT assimilation would help a firm improve the knowledge transformation and exploitation, that is, the RACAP.

2.2. Information technology assimilation, business opportunities and challenges

Firms rendering their offer in a B2B setting deal with few customers in comparison with firms operating in a B2C context. Hence, B2B firms face complex, dynamic and fierce competition from peer organisations in their pursuit to win customer orders (Sadasivan and Unnithan, 2017). A marked increase in environmental volatility due to greater uncertainty in international financial markets, volatile consumer demand and rapid product and service obsolescence have led B2B firms to reconsider their ability to respond to change. Faced with rapid and often unanticipated change, agility, has emerged as a key business imperative for survival and prosperity for contemporary organisations (Huang et al., 2012). Organisational agility refers to the capability of a company to rapidly change or adapt in response to changes (Tallon and Pinsonneault, 2011). Van Oosterhout et al. (2006) define organisational agility as the ability of an organisation to develop and exploit its knowledge structures to compete successfully in uncertain and unpredictable environments. Organisational agility is fundamentally necessary for organisations facing changing conditions to use production factors to achieve the objectives of the organisation, employees and shareholders. For this reason, B2B companies are increasingly turning to IT to help them respond to unanticipated environmental threats and opportunities (Tallon et al., 2019).

IT assimilation have been proven to be positively associated with organizational agility (Gao et al., 2020). In fact, IT assimilation is expected to improve agility because diffusing advances IT applications enables a B2B firm to effectively connect with its suppliers, customers and other significant business partners developing an integrated information flow (Zhu et al., 2006). Furthermore, IT applications could help firms monitor, analyse and interpret data in real time to identify patterns or simulate strategic scenarios (Wixom and Watson, 2001) and predict how various opportunities and challenges might affect the firm and its competition. In addition, IT systems permit firms to adapt to changing requirements more quickly by changing information-based value propositions, forging value-chain collaboration with partners that competitors cannot easily duplicate, and rapidly exploiting emerging and untapped market niches (Sambamurthy et al., 2003). Therefore, IT assimilation firstly increases firms' abilities to anticipate and interpret opportunities and challenges, and secondly respond to opportunities and challenges. These arguments support the role of IT assimilation as a platform for organisational agility in B2B markets.

However, certain researchers have posited that the IT –organisational agility relationship could be more indirect, through other organisational capabilities, than direct (Felipe et al., 2016; Trinh-Phuong et al., 2012). In 2003, Carr (2003) already pointed out that the core functions of IT were increasingly becoming easily available and affordable to all. As their availability increased and their cost decreased –as they became ubiquitous, IT became commodity inputs. But what makes a resource truly strategic, what gives it the capacity to be the basis for a sustained competitive advantage, is not ubiquity but scarcity. Hence efforts from many executives were directed to find out how to leverage their IT for differentiation and advantage in organisational agility. In this regard, perception of a firm's agility is determined by the degree of knowledge reach and knowledge richness the firm can achieve (Sambamurthy et al., 2003). This indicates that absorptive capacity can be used to develop agility through resources different from those used by the competition. A company with a stronger absorptive capacity has a better preparation to perceive changes in the markets and to learn from experience (Malhotra et al., 2005). For example, with electronic catalogues of products and services, expertise from electronic auctions, and other procurement knowledge generated in the B2B electronic markets, corporate buyers can do one-stop comparison while shopping from thousands of suppliers and select the best source in real time. As Tallon and Pinsonneault (2011) indicate, companies assimilating and exploiting external knowledge may have a greater opportunity to leverage its internal business processes, which in turn can help to respond appropriately to market volatility and dynamism. Previous research showed that absorptive capacity has positive effects on organisational agility (e.g. Mao et al., 2015; Kale et al., 2019). Overby et al. (2006) highlighted that whilst absorptive capacity refers predominantly to firms' ability to manage knowledge (i.e. by acquiring, assimilating, transforming, and exploiting it), organisational agility relates to firms' ability to use knowledge to manage change (i.e. by sensing and responding to it.). That is, B2B firms develop their absorptive capacity by acquiring, storing and processing products information, purchase expertise or knowledge from inter-organisational communication with partners, suppliers or corporate customers. Then, their experience and knowledge help make the best strategic decisions to quickly respond to B2B markets changes and demands (Gölgeci et al., 2019). On this basis, we suggest that PACAP and RACAP could be considered as antecedents of organisational agility. Following up on this argument and taking into account that, as exposed in previous section, IT assimilation lead to enhance both PACAP and RACAP, it can be derived an indirect IT assimilation–organisational agility link with a mediator role of absorptive capacity. We therefore propose the following hypotheses (see Figure 1):

H1. PACAP positively mediates the relationship between IT assimilation and organisational agility.

H2. RACAP positively mediates the relationship between IT assimilation and organisational agility.

H3. PACAP and RACAP sequentially mediate the relationship between IT assimilation and organisational agility.

Finally, organisational agility has also been found to have a positive relationship with organisational performance by previous studies (Cegarra-Navarro et al., 2015; Nemkova, 2017; Ravichandran, 2018). This is because organisational agility may contribute to the fostering of an organisation's ability to respond to environmental changes in a purposeful manner and to engage in other actions that control market risk and uncertainty (Benaroch et al., 2006). B2B decision-making processes tend to be more complex than those in B2C markets. They involve more people, are more formalised, and involve buyers, who have extensive knowledge of the products and services they are purchasing (Chang et al., 2018). Hence, when B2B firms are better able to react to changes in product demand, to increase the pace of innovation, or to expand into new markets, they are more likely to experience higher profits, reduced costs and improved market share at a later point in time (Sambamurthy et al., 2003; Alfert and Baaken, 2017). A firm that promotes organisational agility may increase its revenue sources by entering new market segments (Sabherwal and Chan, 2001). In addition, the firm may reduce its costs and ineffective business practices by continuously adjusting its business processes toward the industry best practices (Rindova and Kotha, 2001). Agile firms can expect some future benefit in the form of revenues or profitability, cost avoidance, or higher market growth (Tallon and Pinsonneault, 2011). This is particularly important in a B2B scenario where the market share is much lower since it is focused on the needs of corporate customers as opposed to retail customers (Cassia and Magno, 2019). Kale et al. (2019) stated that when businesses become agile, they can gain a competitive edge and improve their performance. Therefore, organisational agility may allow firms to achieve increased performance levels and outcomes, which drives the following hypothesis:

H4. Organisational agility is positively related to organisational performance.

The figure 1 represents our proposed research model.

<Figure 1>

3. Research methodology

3.1. Data collection

The target population for this study was a set of Spanish companies that had more than 100 employees which make use of the Editran, a platform for communications over data networks and the Internet. Editran allows the exchange of information and knowledge through the use of advanced solutions that enable direct connectivity between IT applications and devices using different operating systems. This information and knowledge exchange enable an interaction between heterogeneous business activities, entities and public bodies, enabling and supporting B2B relationships. Its capacity to integrate with different operating systems, the dynamic configuration of its operating mode and simultaneous multiple exchanges with various remote centres and various network protocols have made Editran the standard in electronic information exchange processes in the Spanish financial system. Editran is a software that enables electronic data interchange, but it also is a tool to put information in context (Martínez-Caro et al., 2018; Martinez-Caro et al., 2013). Since absorptive capacity is defined as "the ability of a firm to recognise the value of new, external information, assimilate it, and apply it to commercial ends is critical to its innovative capabilities" (Cohen and Levinthal, 2006), Editran can be an ideal tool to make right decisions about customers and competitors and transform external information into internal knowledge. For example, if a bank has the financial information of a client in other financial companies, it can advise he(she) on financial products more appropriate to his (her) profile. A total of 360 firms that use Editran were identified from the SABI (Sistema de Análisis de Balances Ibéricos) database and contacted with an invitation to participate in the research. During a first stage a pilot study was performed. Following its completion, a survey was conducted.

The unit of analysis for the study was the company, and the survey was administered to the CEO of all companies via a telephone interview over a period of 2 months, from October 2012 to November 2012. By 2012 and taking as reference the database SABI (Iberian Balance Analysis System), these companies had an average of 1709 employees. A profile of the participating companies is provided in Table 1. In total, 110 valid responses were obtained, yielding a response rate of 33.55 percent.

3.2. Measures

The survey used to collect the data was based on a 7-point Likert scale. The questionnaire constructs were operationalised and measured as follow (see Appendix for a list of items):

To measure IT assimilation, we firstly reviewed the existing IT literature as a basis for developing a scale. IT researchers have distinguished between adoption, the process whereby technology spreads across a population, and assimilation, being the process by which progress from initial awareness of an innovation to formal adoption and full-scale deployment is made (Fichman and Kremer, 1999). According to Zhu et al. (2006), technology assimilation –as opposed to its adoption-, refers to the acquisition, full utilisation, and institutionalisation of a technology. That is, the conceptualisation of IT cannot be limited to IT use but should be considered as the internalised use of IT by all employees of the company. They should perceive IT usefulness considering them as a real improvement in their tasks that facilitate the development of the business processes in the different functional areas (operation, management and decision making). IT assimilation implies that the IT usage does not entail effort but is a change that employees have already processed so that working with those IT is something natural and taken. Amstrong and Sambamurthy (1999) and Cooper and Molla (2014) suggest that IT assimilation is linked with the ability of managers to examine the synergistic opportunities for business use of IT. Managers must enhance their understanding of the role of IT in their business activities and strategies to ensure that they do not abdicate the IT assimilation responsibilities entirely to their staff. Their role should be to support and facilitate the use of IT. On the other hand, IT assimilation implies the availability of resources such as IT infrastructure and IT knowledge. Firms that develop the base foundation of IT capability through investments in technologies such as B2B platforms, are more likely to foster IT use in their value-chain activities and business strategies. Previous research (for example, Purvis et al., 2000; Paroutis and Al Saleh, 2009) points out the important role played by managerial support in securing the organisational legitimisation of the technology. Furthermore, resources such as IT training or the technical support for using of IT tools by front-line employees and middle managers in operational and tactical decisions, implies an effective IT assimilation (Kuan and Chau, 2001; Neirotti and Paolucci, 2011). Therefore, we measure IT assimilation by asking CEOs to measure if the IT system is easy to use and it is useful to deliver the tasks requires, the support of managers in the use of the IT system and, the availability of the resources necessary to use the IT system.

To examine PACAP and RACAP, our intention was to measure the dimensions that have been defined above (Zahra and George, 2002). Items were measured using a scale from the study by Jansen et al. (2005) and adapted by Cepeda et al. (2012a). Four items assessed the presence of 'PACAP' and 'RACAP' respectively. While PACAP assesses the intensity and direction of the efforts expended in analysing and understanding new external knowledge, RACAP assesses the extent to which firms are able to facilitate the recognition of the opportunities and consequences of new external knowledge for existing operations, structures and strategies (Zahra and George, 2002). Six items referred to the extent to which firms are able to exploit new external knowledge. The scale gauged companies' ability to incorporate new external knowledge into their operations.

As it has been described, organisational agility (OA) may refer to the firm's capability to deal with changes that come from the business environment by using rapid and innovative responses. This study measures OA using items from Lu and Ramamurthy's (2011). The final revised scale consists of 6 items to measure OA.

Finally, we operationalised firm performance (FP) using items from previous research (Judge and Douglas, 1998; Quinn and Rohrbaugh, 1983) through which respondents rated their organisation's performance relative to others in the industry. The final revised scale consists of 3 items to measure FP.

3.3. Data analysis

All our measures were already operationalised as composites (Rigdon, 2013; Henseler, 2017) in former PLS-SEM studies (Cepeda-Carrión et al. 2012a; Cegarra-Navarro et al., 2015; Khan et al., 2019), therefore, we decided in favour of using PLS-SEM as the best data analysis tool to test our model and its hypotheses. All composites were estimated in Mode A because the indicators that compound of composites, are correlated. Our study adopted a confirmatory, explanatory and predictive approach following to Cepeda et al. (2019). To asses models in a confirmatory way with PLS-SEM, an additional procedure proposed by Henseler at al. (2016) and implemented by SmartPLS (Ringle et al., 2015), has been established to the classical 2-step approach in PLS-SEM (Hair et al., 2017): (1) assessment of global model fit (additional procedure and exceptional only for confirmatory studies in PLS-SEM); (2) assessment of measurement model and (3) assessment of structural model. In order to find significance of parameters, we used a bootstrap procedure (Chin, 1998). Bootstraping is a resampling procedure that is able to determinate the significance of all of the following: fit indices, path coefficients and weights and loadings of indicators for each composite (i.e. latent variable). SmartPLS 3.2.9. (Ringle et al., 2015) was used in combination with a procedure to test mediation described by Cepeda-Carrión et al. (2017). Finally, we test the out-of-sample predictive-power of our model (4) through hold-out sampling described by Shmueli et al., (2016, 2019).

(1) Bootstrap-based tests of model fit are calculated, including the geodesic discrepancy between the empirical and the model-implied correlation matrix (Dijkstra and Henseler, 2015); the standardised root mean square residual (SRMR) (Henseler et al., 2014); and the unweighted least squares discrepancy (Dijkstra and Henseler, 2015). A model has a nice fit when these values are lower than 95% or 99% quantiles extracted from bootstrap (Henseler et al., 2016). It is true that these measures have been questioned for some researchers and its routine use should be avoided (Hair et al., 2019a). However, as the relationships between the composites in our model have already been tested in previous studies, providing some confirmatory measures becomes an extra contribution from our study.

(2) A good measurement model should demonstrate sufficient reliability and validity. The most appropriate consistent measures of internal consistency reliability are: ρ_A,

Jöreskog's rho, composite reliability, and Cronbach's alpha (Hair et al., 2017). While reliability values as low as 0.7 indicate suitable reliability in the early stages of research, higher values such as 0.8 or 0.9 should be used in more advanced research (Nunnally and Berstein, 1994), which exceed the common threshold values. The average variance extracted serves as a measure of unidimensionality (Fornell and Larcker, 1981). Finally, a heterotrait-monotrait ratio of correlations (HTMT) that is clearly below 0,898 provides evidence of discriminant validity (Henseler et al., 2015) and Monte Carlo simulations show that the HTMT outperforms more traditional measures of discriminant validity (Voorhees et al., 2016) as Fornell and Larcker's criterion.

(3) The path coefficients are the one of the most important results of the structural model. They indicate that the change in a dependent variable is a consequence of a unit change in an independent variable if all other independent variables remain constant. Bootstrap percentile confidence intervals of the path coefficients help in the generalisation from sample to population. The consideration of bootstrap percentile confidence intervals (Hair at al., 2019b) gives greater assurance than simply relying on null hypothesis significance testing (Cohen, 1988). It can be said therefore that the assessment of direct and indirect effects jointly provides evidence for mediation (Nitzl et al., 2016). Additionally, the values of R-square were also reported

(4) While researchers using PLS routinely stress the predictive nature of their analyses, until very recently, model evaluation has relied exclusively on metrics designed to assess the explanatory power (in the sample) of the path model (e.g. Coefficient of determination (R2) and Q2 (blindfolding test)). However, these metrics tell us nothing about the accuracy of the model in predicting the outcome values of new cases (not included in the sample used to estimate the parameters). The predictive validity of PLS models (out of sample) can be measured using holdout samples. The critical question is whether the antecedent variables of an endogenous variable are capable of predicting the behavior of that dependent variable, and its indicators, in separate samples from the initial data set used to test the theoretical research model. Shmueli et al. (2019) propose a procedure that has been implemented in SmartPLS since version 3.2.6. and allows to determine the predictive power of a single model (Danks and Ray, 2018; Shmueli et al., 2019). This study provides an application of this procedure.

To detect potential issues of common method bias (CMB), a full collinearity test based on variance inflation factors (VIFs) was carried out. According to Kock and Lynn (2012) when a VIF achieves a value greater than 3.3, there would be an indication of pathological collinearity. This would warn if a model may be contaminated by CMB. The present model, with a maximum VIF of 2.21, may be considered free of CMB. Additionally, we applied the procedural remedies proposed by MacKenzie and Podsakoff (2012) and Podsakoff et al. (2012) when we made our data collection. We also employed a statistical remedy to detect and control for different sources of CMB, namely, the measured latent marker variable (MLMV) approach (Chin et al., 2013) —a method suggested for handling CMB in PLS-SEM models. MLMV must not belong to the same domain of the variables included in the hypothesised model and must be drawn from a different unit of analysis. We included measures of use of technology at employee level in our questionnaire, a different level of analysis. The results show that the model with MLMV had worse fit, no significance of coefficients paths from MLMV and there are not significance differences between them. These additional tests reinforce our argument that our model is free of CMB.

4. Results

4.1. Global model fit

The provided model (see Figure 2) has a nice fit. In Table 2 all fit indices are reported, their values are provided both in absolute terms and confidence intervals (95% and 99%). Therefore, there is a significant adjust between the empirical data matrix and the proposed model matrix. Table 2 exhibits the model fits and three parameters associated to it. The estimated model fit indices, these refer to the global model. All of three indices in this study meet the conditions. This a requirement for confirmatory analysis with PLS-SEM (Henseler, 2018)

Figure 2 here

Table 2 here

4.2. Measurement model

Heneseler et al. (2016) propose the fit indices for the saturated model is a nice measure to perform confirmatory composites analysis. Thus, we report in Table 2, the fit indices for the saturated model, they confirm the measurement model has a good fit. Additionally, the results show that the measurement model meets all of the commonly stipulated requirements. First, the individual items are reliable because all standardised loadings are greater than 0.7 (Table 3). Second, because all consistent measures are greater than 0.8 (Table 4), the model satisfies the prerequisite of construct reliability. Furthermore, the scores for average variance extracted (AVE) exceed the threshold of 0.5 (Table 4) for composites unidimensionality, and these latent variables therefore achieve convergent validity. Finally, all the variables attain discriminant validity, since all HTMT are below 0.85 (Table 4). Additionally, a table with the mean and standard deviation of our measures is provided with a correlation matrix (Table 5).

Table 3 here
Table 4 here
Table 5 here

4.3. Structural model

As Hair et al. (2017) comment, the use of bootstrapping (5,000 resamples) produces standard errors and t-statistics to assess the statistical significance of the path coefficients. All the direct effects in Table 4 are supported, with the exception of a2 (IT on RACAP). The percentile bootstraps at the 95% confidence interval have this outcome (Table 6). Our model provided R-squares of 0.631for OA and of 0.363 for FP

Table 6 here

The approach described by Nitzl et al. (2016) is used to test the three mediation hypotheses (Hypothesis 1, Hypothesis 2, and Hypothesis 3). Table 7 shows that the path-coefficients product for each of the paths in the mediational chain are used to estimate the mediation effects (Nitzl et al., 2016). The results demonstrate the non-existence of any mediation effect between IT assimilation and organisational agility through RACAP alone (non supporting Hypothesis 2). However, other two hypotheses were supported; the results demonstrate the existence of a single mediation of PACAP in the relationships between IT assimilation and organisational agility (supporting Hypothesis 1) and one sequential mediation of PACAP and RCAP on the former link (supporting Hypothesis 3).

The use of bootstrapping allows the mediation hypotheses to be tested (Nitzl et al., 2016). This study's 5,000 resamples generate 95% confidence intervals for the mediators. As Table 4 shows, IT assimilation has a significant direct effect on organisational agility (c' = 0.21) and these results therefore show a partial mediation between IT assimilation and organisational agility, since the indirect effects that are captured in Hypothesis 1 and Hypothesis 3 are significant. However, the results fail to support Hypothesis 2 (Table 7). This study also calculates the variance accounted for (VAF) index (Hair et al., 2014), which determines the size of the indirect effect in relation to the total effect. When the outcome of the VAF is between 20% and 80%, there is an expectation of a partial mediation, and this is seen in this case, given that the VAF for the indirect effect alluded to in Hypothesis 1 is 31,46%, in Hypothesis 2 it is 1,57%, and in Hypothesis 3 it is 9,14%.

Table 7 here

4.4. Predictive power

Finally, we measure predictive power in our model following the Shmueli et al. (2016) procedure, which was implemented from version 3.2.6 of SmartPLS and developed later by Danks and Ray (2018) and Shmueli et al. (2019). This procedure needs to make two decisions from researcher such as.

(1) Number of folds. PLSpredict is based on the concept of k-section cross validation (fold), whereby the overall data set is divided into k subsets of data of equal size. The cross validation process is repeated k times (sections), and each of the subsets k is used exactly once as a hold-out-sample. It is recommended that the minimum size for a holdout sample be N = 30 Therefore, number of folds was fixed on 3 according to our sample size.

(2) Number of repetitions. Following to Shmueli et al. (2019), 10 repetitions were used.

The results of this procedure start assessing the PLS-SEM $Q^2_{predict}$ for indicators of dependent variable (i.e. FP), and then measures the skewness of prediction errors (i.e. root mean squared error (RMSE) and mean absolute error (MAE). If skewness is greater than 1, RMSE is used, otherwise MAE is used. Finally, we check if PLS-SEM residual-errors are greater than linear regression residual-errors (i.e. LM), in which case we can state that the model has predictive power (Shmueli et al., 2019)

Table 8 show the results of predictive power for FP indicators. We can see that all $Q^2_{predict}$ for all FP indicators, are positive and, we use RMSE as residual error due to high distribution symmetry of errors. As it can be seen, all residual errors for all three indicators are higher than LM, and therefore we can argue that our model has a high predictive power (Shmueli et al., 2019).

Table 8 here

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5. Discussion

Developments in the IT domain have revolutionised the way businesses operate, and in particular their relationship with stakeholders. New business models continue to emerge, often relying on the assumption that business engagement with stakeholder must be mediated by the use of IT. The business and information systems literature is filled with examples of successful IT-driven strategies for stakeholder engagement including the ease and agility of communications, access to a greater number of clients, suppliers and commercial partners, and the automation of operations. However, the business value of IT in supporting business models such as B2B to increase performance has long been a subject for research and intensive debate (Li et al., 2009), leading to the emergence of what's been termed as the 'productivity paradox'. Despite continuing to hear that investments in new technologies is a must for transformations of their traditional business models, little information is available to show practitioners how to turn technology acquisition into a competitive advantage. Our research has been initially driven by the need for a better understanding of how newly acquired information technologies can be adopted and used to ensure that these become a vehicle to improved performance in a B2B context.

A body of research was identified in our review of the extant literature, which focused on understanding the implications of IT on organisational performance by using different assessment mechanisms, taking IT assimilation as a key concept. We then set out to respond to the need for a better understanding of the concept of IT assimilation from the perspective of the firm. We do so by investigating the mediating role of other business capabilities in the relationship between IT assimilation and firm performance, specifically in a B2B context. We identified in the perception of the concepts of RACAP and PACAP and the methodological approach to their study a fundamental gap where our research would contribute new knowledge to the current debate. The first of these is a conceptual contribution: different from scholars such as Armstrong and Sambamurthy (1999), Liang et al. (2007) or Liu et al. (2013), we bring our understanding of RACAP and PACAP as fundamentally different concepts which require very different strategies and structures within the organisation. We then decided to use composites as latent variables for both concepts. The second one, derived from the previous point, is a methodological contribution: while previous research has used analysis methods such as regression analysis (e.g. Chakravarty, 2013; Lu and Ramamurthy, 2011), qualitative approaches (e.g. Schlagwein and Hu, 2017) or structural equation modelling (e.g. Liu et al., 2013; Wu et al., 2019), we acknowledge the value of using other advanced techniques available which can broaden the understanding of the relationship between RACAP and PACAP. In our study, we adopt PLS-SEM as data analysis technique for our study because of the epistemological nature of the construct representing our theoretical concepts.

We started our research by hypothesising that IT assimilation could support the development of on both PACAP and RACAP, which in turn could positively affect organisational agility. Furthermore, we hypothesised that organisational agility positively influences firm performance. In terms of direct effects, it is worth noting that while IT assimilation is statistically significant and positively related to PACAP, it has not been found to be statistically significant in its relationship with RACAP, which partially contradict those findings reported by Liu et al. (2013). A plausible explanation for this could be supported by the following two facts: (1) each study reported in the literature has been to operationalise absorptive capacity in a different way: while Liu et al. (2013) operationalise absorptive capacity as a multifaceted construct (i.e. a second order-construct), construed from four dimensions, namely acquisition, assimilation, transformation and exploitation, the current study splits absorptive capacity into two second-order constructs (i.e. PACAP and RACAP); and (2) due to the artificial and latent nature of absorptive capacity variables, in the current study PACAP and RACAP have been operationalised as composites in line with previous studies (Cepeda-Carrion et al., 2012a; Ali and Park, 2016; Mennens et al., 2018; Costa and Monteiro, 2018).

In view of the above findings, it appears appropriate to separate the concepts of PACAP and RACAP. This is in line with the argument put forward by authors such as Ali and Park (2016) when they highlighted that not only are PACAP and RACAP different concepts but they can be, and often are, operationalised in different ways. Derived from the above fact, our research has also shown that ‘routinising’ IT applications may not necessarily facilitate the transformation and exploitation of knowledge (i.e. RACAP) within the organisation. This finding firstly contributes to the current debate on the extent to which substantial investments in IT would always report significant increases in firm value in the digital era. Additionally, the finding corroborates the contribution later made by Cegarra-Navarro and Cepeda Carrión (2013), when they found that the implementation of an IT solution may actually generate new issues within the organisation if the new IT systems are not aligned to the policies and objectives of the relevant individuals within the firm. What the above finding suggests is that the presence of PACAP (i.e. acquisition and assimilation of new knowledge) has the potential to foster, in the right conditions, the alignment between perceived utility of IT and the expected innovations derived from its implementation (i.e. RACAP). This finding adds not only to the extant literature on absorptive capacity and the debate around the IT productivity paradox. It also has implications for management practice, particularly with regard to the need to broaden the management perspective of learning from purely knowledge acquisition and assimilation, to also address the potential transformational nature and exploitation capabilities embedded in the newly acquired knowledge resources. This means that investments in IT solutions, particularly in B2B scenarios, must be driven by a strategy that goes beyond acquisition of IT, IT applications and related knowledge, to also foster a culture of innovation and business transformation, potentially leading to the adoption of new business models.

As it was expected, and consistent with prior research (Cepeda-Carrion et al., 2012b; Cohen & Levinthal, 2006; Zahra & George, 2002), organisational mechanisms associated with PACAP had a significant positive effect on RACAP. These findings are deemed significant in the current technology-driven environment as companies may overestimate the value of RACAP as a result of IT assimilation whilst they underestimate PACAP in their efforts to achieve system alignment. That cause and effect relationship (*IT* *assimilation→ PACAP→RACAP*) may be explained through the advantages of acquiring and assimilating external knowledge for the performance of the firm. This knowledge may help in the design of improved structures and procedures to deal with innovative initiatives (Cohen and Levinthal, 2006), which enables the company to search for solutions more effectively, then these activities should improve the efficiency of RACAP. This has practical implications as B2B firms work to minimise the negative impact that factors such as internal communication, or access to and storage of information from external sources, may have on the organisational efforts towards transformation and exploitation of new knowledge. Our research therefore informs firms' efforts to manage the increased complexity associated to the development of new products and services in the current dynamic context derived from an upsurge in the amount of information and knowledge available to organisational members. While the essence of new product and service development is the creation, utilisation and exploitation of such new knowledge, our research shows that success of B2B firms today is embedded in the firm's ability to effectively manage its innovative processes through the assimilation of IT and its applications.

The results of this study also indicate that the indirect effect of IT assimilation on organisational agility via PACAP is positive and statistically significant (*IT assimilation →PACAP → OA*). These results may relate to the fact that, when staff learn how to use technology applications appropriately, time with trifling tasks decrease, and more importantly, the time devoted to more important tasks increases (Roberts et al., 2012). Our research therefore highlights the need for appropriate mechanisms to understand (i.e. capture and measure) those processes that –at all levels within the firm, help the management of innovation, learning and digital transformation, which depend on the effectiveness of technology assimilation. Having effective technology assimilation mechanisms in place provides many advantages to a B2B firm, including saving time and providing a basis for getting things going quickly and efficiently (Chakravarty et al. 2013; Kim 1998; Spithoven et al., 2010). Also, by fostering PACAP managers may gain some additional control over emerging problems and potential was of dealing with IT challenges (Hernes and Irgens, 2012). This in turn facilitates the easy transcription of relevant information and enables users to make a better use of knowledge gained through IT.

Some less obvious results emerged in terms of the indirect effect of IT assimilation on organisational agility via RACAP (*IT assimilation →RACAP → Organisational Agility*). As previously discussed, IT assimilation does not play a significant role in helping companies improve RACAP, which results in a not very significant contribution to organisational agility. However, the results show that there is a positive relationship between the three preceding constructs and organisational agility (*IT assimilation →PACAP →RACAP → Organisational Agility*). This can be explained through the following three facts: (1) IT assimilation leads organisational members to understand technology, thus supporting their efforts to remain abreast of the latest advances; (2) such a process supports continual effort regarding PACAP, exploring and especially acquiring this new knowledge on a daily basis; and (3), most but not all the knowledge derived from PACAP can be transformed and exploited RACAP. These results support the extant literature when it argues that as a result of processing and assimilating new knowledge and skills as well as seeking and making use of guidance, people in general, and managers in particular can help each other (McDermott and O'Dell, 2001; Rivera-Vazquez et al., 2009), especially in solving problems (Lundh-Snis, 2001; Tanriverdi and Iacono, 1999).

This leads us to highlight the importance of mechanisms for knowledge to be communicated from users of the newly acquired technology (i.e. the workforce) to management within the B2B firm. As the workforce use the newly acquired technologies, they develop an ability to convey to management their knowledge about misalignments between its desired and actual functionality. As technology users, staff may even develop innovative uses of technology that require system modifications. By facilitating the transfer of such knowledge to the management team, the firm will better understand its business processes and how the new IT enables the execution of these processes. This will, in turn, help managers and employees overcome mutual barriers and prejudices resulting from procedures or new technology tools (Kelley et al., 2015).

This study also finds support for a direct relationship between organisational agility and firm performance. In this regard, Tallon and Pinsonneault (2011) provide support for these ideas by suggesting that the direct effect of agility on performance is higher in volatile settings, such as the Spanish stock market during the period this study examines. As pointed out by Cegarra-Navarro et al. (2015), the effectiveness of new organisational knowledge may depend on the agility of organisations to take advantage of opportunities and neutralise threats from the business environment.

In summary, the findings of our research highlight the critical role of IT assimilation in achieving firm performance through complementary relationships with absorptive capacity and organisational agility. Hence it is crucial for companies who develop B2B relationships to take steps to facilitate the use and routinisation of IT. As IT assimilation is an indicator of performance improvement, one of the key practical implications is that managers in B2B firms must recognise the importance of IT assimilation and make of its promotion and measurement a continuous process that goes beyond the implementation of IT strategies and tools. Integrating the use of IT across organisational process enables identification, assimilation and application of knowledge from the external environment. Such new knowledge can become a valuable tool for managers to respond appropriately to market volatility and dynamism in a B2B context, which is critical to improve firm performance.

Despite the contribution made, the study has a number of limitations. Firstly, this study relies on data collected by asking Spanish executives at the same point of. Therefore, not only the data provided have a high degree of subjectivity, but also our findings can be affected by differences in time. In addition, this research was performed in a specific country, which might prevent the generalisation of the results to other countries. Secondly, although IT assimilation, PACAP, RACAP and organisational agility have been defined as precisely as possible by reviewing the relevant literature, these constructs can realistically only be appointed as proxies for underlying latent phenomena that are themselves not fully quantifiable.

The limitations of this research open new lines of research. For example, future studies that sample different perspectives (e.g. those of managers from different departments) within companies could add value to our findings. It would also be interesting to expand this study to other countries, since cultural issues might influence the way IT assimilation, PACAP, RACAP and organisational agility are understood and implemented. Finally, we have considered organisational performance in its relationship to only organisational agility. As agility is only one piece of the puzzle contributing to organisational performance, future research could extend our work to examine how other elements interact/couple with IT assimilation, absorptive capacity and agility in enabling organisational performance.

6. Conclusions

As B2B strategies develop, current uncertainties make of IT analytic a capability that organisations require for their fitting in a supply chain partnership context and in general for collaboration with other businesses. Ultimately, the benefit of having access to technology does not rely on building a technology infrastructure in itself but on its assimilation by the organisation in their efforts to generate and apply new knowledge. This research addresses this gap by examining, through an empirical study of 360 organisations that rely on the use of IT to support their B2B strategy and processes, how IT assimilation enables organisations to sense environmental change and respond readily by extending the reach and richness of firm knowledge. Such ability, also known as the organisation's agility, potentially leads to an increased competitive advantage. Thus, the first contribution of this research is to shed light on what may prove to be an important role for management when it comes to develop their IT infrastructure and its integration in their B2B business development strategies.

The analysis of the relationship between organisational agility and both potential and realised absorptive capacities, covering knowledge acquisition and assimilation as well as knowledge transformation and exploitation, has enabled an understanding of how IT integration influences organisational agility and, indirectly, organisational performance. In line with the existing literature, we found that IT-based connection, access and adoption of external knowledge are particularly relevant in most B2B settings, from small technology startups to alliances between industry leaders. In assessing the role of absorptive capacity in the IS/IT field, the research has added to the findings of other scholars who have focused on the role of this powerful construct in other research streams such as knowledge management, IT governance, IT innovation, and IT business value. Our research has therefore not only contributed to theoretical developments in the field of absorptive capacity in the B2B context but also to practice in helping management use external knowledge to validate their startup and find product-market fit before major financial decisions be made.

From a methodological perspective, our research has opened new avenues for the study of the critical and predictive role of IT assimilation in achieving firm performance, particularly in its relationships with both absorptive capacity and organisational agility. This has been achieved through the measurement of the predictive power of our theoretical model with advanced PLS techniques not previously used for the study of the relationships between such concepts. By assessing the PLS-SEM $Q^2_{predict}$ for indicators of our dependent variables, we have confirmed the predictive power of our model. In other words, we have been able to assess and confirm our model's ability to be generalised for new/unseen circumstances, depending on the organisation and its context. This not only adds to the validity and robustness of our findings, but also informs future research on approaches to improve firm performance in the current volatile and dynamic context where B2B operations take place.

In showing that absorptive capacity and organisational agility mediate the influence of IT assimilation on firm performance, this research has added to the current debate on the role of management within organisations and their relationship with management information systems. Technological developments and, in particular IT-based B2B collaborative platforms, continue to blur the boundaries between the physical and digital environments in which the firm operates. This shows that IT is no longer a subject for a specific department but a concern of the management board, responsible for turning investments on IT infrastructure into a sustained competitive advantage.

Finally, this research would not only support B2B companies but also organisations of all types which are currently over-investing in information technologies, by highlighting that a technology assimilation strategy must accompany any IT infrastructure acquisition. This acquires additional relevance in the current context, where investments in new IT is often seen as a solution to challenges such as cyber security and compliance with new data and information management strategies and regulations which are transforming the organisations and their interaction with society.

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Appendix: List of items

IT Assimilation
ITA1 It is easy for employees to use the system in many business processes. ITA2 Employees find the system useful in a large number of functional areas. ITA3 The senior management has been helpful in extending the use of the system in our business processes. ITA4 Employees have the resources necessary to use the system in our business processes.
PACAP
PACAP1 Employees of our departments regularly visit other branches PACAP2 We are slow to recognise shifts in our market (e.g. competition, regulation, demography) (reverse) PACAP3 New opportunities to serve our clients are quickly understood PACAP4 We quickly analyse and interpret changing market demands
RACAP
RACAP1 Employees record and store newly acquired knowledge for future reference RACAP2 We periodically meet to discuss consequences of market trends and new product development RACAP3 We clearly understand how activities should be performed. RACAP4 We constantly consider how to better exploit knowledge
Organisational agility
OA1 We have the ability to rapidly respond to customers' needs OA2 We have the ability to rapidly adapt production to demand fluctuations OA3 We have the ability to rapidly cope with problems from suppliers OA4 We rapidly implement decisions to face market changes OA5 We continuously search for forms to reinvent or redesign our organisation OA6 We see market changes as opportunities for rapid capitalisation
Firm performance
FP1 We offer services of better quality FP2 We have more efficient internal processes FP3 We are more efficient with regard to the use of resources

Note: All questions are seven-point (1–7) Likert-type scales.

Table 1. Profile of the participating companies

	Thousand euros year
Average turnover	368,648
Average profit after taxes	707
Average total assets	824,248
Average own funds	322,925
Average indebtedness	63

Table 2. Global goodness of fit, confirmatory composite analysis, and bootstrap-based 95% and 99% quantiles

Goodness of Fit Measure	Estimated Model	Hi95	Hi99	Saturated Model	Hi95	Hi99
SRMR Standardised Root Mean Square Residual	0.0559	0.0680	0.0752	0.0521	0.0623	0.0686
d_{ULS} Unweighted Least Squares Discrepancy	0.7209	1.0693	1.3054	0.6264	0.8960	1.0856
d_G Geodesic Discrepancy	0.4834	0.7477	0.8699	0.4725	0.7379	0.8626

Table 3. Indicator loadings

Composite	Indicator	Loadings
ITA	ITA1	0.9534
	ITA2	0.9620
	ITA3	0.9639
	ITA4	0.9421
PACAP	PACAP1	0.7151
	PACAP2	0.9308
	PACAP3	0.9234
	PACAP4	0.9379
RACAP	RACAP1	0.8479
	RACAP2	0.8114
	RACAP3	0.8406
	RACAP4	0.8619
OA	OA1	0.7681
	OA2	0.7943
	OA3	0.8083
	OA4	0.8880
	OA5	0.8523
	OA6	0.7724
FP	FP1	0.8183
	FP2	0.9246
	FP3	0.9145

Notes: ITA= Information Technology Assimilation; PACAP= Potential Absorptive Capacity; RACAP= Realized Absorptive Capacity; OA=Organisational Agility; FP= Firm Performance

Table 4. Reliability and validity of construct measurement

Composites	Dijkstra-Henseler's rho (ρ_A)	Composite Reliability (ρ_c)	Cronbach's alpha (α)	Average Variance Extracted	Maximum HTMT
ITA	0.981	0.977	0.968	0.913	0.385
PACAP	0.922	0.933	0.901	0.777	0.898
RACAP	0.865	0.906	0.862	0.707	0.898
OA	0.904	0.922	0.898	0.664	0.767
FP	0.890	0.917	0.865	0.787	0.669

Notes: ITA= Information Technology Assimilation; PACAP= Potential Absorptive Capacity; RACAP= Realized Absorptive Capacity; OA=Organisational Agility; FP= Firm Performance

Table 5. Mean, standard deviation and correlation matrix. Square root of AVE in diagonal (Fornell and Larcker criterion for discriminant validity)

mean	SD		OA	IT	FP	PACAP	RACAP
5.15	1.23	**OA**	0.815				
5.26	1.55	**ITA**	0.365	0.955			
5.20	1.39	**FP**	0.603	0.254	0.887		
5.20	1.39	**PACAP**	0.756	0.208	0.488	0.882	
5.20	1.39	**RACAP**	0.681	0.193	0.528	0.796	0.841

Notes: ITA= Information Technology Assimilation; PACAP= Potential Absorptive Capacity; RACAP= Realized Absorptive Capacity; OA=Organisational Agility; FP= Firm Performance

Table 6. Construct effects on endogenous variables (incl. lower and upper limits of 95% confidence interval)

Effects on endogenous variables	Direct effect	Confidence intervals (95%)		Significance of effect (p-value)	Cohen's f-square	R^2 of dependent construct
		$5\%CI_{lo}$	$95\%CI_{hi}$			
ITA -> OA (c')	0.211	0.079	0.359	Yes (0.007)	0.115	0.631
ITA ->PACAP (a1)	0.208	0.024	0.406	Yes (0.038)	0.045	0.043
ITA> RACAP (a2)	0.028	-0.094	0.157	No (0.357)	0.002	0.634
PACAP -> RACAP(a3)	0.790	0.696	0.870	Yes (0.000)	0.633	0.634
PACAP -> OA (b1)	0.551	0.335	0.733	Yes (0.000)	0.299	0.631
RACAP -> OA (b2)	0.203	0.012	0.406	Yes (0.045)	0.041	0.631
H4: OA -> FP	0.603	0.467	0.746	Yes (0.000)	0.571	0.391
Control variable: Size-> FP	-0.039	-0.031	0.006	No (0.358)	0.003	0.391
Control variable: Firm age-> FP	-0.068	-0.207	0.080	No (0.215)	0.007	0.391

Notes: ITA= Information Technology Assimilation; PACAP= Potential Absorptive Capacity; RACAP= Realized Absorptive Capacity; OA=Organisational Agility; FP= Firm Performance

Table 7. Indirect effects on endogenous variables (incl. lower and upper limits of 95% confidence interval)

Indirect effects on endogenous variables	Indirect effect	Confidence intervals		Support
		$5\%CI_{lo}$	$95\%CI_{hi}$	
H1: ITA ->PACAP -> OA (a_1xb1)	0.115	0.014	0.207	Yes
H2: ITA ->RACAP -> OA (a_2xb_2)	0.006	-0.028	0.033	No
H3: ITA ->PACAP->RACAP -> OA ($a_1xa_2xb_2$)	0.033	0.001	0.108	Yes

Notes: ITA= Information Technology Assimilation; PACAP= Potential Absorptive Capacity; RACAP= Realized Absorptive Capacity; OA=Organisational Agility; FP= Firm Performance

Table 8. Assessing predictive power of endogenous variables indicators

Indicators	RMSE (PLS)	Q²_predict (PLS)	RMSE (LM)	RMSE (PLS-LM)
FP1	1.063	0.008	1.146	-0.083
FP2	1.137	0.008	1.174	-0.037
FP3	1.043	0.021	1.05	-0.007

Notes: FP= Firm Performance

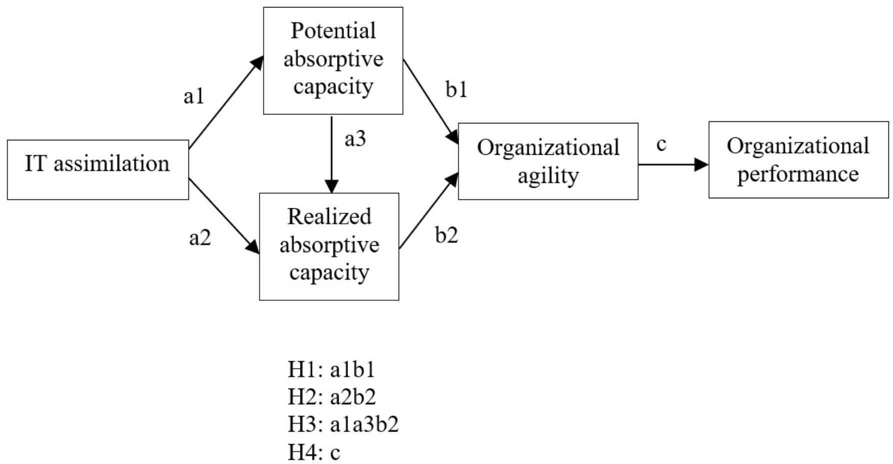

Figure 1: Research model

262x136mm (120 x 120 DPI)

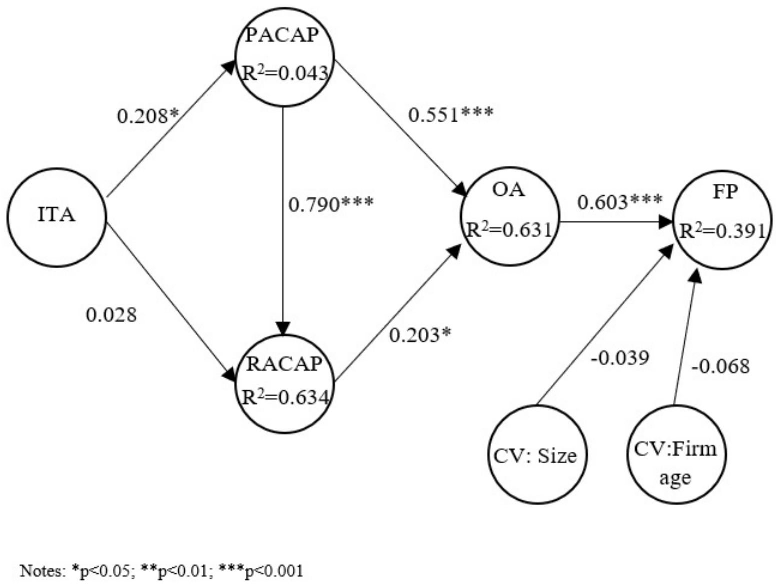

Figure 2: Global model fit

294x192mm (72 x 72 DPI)