Exploring ERP systems adoption in challenging times. Insights of SMEs stories

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ABSTRACT

This paper offers a study of real success experiences of SMEs, in relation to the motivations of selection and implementation of Enterprise Resource Planning (ERP) and its benefits that also allow the confrontation with theoretical concepts, based on reviewed literature. We followed a qualitative approach based on in-depth content analysis of SMEs online stories included in the 'Customer Stories' directory available on the SAP website using the R language to scrape data and statistical analyses. The findings provide evidence that the use of ERP, for managing SMEs, is constructive to their success and improves the quality of their decision-making processes. Although the technologies implemented by SMEs were characterized by their specialisation and adaptation, SAP Business One is the leading solution, without significant differences by sector compared to Europe. They also reveal that the effectiveness of implementing ERP is intrinsic to the reputation of the software vendors and the high professionalism of the partners. Additionally, the results indicated the short-term approach of SMEs when implementing this type of tool, takes precedence over the strategic and economic benefits. Furthermore, the empirical analysis supports the association of some motivational factors of ERP implementation and selection with characteristics of the organisations, such as activity and size.

1. Introduction

The changes experienced in the management of enterprises in a globalised and digitised environment such as the current one, regardless of the type of company (sector, size, activity, etc.), require the incorporation of technological solutions. These technologies will allow more efficient management and, thus, ensure decision-making in different areas of the companies, including stakeholder satisfaction.

The management processes of companies are increasingly complex. They require the involvement of more functional areas or departments and greater amount of accessible and updated information (available online and in real time). This way, it is worth mentioning the insufficiency of software solutions that have traditionally been used since the appearance of the first computers. They have been characterized by independent management of processes, lack of automation, duplication of tasks, maladjustment to the businesses, inconsistency and altered information, and little control. The progressive incorporation of the latest technological advances associated with the so-called industrial revolution 4.0 (Internet of things [IoT], cloud, big data, etc.) not only makes it possible to automate production processes and product design,

but also improve management of the companies, like increased man and machine productivity, reduction in wastages, increased customer satisfaction, improved operational efficiency, reduced direct operating and labour costs (Doyle and Cosgrove, 2019; Gunjal and Gogte, 2019; Verhovnik and Duh, 2021). In addition, this industrial revolution is not only transforming how companies operate but also relics optimistic regarding the opportunities that may bring for sustainability (Lin et al., 2020; Birkel and Müller, 2021; Roh et al., 2022; Di Maria et al., 2022). Industry 4.0 enhances the company's environmental performance by increasing manufacturing efficiency, decreasing energy consumption, and eliminating uncertainty and waste, and pollution (Singh et al., 2019; Lai et al., 2019; Pandey et al., 2021). Recent studies contribute to the expanding body of literature on adopting Industry 4.0 and, how it affects the environmental, social, and economic performance of organisations (Khan et al., 2022; Khan et al., 2023). They empirically show the potential of these technologies to achieve sustainability, thus strengthening the competitive advantages of the organisations in the current environment.

This phenomenon implies the redefinition of organisational management, which requires new tools that incorporate technological

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advances for the planning and management of business resources, highlighting also the need to adapt traditional enterprise resource planning (ERP) systems to the new digital environment (Gessa et al., 2018). In this sense, ERP systems play a very important role in this process of changing business management towards digitised management as part of the strategy of companies. Like all technological resources, it is characterized by a short lifecycle where yesterday's technology becomes obsolete today (Chatti et al., 2021).

According to Bytniewski et al. (2020) ERP systems in the current digital environment "are a new symptom of the crystallisation of management information systems, with expanded information capabilities, transforming information into knowledge, making it available in real time to make quick decisions aimed at optimizing strategic and current business processes, i.e. those systems are going to implement the concept of real-time enterprises".

Small and medium-sized enterprises (SMEs) are not exempt from this new scenario and, possibly, even more affected, precisely because size and limited resources are of the main reasons argued to justify their technological obsolescence resulting from the delay in incorporating technological solutions for their management (Eseryel et al., 2020). In addition, the complexity, time and resources necessary for the implementation of ERP systems should be taken into consideration (Jituri et al., 2018). This scenario can make the integration process of these technologies for comprehensive management advance at a slower pace than in larger companies, despite the role that SMEs play in the economies of developed countries. It is worth mentioning that SMEs are part of the large digitised industrial value chains, from suppliers to the final customers, performing their activities within the framework of industry 4.0 (Estensoro et al., 2021). However, recent events, such as Covid, can make us reflect on the possibility of having accelerated the pace of technological adaptation changes in recent years (Penco et al., 2022; Roffia and Mola, 2022).

The offer of this type of software constitutes a key piece for the selection and implementation of ERP in SMEs. A wide range of ERP software is commercially available, including specific for SMEs. In addition, the variables to take into account when making decisions about the ERP vendors have been the subject of research community in recent years (Czekster et al., 2019; Yurtyapan and Aydemir, 2022).

In fact, during the last decades there has been a growing interest on the part of academics and researchers to delve into the different areas of ERP software selection and implementation in SMEs. However, this context has undergone important changes derived from important technological advances, with implicit updating, and others, due to the events of the current environment (Covid, wars, shortages, etc.). Indeed, new contexts are generated caused of the reduction of cost constraints by integrated 4.0 tools, such as the cloud, and other success factors (Venkatraman and Fahd, 2016). Therefore, the situation requires a revisit with updated contributions in this field to consolidate a conceptual framework. The purpose of this paper is to offer a study of real success experiences of SMEs, required by this field of research and proposes the below given research objectives (ROs):

RO 1. To examine decision factors to implement ERP systems in SMEs.

RO 2. To identify the dimensions that influence the selection of the suppliers and partners of ERP systems in SMEs.

RO 3. To analyse the implementation benefits of ERP systems in SMEs.

RO 4. To find out the possible significant relationship between the decision factors to implement and select ERP systems and the main characteristics of SMEs.

To that end, this document is structured as follows. Once the topic of analysis has been presented, the methodology is collected in the following sections, after performing the detailed literature review literature. Next, the results of the study are presented. Finally, the conclusion of the current study, along with the implications, limitations, and future studies, are presented in the last section.

2. Literature review

2.1. Reasons for implementation ERP system

The reasons that lead companies to implement enterprise management software are diverse. Those of a technological, operational, and organisational nature have been mainly pointed out in the literature (Depietro et al., 1990). The implementation of ERP systems allows companies to be more efficient, eliminate duplication, and improve productivity and management effectiveness. The ability to unify, automate, and integrate data and business processes of an organisation throughout the company, in an almost real-time environment, are some of the main characteristics of latest ERP systems (Haddara, 2018; Keong et al., 2012). Also, these systems allow improving management decision-making and operations (Beheshti et al., 2014; Hallikainen et al., 2004; Rouhani and Mehri, 2018). According to Vera (2006) "one of the main reasons for companies to implement ERP is the need to have access to accurate and timely accounting information, optimisation of the processes of the company, and the possibility of sharing information between all areas within the organisation". Therefore, information management is an essential aspect in a competitive market like today's (Beskese et al., 2019).

Besides mentioned reasons, economic ones are also recognized as driving the ERP implementation. So, the reduction of costs, derived from greater standardisation of processes is one of the most outstanding (Alaskari et al., 2019; Bhatt et al., 2021). In turn, that reduction allows companies to maximise return on investment, shorten delivery times, and achieve other secondary objectives, such as improving customer service, satisfaction of other stakeholders (partners, suppliers, etc.), mergers and acquisitions, access to global markets, identification of competitive threats, and reduction of labour costs (Beheshti et al., 2014). The suitability of ERP for organisations is a primary criterion in the selection process. One of the main objectives of ERP is precisely the standardisation of business processes between business functions within the companies (Haddara, 2018).

To the reasons stated above, contextual factors are added, and organisational characteristics in the ERP implementation process are also included in the studies.

Most studies in the literature acknowledge that the size of the organisations has a direct impact on the success of ERP implementation. In addition, it is not enough to implement an ERP system to achieve benefits; there should also be a balance between the strategic objectives of the companies and the characteristics and functionalities of the ERP system, due to its influence and the complexity of the implementation (Haddara, 2018).

2.2. Selection of ERP vendors and partners

Along with other factors linked to the supply of this type of software (cost, compatibility, specialisation, functionality, technological, etc.), the reasons that lead companies to decide to implement ERP systems become key factors for a wise decision to select the ERP software provider. The reputation and references of the vendors in the market, the ease of use and maintenance provided by them (Czekster et al., 2019) or the stability and variety of its offer (Kanchana and Sri, 2018) are essential requirements for final vendor's selection.

Without wishing to be exhaustive, because it is beyond the scope of the present study, Table 1 presents some recent studies that have addressed the selection of ERP providers.

Following Beskese et al. (2019), and in order to specify, these reasons can be grouped into three factors, namely: product (functionality, reliability, ease of use, efficiency, maintenance, and portability); project (time and cost); and provider (reputation, service and support, and industrial expertise).

In this context, the support offered by the providers through their partners (professionals and external experts) becomes a key facilitating

Table 1
Some studies on ERP selection.

Reference	Industry type (country)	Research methodology/analysis
Vaidyanathan and Fox (2017)	Electrical equipment (United States)	Case study/Multicriteria technique-AHP-fuzzy
Haddara (2018)	Petroleum derivatives (Egypt)	Case study/Simple multi-attribute rating technique-SMART
Bhatt et al. (2021)	Manufacturing (China)	Case study/Factorial analysis and Multicriteria technique-AHP-fuzzy
Alaskari et al. (2019)	Hydraulic (United Kingdom)	Case study/Questionnaire
Beskese et al. (2019)	Automotive (Turkey)	Case study/Multicriteria technique-AHP-fuzzy
Kanchana and Sri (2018)	Several industry (India)	Quantitative approach/Sample (n = 28)
Goumas et al. (2018)	Manufacturing (Greece)	Quantitative approach/Sample (n = 182)
Kiran and Reddy (2019)	–	Literature review
Czekster et al. (2019)	Healthcare (Brazil)	Case study/Multicriteria technique-AHP-fuzzy
Beheshti et al. (2014)	Manufacturing (United States)	Cases study/Interviews and questionnaires

element of the ERP system implementation process. They provide knowledge to the organisations in order to reduce dependency and improve the probability of achieving a successful implementation (Leonardo and Napitupulu, 2022; Kiran and Reddy, 2019).

2.3. Benefits of ERP implementation

Undoubtedly, the benefits obtained with the implementation of ERP systems, and, therefore, the satisfaction of companies, are a direct consequence of the reasons that have precisely led companies to make the decision to implement the systems so that their expectations are met. Therefore, also it is possible to classify these benefits equally into operational, strategic, business, technological, and organisational (Shang and Seddon, 2000).

The availability of updated and real-time information thanks to data processing with the implementation of ERP systems and their analytical power (Goumas et al., 2018; Menon, 2019) allow companies to standardise operations, perform more centralised management, and improve decision making (Granlund, 2011; Davenport, 1998). The integration of all functional areas within companies with implemented ERP systems allows greater interaction and better communication between them (Sumner, 2005; Vera, 2006) due to the communication flows within the company. According to Goumas et al. (2018), the "ERP systems integrate multiple business functions that were previously stored in autonomous software units and are shared by the different departments of companies in a unified manner".

Planning and control of production is one of the areas of companies that has benefited the most from the implementation of ERP, highlighting better production traceability, inventory management and better use of resources (Buhr, 2003; Garg and Venkitakrishnan, 2004; Cotteleer and Bendoly, 2006). These advantages, in turn, make it possible to improve the relationship with customers, increasing their satisfaction with the purchase or receipt of greater quality services without delays in their deliveries (Mabert et al., 2003; Garg and Venkitakrishnan, 2004).

Moreover, it is worth noting the size of the companies as a differentiating factor associated with the benefits of ERP implementation. In this sense, Mabert et al. (2003) found that economic reasons prevailed over others in larger companies; whereas in the case of SMEs the reasons were others, such as inventory management, on-time deliveries, and interactions with the customers.

2.4. The implementation of ERP in SMEs

Although initially there is no reason to exclude SMEs from the analysis of the key factors of ERP implementation performed in the previous section, their peculiarities (Wong and Aspinwall, 2004) make it necessary to highlight some relevant aspects related to the decision to implement ERP solutions and the potential benefits of their application, as well as the right software selection, highlighting the latest advances in this area of research.

The economic reason is among the main barriers identified in the literature in the SME sector (Chang et al., 2004). It is followed, among other reasons, by organisational culture (Calvert and Seddon, 2006), low qualification and training of personnel (Albadri and Abdallah, 2009), associated, in many cases, with the seniority of the workforce (Ma'arif and Satar, 2018), reason for implantation not fully defined, or not adequately known by the teams (Badenes et al., 2018), which can lead to failure.

An alternative to face the economic limitation is the offer by companies that provide ERP solutions in the cloud, lowering the amount of investment and associated costs, allowing in turn the integration of information throughout the chain of supply (Marston et al., 2011). There are several studies that have addressed this alternative, observing barriers, benefits and challenges for SMEs. In this sense, according to the technological, organisational, and environmental (TOE) framework (Depietro et al., 1990), researchers as Alsharari et al. (2020) and Zamzeer et al. (2020) explore the factors that influenced the adoption of cloud ERP in different cases. Moreover, Gupta et al. (2018) determined the organisational and technological factors that could lead to success in the implementation of the ERP in the cloud. Hustad et al. (2019), for their part, observed organisational changes as a central challenge, considering that companies should change their way of thinking and the processes of previous systems.

Other benefits also associated with this alternative (cloud) and recognized in the literature are cost reduction, faster implementation, and greater competitiveness (Huang et al., 2021). However, not all studies agreed. There are authors who pointed out that there were no positive results in business planning derived from the implementation of ERP in the cloud (Alsharari et al., 2020).

The progressive increase in the use of cloud computing services by companies in the European Union in recent years is evidence of the commitment to this type of service to meet the needs of information and communication technologies (ICT) of companies. 40 % of European enterprises using cloud computing services (Eurostat, 2021). However, security and data privacy reasons, and in general, the uncertainty generated by this type of technology, have become a barrier to its implementation (Zamzeer et al., 2020).

Another of the peculiarities to be highlighted is the confusion generated in the sector due to the great offer in the market. There is a variety of different technologies and platforms, which makes it difficult to select an ERP system (Terminanto and Hidayanto, 2017). Thus, the providers of these applications, directly or through their associated partners (consultants), become a key element in the selection of ERP systems. Their adaptation and professionalism are the most valued factors by companies. Other factors such as price, ease of implementation, or adaptability are also taken into account (Badenes et al., 2018). The main reason why consultants are needed is because SMEs face knowledge barriers and rely on experts to overcome these obstacles (Thong, 2001; Nevo et al., 2007; Carey, 2008; Chen et al., 2008). To that end, consultants employ a wide range of knowledge-sharing mechanisms (Bradshaw et al., 2015).

Under this approach, SAP is recognized as a leader in the ERP market with the highest satisfaction level based on ERP-comparators records (Gulsah Hancerliogullari Koksalmis and Seckin Damar, 2022; Elbahri et al., 2019; Annamalai and Ramayah, 2011). Currently, it becomes an alternative for SMEs offering several possible solutions, whose main characteristics are illustrated in Table 2. Previous studies have also

Table 2
Overview of SAP solutions.

SAP solutions	Main objective	Characteristics
S/4HANA	Increase agility	• Features by industry • Processes with matching learning • Real time analytics • Automation 360 processes
Business One	Control and provide strategic information	• On-premise or in the cloud • Integrated business intelligence • Integration with SAP HANA • Fast implementation
Business ByDesign	Support company growth	• Optimised end-to-end processes • Agility of adaptation • Real time analytics • ERP in the cloud

Source: own elaboration from SAP.

focused on the study of SAP solutions. On the one hand, Blount et al. (2016) and Lodh and Gaffikin (2003) deal with the integration of SAP solutions in the accounting and management field in different settings (academic and business, respectively). On the other hand, Gulsah Han-cerliogullari Koksalmis and Seckin Damar (2022) analyse and integrate various dynamics that affect the adoption of the SAP ERP system according to the technology acceptance model (TAM). More recently, Leonardo and Napitupulu (2022) study which factors can affect the success of one specific SAP ERP product in a real case.

Although it is true that in recent years its main competitors, Microsoft Dynamics and Oracle, have increased their market share, SAP remains the market leader in enterprise application software increasing its market share. With respect to SMEs, SAP tried to penetrate this market in 1996 in the United States. They launched a first attempt (mySap) aimed precisely at this market. However, it failed due to the enormous effort of implementation and adaptation of the system, which could only be adopted by the most complex companies. In 2002, they tried again, this time distinguishing between 'more complex' and 'less complex' SMEs. The company launched 'mySap All-in-one' for the former, and 'SAP Business One' for the latter. The latter was specially designed for small SMEs, offering them a single application with which they could automate business processes and offer a precise and unified image of their businesses and their functional areas. That is why it is considered the most detailed, complete and integrated system. In addition to its characteristics, many companies choose SAP for its relationship with its partners, for its reputation, or for its advantages in comparison to others.

3. Method and data

3.1. Research context

To achieve the general goal of the present study, the Spanish SMEs that had implemented ERP SAP systems and were included in the 'Customer Stories' directory available on the SAP website (https ://www.sap.com/spain/about/customer-stories.html?sort=latest_desc) (May 2022) were assessed. Final sample of the study is composed by 96 companies (17.45 % of all SMEs worldwide included in the SAP directory). Their main characteristics are shown in Table 3.

We focus on SAP, for being an international benchmark, for the availability of information, for ranking as a leader in ERP customer satisfaction and, above all, for incorporating the latest technological advances. In addition, it is a pioneer in meeting the needs of SMEs and has a multisectoral approach that will allow a more complete sectoral study, away from the typical study of the manufacturing sector.

Customer stories are valuable repositories of information, because they are written by customers themselves. Therefore, they are an important source of data on the experience and expectations of active

Table 3
SMEs profile.

Characteristics	Frequency	Percent
Legal form		
Limited liability company	70	72.9
Public limited company	19	19.8
Other companies	7	7.3
Year of establishment		
Before 1960	14	14.6
1961–1980	14	14.6
1981–2000	36	37.5
2001–2020	32	33.3
Location		
Madrid	23	24
Cataluña	23	24
Valencia	11	11.4
Aragón	8	8.3
Other regions	31	32,3
Size of company[a] (no. of employees)		
Micro (≤10)	7	7.8
Small (≤50)	51	56.7
Medium (≤250)	32	35.5
Turnover[a] (M €)		
Micro (≤2)	7	7.5
Small (≤10)	49	52.1
Medium (≤50)	38	40.4
Activities (NACE code)		
Professional, scientific, and technical activities (Group M)	9	9.4
Wholesale and retail trade; repair of motor vehicles and motorcycles (Group G)	37	38.5
Manufacturing (Group C)	36	37.5
Other activities	14	14.6

[a] According to European Commission (2014).

customers and can provide valuable information for making decisions about ERP systems and their features. This methodology has proven to be a valid source of knowledge in previous research in the field of our study (Gabryelczyk and Biernikowicz, 2019; Poba-Nzaou et al., 2014; Raymond et al., 2006; Seddon et al., 2010; Shang and Seddon, 2000; Staehr et al., 2012; Tiefenbacher and Olbrich, 2015). Nevertheless, this does not stop us from acknowledging its limitations. The approach of using customer stories can skew the results because the information can be manipulated to benefit the selling company. However, considering that the objective of this study is not to determine the degree of success of the implementation of an ERP system, but to explore the reasons for investing in successful ERP systems, we consider it appropriate to use the data obtained from these stories. In addition, the study applied rigorously the basic techniques of case method (Yin and Heald, 1975): (1) selecting cases from inclusion criteria, (2) developing a coding scheme to convert qualitative data case description into quantified variables, (3) using multiple coders and (4) assessing inter-rater reliability. Fig. 1 illustrates the research methodology and the entire procedure.

3.2. Coding and data analysis

We obtained our data set using information extracted from the documents and videos published on the SAP website, through web scraping with Python. The stories were assessed using content analysis. Words, sentences, and paragraphs that described customer expectations or motivations were collected in a preliminary analysis to develop codes allows us grouping record units that can be defined by the same theme (Bailey, 1994). In the initial stage of the analysis, the original words of these stories were used as code labels and a preliminary coding taxonomy was generated during the assessment. A second review of the stories and coding taxonomy helped create advanced categories to conceptualise the detailed expectations and motivations of customers to implement ERP systems. Topics and subtopics were developed in each advanced category. Web scraping and subsequent analysis ensured the
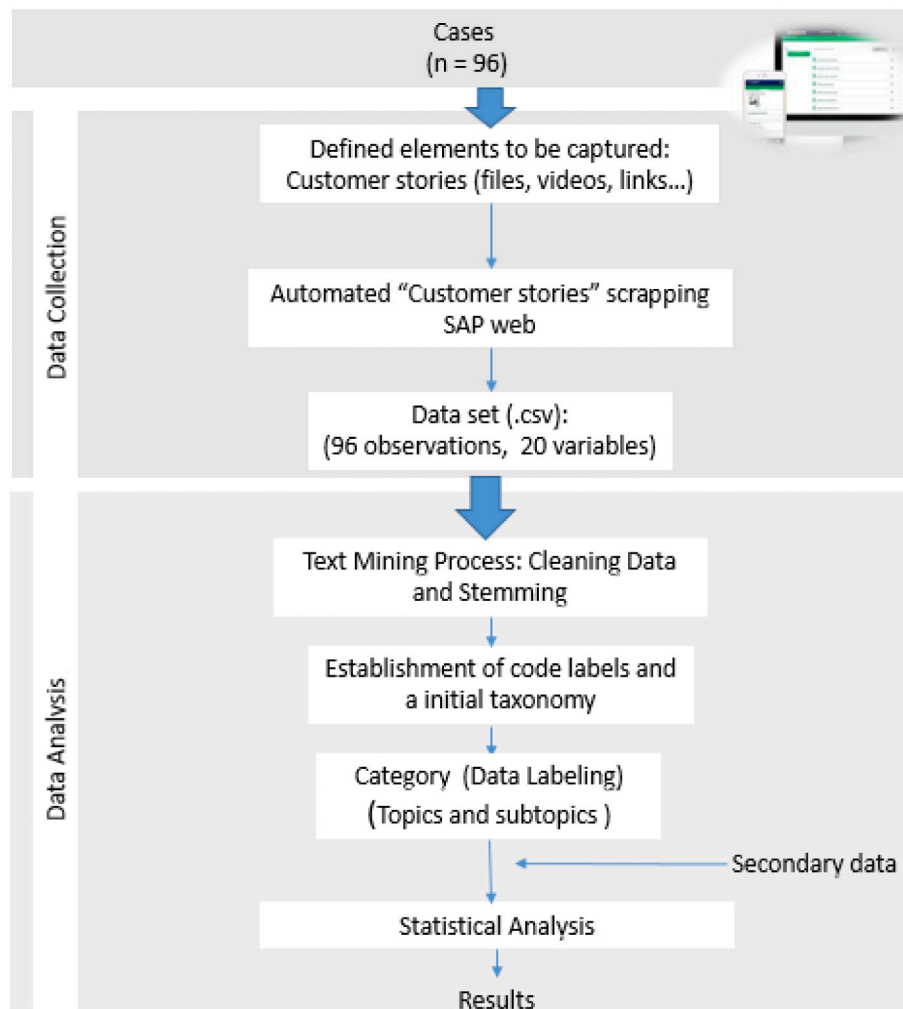
Fig. 1. Research methodology.

reproducibility of the research (Peng, 2011), something that is fundamental to the scientific method. Any manipulation of data may involve subjective choices and interpretations regarding what data are retrieved and how they are formatted, pre-processed and saved. Likewise, the research team also performed independent coding work on the same random experiences to validate the coding process.

To complete the information, the economic-financial data of the companies were extracted from the Iberian Balance Sheet Analysis System (SABI) database. In addition, other sources of secondary information (corporate websites of SMEs, regulations, reports, articles, other websites, etc.) were also consulted.

Different variables of the SMEs in the sample were analysed. A first set of variables allowed us to draw a profile of the sample (legal form, location, year of incorporation, size, activity, etc.) in order to contextualise their activity. Another block included the variables directly linked to the implementation of integrated information systems (ERP), such as the implemented solution, influencing factors in the decision to implement it, supplier and partner selection criteria, and benefits obtained with the implementation of ERP systems. Table 4 illustrates the study variables and their respective categories.

A cross-sectional observational study was designed to achieve the objectives set. After descriptive analysis, the possible dependency relationships between the variables could be studied, according to the Chi-Square statistic, through IBM SPSS Statistics version 25 (IBM Corp., Armonk, NY, USA). Specifically, it analysed whether different variables (size, sector, turnover, seniority, SAP solution, and internationalisation)

could influence the selection and subsequent implementation of ERP systems. Likewise, to confirm or rule out the possible relationship between the different dimensions of each analysed aspect, bivariate correlations (Pearson's coefficient) were calculated.

4. Results and discussion

4.1. ERP solutions

As mentioned above, SAP ERP offers a wide range of solutions to suitable needs of SMEs (see Table 2). For his part, SAP Business One, a leading solution in the market with >75,000 clients spread all over the world (SAP website), was the most selected alternative by the SMEs assessed (93 % of the total). It is a complete and integrated state-of-the-art software that includes 4.0 technologies and meets the needs of all business areas (accounting and finance, customer relationship management, sales and customers, purchases and operations, services, inventory and warehouse, projects, production, human resources, and reports and analysis). This software functions through on-premise implementation or cloud-based. These characteristics make these ERPs very attractive alternatives that are recognized by SMEs as essential for the digital transformation of their businesses, in line with the content of next section.

The rest of the SAP solutions available for SMEs (ByDesign and S/4HANA) were distributed among the different sectors, highlighting greater concentration of them in the manufacturing sector, with 67.67 and 100 % of SMEs, respectively (Fig. 2).

Table 4

Study variables.

Variables	Categories	Brief description	References
Reasons for implementation (Ii)	Centralisation and integration (I1)	Process integration	Beskese et al. (2019)
	Consistency and accurate information (I2)	Elimination altered and inconsistency/conflicting information	Vera (2006)
			Haddara (2018)
	Digitisation (I3)	Implementation new technologies and practices to business management	Keong et al. (2012)
	Other reasons (I4)	Time and costs savings, instant visibility, customer satisfaction increase	
Provider selection (SAPi)	Reputation (SAP1)	Position market	Czekster et al. (2019)
	Suitability (SAP2)	Quality of being right or appropriate for its purpose	Kanchana and Sri (2018)
	Flexibility (SAP3)	Ability to adapt easily	Elbahri et al. (2019)
	Usability (SAP4)	The ease of use of the system for a particular function and is strongly related to functionality	Hustad et al. (2019)
	Economic (SAP5)	Software/Hardware, maintenance and training cost	
	Compatibility (SAP6)	Ability to work with most of the software/hardware of another system	
Partner selection (PTi)	Professionalism (PT1)	Market position	Beskese et al. (2019)
	Adaptability (PT2)	Customatization	Kiran and Reddy (2019)
	Reliability (PT3)	Industrial credentials	Badenes et al. (2018)
	Economic (PT4)	Installation, maintenance and training costs	
Benefits (Bi)	Operational (B1)	- Control (B1.1)	Buhr (2003)
		- Traceability (B1.2)	Beheshti et al. (2014)
		- Order control (B1.3)	Rouhani and Mehri
		- Error reduction (B1.4)	(2018)
	Economic (B2)	- Cost reduction (B2.1)	Goumas et al. (2018)
		- Increase turnover (B2.2)	Alsharari et al. (2020)
	Organisational (B3)	- Reports (B3.1)	Bruque-Cámara et al.
		- Communication (B3.2)	(2016)
		- Reduction of deadlines (B3.3)	Akça and Özer (2016).
	Strategic (B4)	- Improved decision making (B4.1)	
		- Automation (B4.2)	
		- Digital transformation (B4.3)	
	Other benefits (B5)		

4.2. Reasons for ERP implementation

The digitisation of the companies was the main reason for the implementation of ERP systems, recognized by 70 % of them. The digital transformation of these organisations was present on their agendas, including it in their strategic plans, considering the integration of data and the automation of processes. For thus, the relevant role of ERP systems is evident, as efficient and effective information systems, to face the continuous digital challenges, the changing environment requirements and keep up to date with company services and products (Metawa et al., 2022; Ranky, 2015).

This digitisation allows SMEs to face their main barriers in managing companies internally. Those obstacles have been identified as lack of centralisation and integration (29 %), and inconsistency and altered data (20 %), which can lead to increased costs and, thus, lack of competitiveness.

The Chi-Square statistic did not indicate significant differences between SMEs with respect to the variables assessed and the different reasons for implementation considered in the present study. Only the reason 'centralisation and integration' exhibited a significant difference with respect to the SAP Solution implemented in SMEs ($\chi^2 = 4.958$; $p = 0.04$) (see Table A1).

On the other hand, the bivariate correlation analysis between the different reasons for implementation indicated a significant relationship between 'centralisation and integration' (I1) and 'digitisation' (I3) ($r = -0.445$; $p = 0.000$).

4.2.1. Provider selection

When selecting ERP providers, many companies choose SAP. This selection is due in part to the reputation that SAP has achieved over time (37.5 % of enterprises), obviously in addition to its characteristics; the most mentioned being its suitability and flexibility (37 and 14.6 % of enterprises, respectively). Other reasons (usability, compatibility, economic and other) do not exceed 6 % of companies.

The value assigned to the characteristics is a clear indication of the importance that SMEs give to the ability of providers to provide solutions to the different contexts of each company or moment. The

alternatives used by ERP providers to meet these demands are affordable and simpler comprehensive solutions, such is the case of the solution with the highest market share in this document (SAP Business One) among other solutions from providers such as Microsoft dynamics Nav, JD Edwards Enterprise One (Oracle), Alliance Manufacturing (Exact Software), etc. (Venkatraman and Fahd, 2016). Some of the main features of these solutions are: compact or pre-configured solutions, flexible pricing policies, hosting options, more specialized functionalities, open source ERP and implementation methods among others (Venkatraman and Fahd, 2016). Interestingly, the results reveal a significant and positive change regarding the economic factor that has overcome this crucial barrier to date.

The Chi-Square statistic regarding the variables assessed and the reasons for selecting SAP as a supplier considered in the study indicated two significant differences between SMEs (see Table A1). On the one hand, 'reputation' had a significant difference with respect to 'turnover' in SMEs ($\chi^2 = 15.204$; $p = 0.002$) and, on the other hand, the reason 'flexibility' also had a significant difference, in this case with 'internationalisation' ($\chi^2 = 9.975$; $p = 0.002$).

In addition, the bivariate correlation analysis between the different SAP selection reasons indicated numerous significant relationships, among them 'reputation' (SAP1) with "suitability" (SAP2) ($r = -0.392$; $p = 0.000$) and 'flexibility' (SAP3) ($r = -0.259$; $p = 0.011$), the latter with 'compatibility' (SAP6) ($r = 0.209$; $p = 0.041$), 'usability' (SAP4) with the 'suitability' (SAP2) ($r = -0.204$; $p = 0.046$) and 'economic reasons' (SAP5) ($r = 0.201$; $p = 0.05$).

4.2.2. Partner selection

One of the factors that determine the success or failure of an ERP implementation is the appropriate selection of the partner in charge of accompanying the companies that decide to implement the system throughout the entire process (before, during and after). >20,000 partners (SAP Business Partners) are responsible for training staff and monitoring the implementation of SAP ERP in the world. The factor that companies most value when selecting partners is their professionalism (49 % of enterprises). This characteristic is also directly linked to the two factors that follow in the list, i.e., adaptability (45.8 %) and reliability
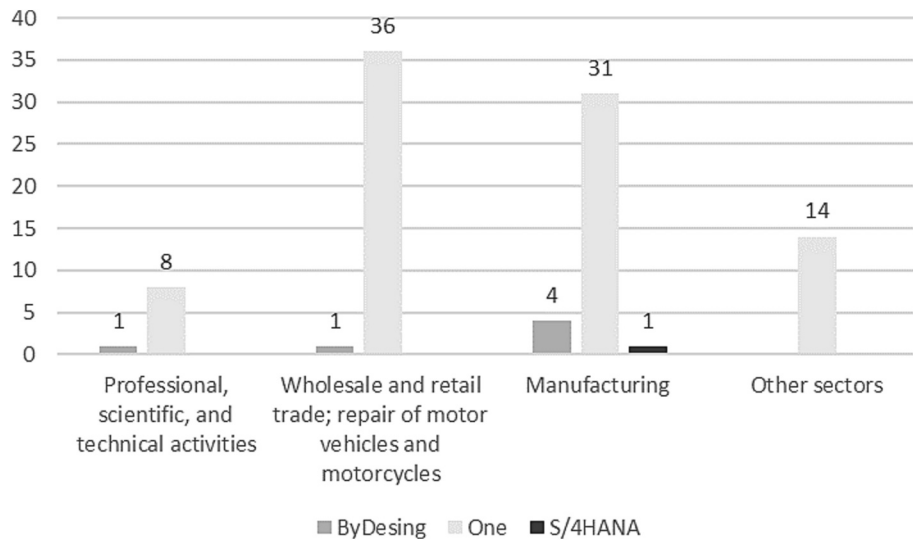
Fig. 2. ERP solution by activity type (No. SMEs).

(37.5 %). This is an important investment for the companies and they need to ensure the success of the implementation. Surprisingly, the economic factor did not condition the selection of partners, occupying the last position in the list of influencing factors (only two SMEs). Therefore, ERP vendors have evolved over time to be quick to execute in order to reduce cost, time and effort for SMEs through tailored implementation methods (Venkatraman and Fahd, 2016).

Seidor was clearly the most selected alternative, among the 36 alternatives available (20 % total), followed by Advantic and Expert One (15 and 14 % respectively). It is a leading multinational in consulting solutions for management software and value-added ICT services, with offices all over the world. Its reputation, specialisation, and professionalism ensure its position in the market. This fact is endorsed by the numerous recognitions and awards received in recent years, including the prestigious SAP Pinnacle award in the Partner of the Year category for the third consecutive year. Seidor is currently the only Spanish consulting company to win or be a finalist in the different awards related to SAP ERP.

By sectors, excluding 'other sectors', only in the manufacturing industry Seidor competes with Advantic with the same share (Fig. 3).

On the other hand, as shown in Table A1, some variables stood out due to the existence of a significant association with some of the reasons for selecting SAP partners. The "size" with "economic reasons" ($\chi^2 = 19.475$; $p = 0.000$) and "professionalism" ($\chi^2 = 15.204$; $p = 0.002$); and "internationalisation" with "reliability" ($\chi^2 = 8.007$; $p = 0.005$).

The results of bivariate correlation analysis of partner selection reasons show a relationship between professionalism and adaptability ($r = -0.441$; $p = 0.000$) and reliability ($r = 0.194$; $p = 0.05$).

4.2.3. Implementation benefits

The assessment of the benefits associated with the implementation of ERP SAP indicated that they were many and varied. Each company indicated at least three benefits obtained or expected to be obtained with that implementation.

Above all the reasons, the availability of information (B3.1) stood out (70 % of enterprises). The software allows obtaining reports in real and minimum time and referring to any state of the product, since it is part of the production chain until it reaches the hands of the final customers ('Just one click away'). Information is essential for SMEs, since it allows them to control all business management and be able to make
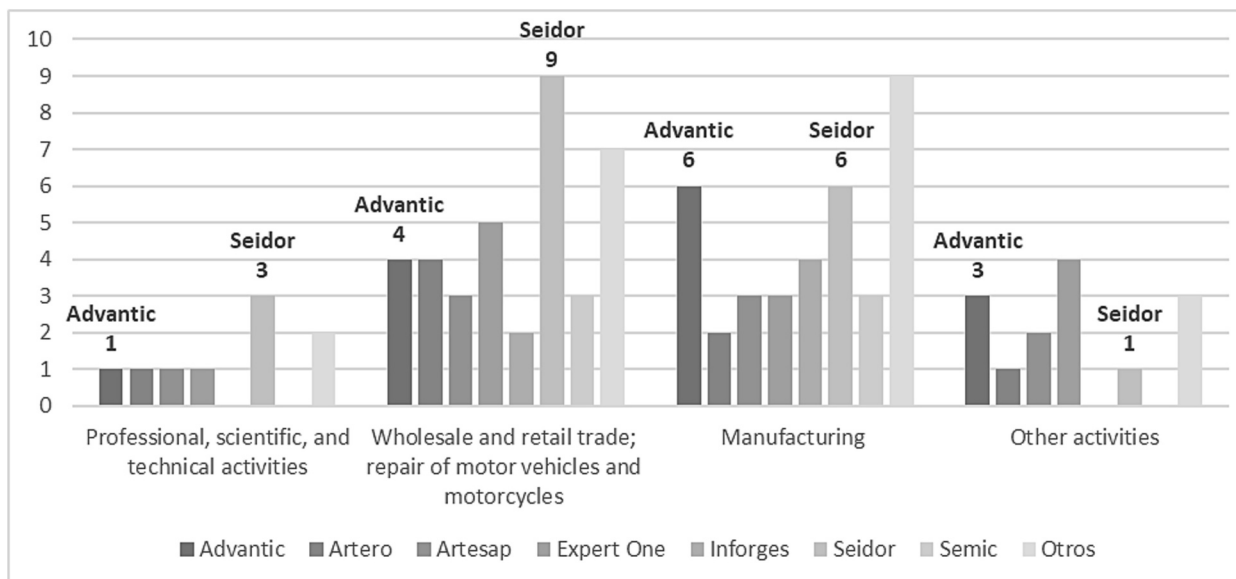

Fig. 3. Partners distribution by sectors (No. SMEs).

appropriate decisions in a timely manner, improving their planning, reducing errors and deadlines, thus increasing their productivity and turnover in most cases.

According to the established reclassification, grouping the benefits according to the review of the literature (see Table 4), operational and organisational benefits were the most mentioned by the companies and, therefore, the most valued by them. The little importance given to economic benefits stood out (Fig. 4).

With respect to the association between benefits and the respective variables (see Table A1), there were some significant differences between the operational benefits with the turnover ($\chi^2 = 8.409$; $p = 0.038$) and size of SMEs ($\chi^2 = 8.636$; $p = 0.035$).

Regarding the activity of SMEs, there were no significant differences. In all sectors, organisational benefits led the ranking, ranging between 70.2 and 89 % of SMEs, followed by operating benefits (50 to78%), and economic benefits (11.11 to 21.43 %) (Fig. 5).

Finally, it was determined whether there was a correlation between the motivational factors that prompted SMEs to implement ERP and the benefits derived from the implementation of the projects. We found only one significant difference between SMEs, i.e., between 'centralisation and integration' and 'operating benefits' ($\chi^2 = 4.933$; $p = 0.026$).

5. Conclusions

The present study made it possible to achieve its general purpose, i. e., to assess the experience of a group of customers (Spanish SMEs) of the SAP, a benchmark in the international ERP software market. The focus of the study was the influencing factors in the process of selection and implementation of ERP systems in this group of companies.

Although the technological solutions implemented by SMEs were characterized by their specialisation and adaptation, the results did not show differences by sector, with the largest number of SMEs concentrated in one of the SAP software available for SMEs that leads the international market, i.e., SAP Business One, which offers the possibility of being implemented on-premise or in the cloud. In addition, the new technological alternatives incorporated in this software, show the importance that they can have when the SMEs implement an ERP system. Considering the distribution of the sample by sectors, no differences were found with respect to the level of implementation in the

European market, with the highest percentage concentrated in groups C and G (National Classification of Economic Activities, 2009) (manufacturing industry and commerce, vehicles and motorcycles repair, respectively).

The reasons for implementing ERP systems argued by the majority of SMEs revealed one of their main concerns in the current business environment, technological obsolescence and, therefore, the inclusion of digital transformation in their corresponding agendas. This way, at the same time, this transformation will allow these companies to achieve other objectives, which are precisely their main limitations to manage processes in the most efficient and profitable way, i.e., lack of centralisation and integration, and inconsistency of data and altered information. This will also make it possible to face new challenges due to recent events (COVID, war conflicts, etc.).

It is evident that SAP is a reference in the ERP market, which allows it to have a consolidated reputation. It is exactly the dimension together with the suitability of the tool that makes it to be considered one of the most complete in the market, concentrating the largest number of SMEs, with approximately 40 % of them. For this reason, reputation together with flexibility are the two influential factors in the selection of the seller, with a significant difference, depending on the turnover of SMEs ($\chi^2 = 15.204$; $p = 0.002$) and their presence in international markets ($\chi^2 = 9.975$; $p = 0.002$), respectively.

For the success of the implementation of this type of software in companies, the role of the partners is crucial. The reasons for selecting the consultant are conditioned, according to the association analysis performed, by the size of the SMEs (number of employees), the benefits of economic nature ($\chi^2 = 19.745$; $p = 0.000$), and the trust generated based on the presence or not of the SMEs in international markets ($\chi^2 = 8.007$; $p = 0.005$). Likewise, professionalism is valued differently, depending on the turnover of SMEs ($\chi^2 = 15.204$; $p = 0.002$).

Regarding the benefits obtained with the implementation of the ERP software, those of an organisational and operational nature were the ones that led the ranking (32.72 and 34.57 % of companies over the total, respectively). This fact revealed the lack of operability of the management tools traditionally used by these companies or even, in many cases, their absence or insufficiency. Precisely, this situation hinders their integration into the large digitised industrial value chains of which they are currently a part. Additionally, the results indicated the short-term approach of SMEs when implementing this type of tools, placing the benefits linked to the long term (strategic and economic) in the background with an average of 19.44 and 5.86 %, respectively. Likewise, the operational and organisational benefits were those that had a significant relationship with the size of the SMEs, depending on the number of employees and/or turnover ($p < 0.05$).

5.1. Theoretical contribution

This study reinforces the understanding of the importance of digital transformation of the SMEs management to be competitive. Specifically, the results of the study contribute to the consolidation of the research field on the selection and implementation of ERP solutions in the SMEs in the current context, since it has undergone important changes derived from important technological advances (Industry 4.0) and other recent events (Covid, wars, shortages, etc.). Studies like this allow updating the literature in the field of research, based on real stories of SMES. It provides a taxonomy of key factors to evaluate technological advances in the management of SMEs, especially the ERP implementation and selection in challenging times. Indeed, according to the literature, it can serve as a form of classification and a fundamental mechanism for organizing knowledge for future research.

5.2. Practical implications

On the other hand, we believe that this contribution could leverage ERP adoption in SMEs, because of the practical implications for

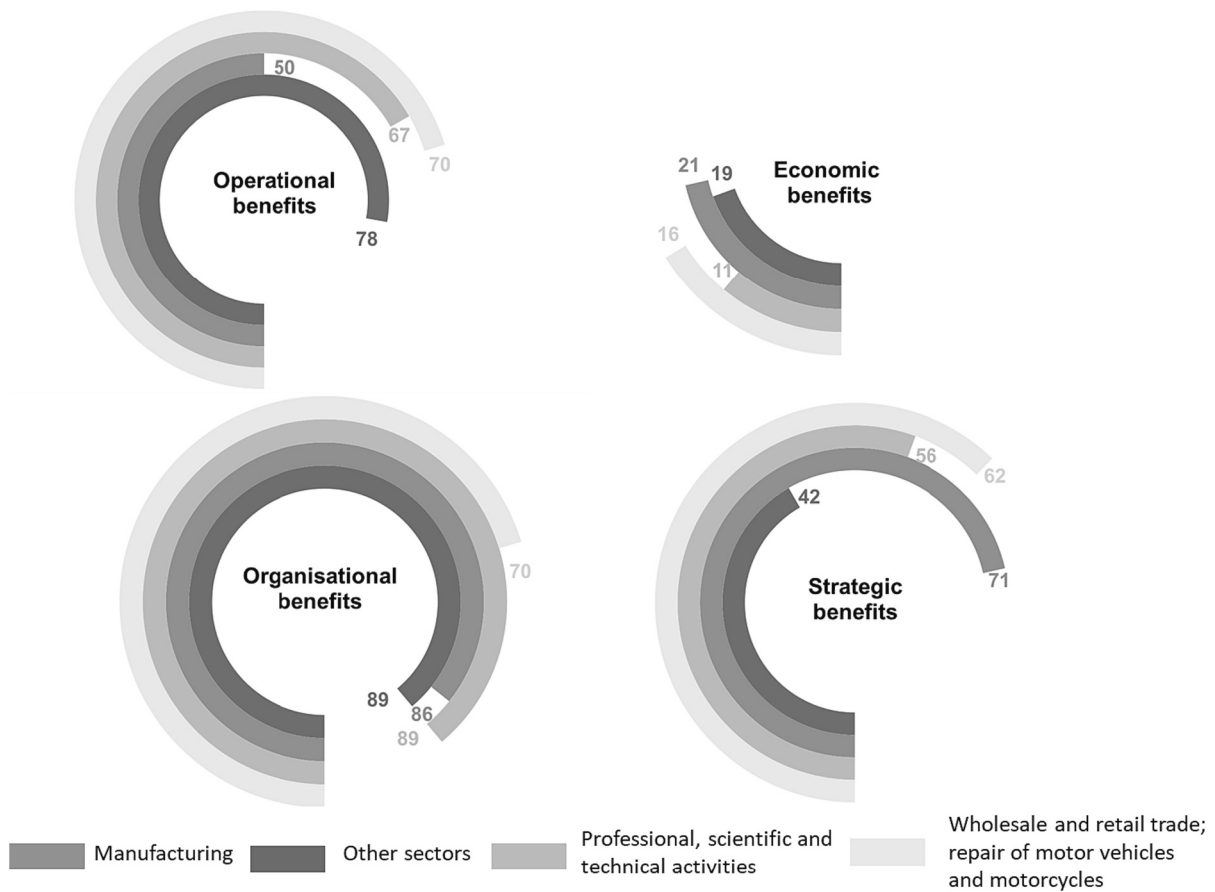**Fig. 4.** Implementation benefits (benefit type, No. SMEs).

Fig. 5. Ranking activities by type of benefits (% SMEs).

companies, solution providers and business consultants. This study's empirical evidence helps SMEs organisational management understand the relevance of implementing ERP systems to be competitive in the current environment. They give managers a fresh perspective on how ERP solutions could be implemented to enhance organisational performance, banishing myths and taking advantage of the opportunities that the context offers (software offer, technological disruption …). For that, the inclusion of digital transformation in their corresponding agendas is recommended for improved organisational performance, considering, at the same time, that SMEs are part of the large digitised industrial value chains, from suppliers to the final customers, performing their activities within the framework of industry 4.0 (Estensoro et al., 2021). Likewise, the need to establish incentives through government policies and strategies is evident. All the highlighted practical contributions make it possible for SMEs to face new challenges in the current environment.

And ERP vendors and their partners, provide actionable guidelines to identify user profiles in the SME and therefore service improvement to increase customer satisfaction, and therefore their market share.

5.3. Limitations and future studies

It is important to recognize that this study has been limited to identifying and analyzing the critical factors facing SMEs para implanter ERP system in a particular context. There are also limitations regarding the number of SMEs and ERP vendors that were analysed. Undoubtedly, a wider range of data on SMEs would help to increase the value of the analysis. This was an exploratory study, primarily aimed at clarifying the critical factors to which greater attention should be paid in order to help the SMEs to adopt ERP systems in challenging times. Nevertheless, there is room for future studies to investigate other contexts which may

provide information from a greater number of SMEs and other leading ERP vendors. Further, while we have shed some light on this issue, we have not explored how, at the same time, this transformation will allow these companies to achieve other objectives, such as the sustainable development. Further studies might develop these aspects by adopting the focuses taken in other research, such as the study of Khan et al. (2023); indeed, we encourage scholars to do so.

CRediT authorship contribution statement

Ana Gessa: conceptualization; methodology; investigation; validation; formal analysis; writing original draft, review & editing; funding acquisition, supervision.

Amor Jiménez: methodology; investigation; validation; formal analysis; original draft; review & editing.

Pilar Sancha: methodology; investigation; validation, formal analysis, original draft; review & editing.

Declaration of competing interest

There are no competing interests to declare.

Data availability

Data will be made available on request.

Acknowledgements

Appendix A

Table A1
Results chi-square tests ($n = 96$).

Variable	Chi-Square test	I1	I2	I3	I4	SAP1	SAP2	SAP3	SAP4	SAP5	SAP6	SAP7	PT1	PT2	PT3	PT4
Activity	p-value	3.605	1.881	1.692	1.231	4.395	0.306	1.282	1.544	2.384	1.316	2.384	3.304	0.382	4.482	6.906
	Sig.	0.307	0.597	0.639	0.746	0.222	0.959	0.734	0.672	0.497	0.725	0.497	0.347	0.944	0.214	0.075
No. of employees	p-value	2.258	1.127	4.328	.239	2.202	1.159	4.195	0.528	0.428	0.861	1.656	5.561	3.557	3.238	19.745
	Sig.	0.521	0.771	0.228	0.971	0.532	0.763	0.241	0.913	0.934	0.835	0.647	0.135	0.313	0.356	0.00*
Turnover	p-value	2.773	4.994	0.620	1.656	15.20	1.435	5.335	2.060	2.970	1.085	1.054	15.20	5.335	2.060	2.970
	Sig.	0.428	0.172	0.892	0.647	0.002*	0.697	0.149	0.560	0.396	0.781	0.788	0.002*	0.149	0.560	0.396
Establishment year	p-value	4.744	0.746	1.268	2.814	5.731	3.039	1.191	2.125	1.606	4.460	1.950	2.875	1.624	0.838	4.085
	Sig.	0.192	0.862	0.737	0.421	0.125	0.386	0.755	0.547	0.658	0.216	0.583	0.411	0.654	0.840	0.252
SAP solution	p-value	4.958	1.987	2.882	.495	1.718	1.976	1.289	0.503	0.244	0.32	3.893	1.561	1.727	0.663	0.161
	Sig.	0.04*	0.370	0.237	0.781	0.424	0.372	0.525	0.777	0.885	0.849	1.656	0.458	0.422	0.718	0.923
Internationalisation	p-value	0.301	4.204	0.301	1.975	2.224	1.441	9.975	0.003	1.622	0.452	0.001	0.235	1.494	8.007	0.221
	Sig.	0.859	0.4	0.859	0.160	0.134	0.230	0.002*	0.956	0.203	0.502	0.969	0.628	0.222	0.005*	0.638

I1: centralisation and integration, I2: consistency and accurate information, I3: digitisation, I4: other reasons; SAP1: reputation, SAP2: suitability, SAP3: flexibility; SAP4: usability, SAP5: economic, SAP6: compatibility, SAP7: other reasons; PT1: professionalism, PT2: adaptability, PT3: reliability, PT4: economic.

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