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Towards a lightweight framework for service management evaluation in SMEs

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Abstract

Small and Medium-sized Enterprises (SMEs) are currently immersed in Volatility, Uncertainty, Complexity and Ambiguity (VUCA) environments and need to adapt and innovate both their services and their management practices and processes. Unfortunately, models and standards for service management are focused on large organisations, therefore, their application in SMEs is expensive and, generally, unfeasible. In order to contribute to the sustained success and development of SMEs, this paper presents a framework for service management evaluation. The objective of this framework, which is based on international standards and the main models for service management, is to be a roadmap containing well-defined and formalised processes that helps SMEs to improve the quality of their customer services. The proposal is validated in this work by means of its application to a real case study.

Keywords Service management · Maturity model · Process reference model · Small and medium-sized enterprises (SME) · ISO/IEC 33000

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1 Introduction

Organisations are currently confronting highly competitive environments dominated by volatility, uncertainty, complexity and ambiguity (VUCA). This new environment obliges companies to adapt and innovate their structures, practices and processes in order to adjust to more complex markets in a state of rapid evolution (Cousins 2018; Mack et al. 2015). All companies must learn to quickly adapt to change by using agile concepts, including those companies that are not necessarily from the Information Technology (IT) or software sectors (Amiri et al. 2021).

The service sector is particularly affected by this situation of dynamism and uncertainty caused by the changes in the market and by the fact that their customers' expectations are also in a state of continuous evolution. Organisations must be capable of generating new experiences for their customers, understanding consumers' needs, wishes and expectations, and considering them in the design and presentation of their services (Hara et al. 2020; Skog et al. 2018). This will also allow them to achieve customer retention and loyalty (Bouranta et al. 2009). Adapting to this continuously changing reality implies that organisations must reformulate their strategies, review their internal processes and, in some cases, adjust their business models to new market challenges without losing the quality of their services.

The improvements made to organisations' internal processes influences the quality of the customer services provided by industrial and service companies (Azam et al. 2012; Bouranta et al. 2009). This principle is based on the Total Quality Management approach (Dahlgaard et al. 2008). Delays in carrying out activities, deficient personnel management, etc., are frequent consequences of internal processes whose quality is poor owing to a lack of standardised practices, procedures and processes (Maleyeff 2006). Companies with well-established operations and processes are in a better position to influence the quality of the products and services that they offer to their customers (Withers et al. 1997), and Small and Medium Enterprises (SMEs) seem to be less prepared in this regard when compared to large companies (Eriksson 2016).

Indeed, SMEs continually come up against barriers related to their size when attempting to access resources that will allow them to grow or to improve the quality of the services with which their customers are provided (Chittenden et al. 1998; Doern 2009). In this context, service management models could help to systemise their strategic and operative actions in a way that would allow the company to be competitive by developing business models that would enable them to attain their business objectives. SMEs on service sector constitute a particularly important part of the global economy and are the main source of employment in several countries (Kok and Berrios 2019), and contributing to their sustainable grow this one of the objectives of this research. The aim is to support SMEs from the service sector in their endeavour to adapt their organisation to handling quality-related challenges associated with today's environment.

Several service management models and standards that are oriented towards evaluating and improving internal processes currently exist, although the majority are related to services linked principally to Information Technologies departments/

areas (IT services). This is the case of proposals such as the Information Technology Infrastructure Library (ITIL) (Gunawan 2019), the ISO/IEC 20000–1 standard (ISO/IEC 2018), the Capability Maturity Model Integration for Services (CMMI-SVC) (CMMI Institute 2010, 2018) and Federated IT Service Management (FitSM) (FitSM 2021a). There are also other models that focus more on organisational management, such as the European Foundation for Quality Management (EFQM) (EFQM 2021) and Value driven, evolving, responsive, integrated service management (Agutter et al. 2017). The ISO/IEC 9001:2015 certification (ISO/IEC 2015g) focuses on product and service quality management systems, placing emphasis also on the process management.

Although enterprises are aware of the importance of service management, they still make little use of any of the service management models (Winniford et al. 2009), especially in the case of SMEs (Silva et al. 2018). When applying this type of proposals, it is habitual for companies to have to contract consultancy services and to have to struggle with generic, rigid and extensive documentation (Samat et al. 2012). Organisations must have considerable economic, technological and human resources at their disposal, which is a limitation, especially for SMEs (Eikebrokk and Iden 2017). SMEs are, therefore, clearly at a disadvantage.

Service management models and frameworks are generally defined by the fact that they are applied to large companies and not to SMEs, since they not consider the specific characteristics of this type of company, and are intended for large companies, particularly as regards organisational structures and resources (Huang et al. 2009). The most frequently used service management models, such as, VeriSM and CMMI, are, therefore, universal one-size-fits-all models. These models are complex frameworks with a great amount of dependencies among processes, and require in-depth expert knowledge for their implementation. Bergeron y Croteau (2020) and Devos, Landeghem and Deschoolmeester (2012) stress that SMEs cannot be treated like large companies, and that it is necessary to consider significant differences from the economic, cultural and management points of view. As Levstek et al. (2022) state, the decision-making structures of SMEs tend to be flat, informal and centralised. Moreover, financial and resource limitations can be significant, and time can also be an issue for these companies, as their owners and managers are regularly overloaded with other business priorities. This signifies that "there is a need to develop more efficient models that are contingency-based and easier to implement than existing models and thus adaptable to the actual needs of the business" (Levstek et al. 2022).

As literature does not contain any definitions of suitable approaches with which to implement service management models in firms, and existing literature insists on universal service management models, which are too complex for SMEs, it would appear opportune to respond to Levstek et al. (2022) call for research and the proposal of a service management framework that is appropriate for SMEs, and that allows the evaluation of SMEs' service management processes on the basis of a contingent approach.

Values such as *Lightness*, promoting a 'lean' mentality, i.e. reducing unnecessary work or having a minimum number of formal and documented processes; *flexibility*, which is understood as the capacity to create changes in a proactive, reactive or

inherent manner through the use of the resources that are available (Conboy 2009), and the *adaptability* of the proposals to organisations' specific needs, are key aspects when attempting to bring this type of service management evaluation framework closer to SMEs, because otherwise it may not be possible for them to apply this type of proposals owing to their limited resources, budgets, etc. This work proposes a framework that is capable of covering the needs described.

In this work, we use the ISO/IEC 33000 family of standards for software process management as a basis on which to present a *Lightweight Framework for Service Management Evaluation (*from here on, *LightSME*). *LightSME* integrates some characteristics from the most representative service management models and standards (EFQM, VeriSM, ISO/IEC 20000–1, ITIL and CMMI-SVC), but is different from them in the following two main respects: it focuses on the evaluation of the processes required by service sector SMEs, thus making this evaluation process more lightweight; and it places emphasis on customer services, the service culture and capturing the customers' needs and expectations.

The main objective of *LightSME* is to be a roadmap containing well-defined and formalised processes that will accompany SMEs on the road towards improving the quality of their services and will involve all the people in the organisation. *LightSME* is composed of a Process Reference Model (PRM), a Process Assessment Model (PAM) and a Maturity Model (MM). The differentiating characteristics of the framework defined in this work are:

- It is *based on the ISO/IEC 33000 standard*.
- It is *focused on services in general*, i.e. all types of services (and not just IT services).
- It is focused on *improving Service Quality* by improving processes.
- It defines a *light and flexible Maturity Model* specifically designed for *SMEs in the service sector*.
- It promotes the *values of lightness, flexibility and adaptability* when being applied in organisations. It does not impose activities, but rather suggests processes with which to guide organisational improvement. The objective is to provide the organisation with an improvement and learning process, and not that of carrying out an evaluation or obtaining a rating.
- It integrates *characteristics from very representative service management models* (EFQM, VeriSM, ISO/IEC 20000–1, ITIL and CMMI-SVC).
- It is focused on *people and on the customer service culture*.
- The framework *has been evaluated* by companies and practitioners from the service sector.

The research methodology employed is based on the Design Science Research methodology (Hevner et al. 2004; Peffers et al. 2007), which comprises 6 steps: *Identifying the problem and motivation, Objectives and proposing a solution, Designing the solution, Demonstration, Evaluation* and *Communication.* The design, demonstration and evaluation phases are carried out iteratively. The first design for the framework was defined on the basis of the state of the art and by integrating previously identified proposals. The design was later refined by means of Focus Groups

formed of service sector experts and professionals who contributed to adjusting and validating the proposal. The *LightSME* framework has been applied in a case study of a marketing and market studies SME, thus allowing the evaluation in a real setting of the reference, evaluation and maturity models proposed. The proposal has proved to be suitable for SMEs.

The main contribution of this work is the definition of a novel and light framework for the evaluation of management processes that is oriented towards SMEs in the service sector. Practitioners will benefit from a process reference model, an assessment model and a maturity model, all of which have been systematically documented on the basis of well-known practices that have been prepared in such a way that they are understandable for SMEs.

This paper is organised as follows. Section 2 presents an overview of the ISO/IEC 33000 standard and analyses the principal management models and standards in the sphere of services and their use in the context of SMEs. Section 3 presents the proposed framework and describes the three models of which it is composed. The DSR methodology employed to create and validate the framework is described in Sect. 4. Finally, our conclusions and future work are shown in Sect. 5.

2 Related works

2.1 Process evaluation and improvement: ISO/IEC 33000

The business processes in both SMEs and large companies must be managed efficiently in order to improve the quality of the services that companies offer to their customers (Preuner and Schrefl 2005). It is, therefore, important to use *process reference models* for this purpose, since they help to identify and describe all the processes involved in the organisation's activities (Berger et al. 2009), *evaluation models,* which make it possible to know to what extent the processes fulfil their objectives of detecting and working to improve the organisation's weak points (ISO/IEC 2015c) and *maturity models,* which make it possible to know the level that the organisation has reached according to its processes (Wendler 2012).

Process reference models define a set of processes with which to collectively support the main objectives of a community of interest, and provide a basis for one or more evaluation models (ISO/IEC 2015c). Well-defined, implemented, evaluated, measured and documented processes and procedures improve the coherence of companies' results and increase the quality of their products and services (Charantimath 2011; Priede 2012).

Maturity models are valuable tools that make it possible to evaluate a company's current situation and identify reasonable improvement measures (Becker et al. 2009; Brookes et al. 2014). They also help to take control of processes in order to improve and evolve in an efficient manner (Curtis and Chrissis 1993; English 1999; Jia et al. 2011).

Measurement frameworks were created in the sphere of quality management. They provide guidelines and evaluation criteria that are used by companies throughout the world as a basis for continual improvement, and can be applied in different

spheres (Doulatabadi and Yusof 2018). In the organisational sphere, these improvement practices are known as business excellence models (Doulatabadi and Yusof 2018; Longbottom 1998; Toma and Marinescu 2018). In the context of software, process improvement models, such as the ISO 9000 standard (ISO/IEC, 2015 h), the Capability Maturity Model (CMM) (Humphrey et al. 1987), the Capability Maturity Model Integration (CMMI) (Forrester et al. 2011), the ISO/IEC15504 (ISO/IEC, 2004) and the ISO/IEC 33000 (ISO/IEC, 2015e) are employed.

The international family of ISO/IEC 33000 standards are responsible for the quality of software processes by evaluating and improving their capacities (ISO/IEC, 2015e). The ISO/IEC 33001 (ISO/IEC, 2015a) contains a glossary of terms related to process evaluation and describes how the different parts of the family of standards are related. The minimum requirements in order to carry out an evaluation of processes that will guarantee that the results will be objective, coherent, repeatable and representative, can be found in the ISO/IEC 33002 standard (ISO/IEC, 2015b). The ISO/IEC 33003 standard (ISO/IEC, 2015f) establishes the requirements that are applicable to process measurement frameworks, which support the evaluation of the quality characteristics of the process. The ISO/IEC 33004 standard (ISO/IEC, 2015c) defines the requirements for process reference models, process evaluation models and maturity models. The ISO/IEC TR 33014 standard (ISO/IEC, 2013) providence guidance on how to improve the processes in a continuous improvement framework. The ISO/IEC 33020 standard (ISO/IEC, 2015d), meanwhile, defines a process measurement framework that supports the evaluation of process capability according to the requirements of the ISO/IEC 33003 standard. The ISO/IEC 33074 standard (ISO/IEC, 2020b), however, provides a process evaluation model in accordance with the requirements of the ISO/IEC 33002 standard and associated with the processes in the ISO/IEC 20000–1 standard.

Despite being relatively recent, the applications of the ISO/IEC 33000 standard are described in several current works. This standard has been applied in order to evaluate the sustainability of software processes (Lami et al. 2014), the construction of process measurement scales (Jung et al. 2014) and data quality in combination with the ISO 8000 standard (Carretero et al. 2016). Frameworks have also been defined for, among other things, Green IT governance and management (Patón-Romero et al. 2019) and the development of maturity models applied in software organisations (Rodriguez et al. 2021), and for the creation of a process evaluation model with which to evaluate, implement and improve the capacity of processes in order to respond to customers' demands (İlisulu et al. 2022).

There is, to the best of the authors' knowledge, currently no evidence of the use of the ISO/IEC 33000 standard to evaluate and improve the processes of companies in the service sector at a general level.

2.2 Process evaluation and improvement in service management

In this section we review the main proposals for service management, analysing its characteristics, strengths and limitations in terms of its application as a generic proposal in small and medium-sized enterprises.

Various models and standards can currently be employed to manage services, and are oriented towards the evaluation and improvement of internal processes. Some proposals are principally related to *services associated with Information Technologies* (IT services). This is the case of proposals such as: *ITIL*, which emphasises good IT service management practices and whose version 4 additionally includes IT service values, i.e. providing benefits for the organisation and stakeholders (Gunawan 2019); the *ISO/IEC 20000–1* standard, which is a standard for IT service management that is principally intended for technology departments, and its recent version *ISO/IEC 20000–1:2018*, which is the extension created to include all types of organisations and services supported by IT (ISO/IEC, 2019), and *CMMI-SVC,* which proposes a process improvement and evaluation model of IT services (CMMI Institute 2018). There is also *FitSM*, a model composed of 6 documents that define IT processes for an organisation's IT service management (FitSM 2021b).

There are also other models and standards which focus on *services management at the organisational level* (not just IT departments or IT Services). This is the case of proposals such as: *EFQM*, which is an organisational evaluation and administration model that is applied in various spheres (EFQM 2021; Tavakoli et al. 2016). Another proposal is that of *VeriSM*, an agile organisational management model that is intended to accompany the digital transformation process. This model can be applied to service management at a general level (Agutter et al. 2017). However, there is, to date, no formal evidence of its implementation in organisations, although some studies highlight the strong adhesion of VeriSM to agile principles, and its capacity to relate different management approaches and emerging technologies (Mora et al. 2021). The *ISO/IEC 9001* (ISO/IEC 2015g) is also an important certification that focuses on product and service quality management systems.

The former proposals focused on IT services are perceived to be the most extensive and detailed proposals as regards processes; the latter, whose profile is oriented more towards organisations, place greater emphasis on characteristics related to people (from the organisation, and its customers) and the service culture, which is considered another determining factor in service quality (Agutter et al. 2017; Ueno 2012).

In order to attain a better understanding of the aforementioned models and standards, we carried out an analysis of them according to the characteristics that are relevant for service management. These characteristics have been evaluated by taking into account the emphasis or importance that each proposal places on the characteristics. This signifies that, for example, the symbol "✓" is used to indicate complete coverage, while that of "✗" is used if the proposal does not consider the characteristic, and the term "Partial" is employed if it is dealt with only partially. Details of the proposals analysed and the results obtained (summarised in Table 1) are provided below.

While EFQM and VeriSM consider *Organisational culture and leadership* as a differentiating factor, from the point of view of these proposals, the definition of and commitment to the organisation's values, mission and vision are key factors for its success. The ISO/IEC 9001 and ISO/IEC 20000–1 standards cover this only partially, since they establish the fulfilment of only some of the requirements associated with the definition of strategies associated with the mission and vision, etc. The

Table 1 Comparison of models and standards

Characteristics	EFQM v2020	VeriSM	ISO 9001:2015	ISO 20000–1:2018	CMMI-SVC v2.0	ITIL v4	FitSM
Organisational culture and leadership	✓	✓	Partial	Partial	✗	Partial	Partial
People	Partial	✓	✓	✓	✗	Partial	Partial
Process improvement	✓	✓	✓	✓	✓	✓	✓
Service quality	✗	✓	✓	✓	Partial	Partial	Partial
Service culture	Partial	✓	Partial	Partial	Partial	✗	✗
Sphere	General services	General services and IT services	General services and products	IT Services	IT Services	IT Services	IT Services
Scope (Organisation)	All	All	Partially	All	All	All	All
Process reference model	✗	✗	Partial	✓	Partial	✓	✓
Process assessment model	✗	✗	✗	✗	✓	CMMI	Partial
Organisational maturity model	✗	✗	✗	✗	✓	CMMI	✗
Agile/Lightness values	✗	✓	✗	✗	✗	Partial	Partial
Origin	Organisations	Digital transformation of organisations	Product and service quality	Technologies	Software	Technologies	IT services

ITIL and FitSM models also cover this aspect only partially. Both models consider organisations' value, mission and vision in order to define improvement strategies but, like the previous strategies, do not define what to do or how to manage organisational culture and leadership. CMMI, however, does not explicitly define aspects related to this criterion.

VeriSM considers that *People* are a key factor in organisational success, and consequently provides a more in-depth explanation of their management and how to incorporate them into the organisational culture. The EFQM model, meanwhile, provides recommendations concerning what an organisation should contemplate in order to manage people, but does not provide an in-depth explanation of how to put this into practice. ITIL has a dimension denominated as "organisations and people" that focuses on the functions and responsibilities of all interested parties (personnel, customers, suppliers, etc.) but does not explore how to manage personnel in any depth. FitSM, meanwhile, does not explicitly define the management of personnel. The ISO/IEC 9001 and ISO/IEC 20000–1 standards cover this aspect, since they define clauses for the management of personnel.

With regard to *Process Improvement*, all the proposals pay particular attention to processes and consider their management to be essential.

The ISO/IEC 9001 and ISO/IEC 20000–1 standard places emphasis on improving *Service Quality* and products from the point of view of quality management system. VeriSM also places emphasis on improving service quality from the point of view of processes, but additionally considers customers' perceptions. CMMI and ITIL do not mention service quality management explicitly, but consider it to be an implicit result of service management. The FitSM model, meanwhile, focuses on improving services by considering the importance of improving the quality of those services by managing them, but does not include any processes or activities by which to do so. EFQM does not explicitly define aspects related to this criterion.

Although the EFQM and CMMI models and the ISO/IEC 9001 and ISO/IEC 20000–1 standards mention the importance of focusing on customer satisfaction, the only model that proposes, promotes and explores the importance of the *Service Culture* as a success factor in customer service management in any depth is VeriSM. In fact, VeriSM defines and emphasizes the characteristics that should be incorporated into an organisation that is focused on customers, providing details of key elements of the service culture, such as empathy, commitment to the customer, the search for excellence in the customer's service, etc.

With regard to the *Sphere* of application, this shows that the ISO/IEC 20000–1 standard, along with the CMMI-SVC, ITIL and FitSM models, are oriented towards the sphere of IT services; VeriSM is, meanwhile, applied to general and IT services, and the ISO/IEC 9001 standard and the EFQM model are applied to general services.

The ISO/IEC 9001 standard can be directly applied to departments, functions, manufacturing processes, etc., while the *Scope* of the other proposals may cover the whole organisation.

The ISO/IEC 9001 standard indicates that it is the organisation that should define its processes according to the requirements established in Sect. 4.4 of the standard (ISO/IEC, 2015 g). The ISO/IEC 20000–1 standard and the FitSM model,

meanwhile, both define a *Process Reference Model* for IT services, and the CMMI model provides process and practice areas that mention the processes grouped in an area. However, neither VeriSM nor EFQM define process models.

In the case of defining a *Process Evaluation Model*, it will be noted that FitSM does not propose a model as such, but rather provides aspreadsheet containing descriptions of processes in order to assist in the evaluation of process maturity; CMMI does, meanwhile, define an evaluation model, and the ITIL model can employ the evaluation model proposed by CMMI. The same occurs with the *Maturity Model*: CMMI defines its own model and ITIL can use it.

The VeriSM model is the only proposal that adheres strongly to *agile/lightness values*. The FitSM does not explicitly contemplate the characteristics and philosophy of agility, although it does recognise the importance of reducing/lightening the amount of documentation in this type of processes (Mora et al. 2021); the ISO/IEC 20000–1 and ISO/IEC 9001 standards are certifiable and imply the fulfilment of established requirements, but do not, as such, apply values of agility/lightness (Sfakianaki and Kakouris 2020). The levels of rigorousness of the ITIL and CMMI models are between moderate and strong and are not, therefore, considered agile (Mora et al. 2021), although version 4 of the ITIL encourages organisation to agile manage their project portfolios, share knowledges across the business with fluid communication thus preventing organisational silos (Axelos 2019). The EFQM model does not explicitly indicate whether it adopts and applies agile/lightness values. At this point, it is necessary to highlight the work of (Verlaine 2017), who propose an adaptation of the agile values and principles of IT service management, although they do not relate it any specific IT service management proposal, such as those mentioned in this section.

With regard to the *Origin* of each proposal, it will be noted that the CMMI model originated in the software industry, while the ISO/IEC 20000–1 standard, and the ITIL and FitSM models originated in IT services. The origin of the EFQM model is organisations, while that of the ISO/IEC 9001 standard is service and product quality, and the VeriSM model originated from digital transformation in organisations.

The analysis carried out highlights the strengths and weaknesses of each model and standard according to the aforementioned characteristics. It provides evidence of the lack of a global framework including a process reference model, evaluation model and maturity model that is specifically focused on the evaluation of service management at a general level, and not focused on the IT area.

Characteristics that are important from the point of view of service companies, such as the service culture, the management of people (workforces, suppliers, collaborators, etc.) and the relationship with and treatment of the customer, are barely dealt with in the proposals identified.

Finally, it is necessary to highlight that reference models in service quality management, such as the ISO 9001 or the 20000–1, are excessively complex as regards their application in small and medium-sized companies (Sfakianaki and Kakouris 2020). Proposals of this type are not generally concerned with values related to agility lightness, flexibility, etc., which makes it difficult, if not impossible, to apply them in SMEs because they lack the resources (financial, knowledge, etc.) required to use this type of improvement tools.

2.3 Service management in the sme context

SMEs represent 99% of the total number of companies in the development world, and make significant contributions to the generation of riches and employment (Matt et al. 2020). Staying competitive in such a turbulent and uncertain environment supposes the capacity to adapt, which is in many cases unattainable because the resources available are restricted (Li et al. 2018; Thrassou et al. 2020).

In the service sector sphere, a company's survival is determined by the need to provide the customer with quality services. The eventual objective is customer satisfaction (Peña and Garrido 2016). The SMEs in the service sector have to provide an effective and efficient response to an increasingly more demanding market. The market dynamic and the dynamism of the environment demand that they be flexible, agile and resilient.

The use of service management models may, in this context, be a different means to respond to the market and the environment. But the lack of resources, knowledge and equipment, together with the fact that the models were designed for large companies (Chittenden et al. 1998; McAdam 2000), signifies that very few companies apply them (Levstek et al. 2022). SMEs that wish to improve are, therefore, at a clear disadvantage. Literature contains several approaches, which are discussed below.

The management processes in small firms were analysed by Jennings and Beaver (1995), who suggested that these processes are unique and entirely different from those in larger enterprises. A study was conducted in the UK by Forth et al. (2019), who found that SMEs were less likely to use formal management practices than were larger firms. However, these practices appeared to have demonstrable benefits for those SMEs that used them, and were positively associated with firm survival, growth, and productivity.

Several works analyse service management models, which are generally oriented towards IT (Forth and Bryson 2019). The most established IT governance (ITG) models, such as COBIT (Isaca 2012), ITIL and CMMI, are universal, one-size-fits-all models and are predominantly designed for large multinational enterprises, and are, therefore, too cumbersome and cost-intensive for SMEs to use effectively (Levstek et al. 2022). Research oriented towards SMEs is, as stated by Melendez et al. (2016), generally lacking. These authors carried out a literature review concerning information technology service management models applied to SMEs and found only 21 works, only 4 of which were published in indexed journals, while the rest appeared in conferences: "Studies found that organizations are becoming aware of the importance of service process model implementation. Some organizations know about best practices or the models like ITIL®2011 and ISO/IEC 20000; however, the problem is how these organizations apply these models. For that, we suggest that organizations need to define a strategy to adopt a model such as ISO/EC 20000, but also they have to be sure about improvement needs to apply good practices" (pp: 126).

The utilization of IT Service Management in SMEs by means of a customised ITSM method was analysed by Küller et al. (2011). The MPS (Softex 2015) proposal defines a process improvement model that is oriented towards service sector

micro companies and SMEs in Brazil. The model was constructed on the basis of models such as CMMI, ISO/IEC 20000 and ISO/IEC 15504, among others, and proposes seven levels of organisational maturity, although the proposal focuses on improving software processes in the sphere of IT services. The work (ISO/IEC, 2016) provides recommendations for the application of the ISO/IEC 9001standard in SMEs. Although the authors recognise that SMEs confront great challenges owing to high costs, their lack of resources, and the difficulties involved in understanding and interpreting the standard, they maintain that it is obligatory to comply with the recommendations and requirements contained in the standard. There would, therefore, appear to be no adaptability or flexibility as regards implementing the ISO/IEC 9001 standard in SMEs (Sfakianaki and Kakouris 2020). A strategic IT governance model was specifically analysed for these companies by Levstek et al.(2022), owing to the need for new contingency-based ITG models in SMEs.

It is possible to conclude that the models and proposals found in the current literature do not generally analyse the processes implemented in the SME framework in any depth. We were unable to identify any proposals whose objective is to improve service management in general, which it is vital to accomplish in this type of enterprises. As stated by Melendez et al. (2016), it is necessary to develop works that define a roadmap, a base model, or combined frameworks with a low complexity for SMEs.

In order to fill this gap, and owing to the significant implications that it may have for the management of SMEs, the objective of this work is to provide a framework that will allow SMEs to evaluate and improve their service management in an accessible and effective manner with the objective of making their management more professional and reducing the uncertainty inherent in making business decisions.

3 LightSME

The *Lightweight Framework for Service Management Evaluation for SME* is based on the ISO/IEC 33000 family of standards as regards the definition of the three models of which the framework is structured (*process reference model* – PRM, *process assessment model*—PAM, and *maturity model* – MM).

The aim of this *LightSME* is to be a roadmap containing well-defined and formalised processes that will accompany SMEs on the road towards improving the quality of their services and will involve all the people in the organisation. The proposal aims to fill various gaps identified in current literature: to define a *complete framework for evaluation and improvement processes in service management* that integrates characteristics from highly representative service management models (EFQM, VeriSM, ISO/IEC 20000–1, ITIL and CMMI-SVC); it is focused on the *management of general services* (not just IT services), and, it *promotes values of lightness, flexibility and adaptability* when applied in organisations, which is *a key aspect as regards facilitating their application in SMEs*.

The three models of which the framework is composed are presented as follows: both the evaluation model and the maturity model are supported by the process reference model, which is presented in the following sub-section.

3.1 Process reference model (PRM)

The requirements determined in the ISO/IEC TS 33054 standard (ISO/IEC, 2020a) were employed as a basis on which to a create PRM for service management that would fulfil the requirements established in the ISO/IEC 33004 standard (ISO/IEC, 2015c).

The PRM is structured around four dimensions that group together processes that are key aspects for management in service companies: processes related to the management of *People* (P), those related to the management of *Services* (S), those related to the management of *Customers and Consumers* (C) and those related to *Organisational Governance* (G). Figure 1 shows diagram of the PRM defined and the relationship among the models/frameworks employed as a basis, showing the degree (according to the size of the bubble) to which each of them has been considered for each dimension.

In addition to the models used as a basis (presented in Sect. 2.2), the PRM proposes the incorporation of characteristics from the P-CMM *(People Capability Maturity Model)* model and the Spanish UNE-CEN/TS 16880 standard. The P-CMM emphasises the efficient management of the people in the organisation
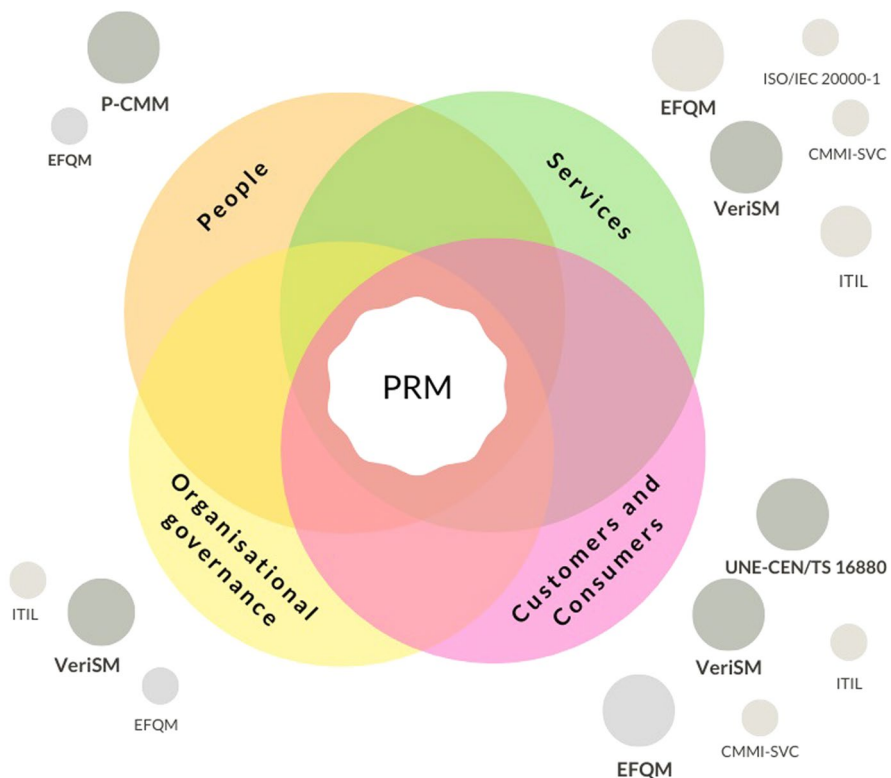

Fig. 1 Dimensions of the PRM

(Curtis et al. 2009), while the Spanish UNE-CEN/TS 16880 standard is focused on excellence in service (UNE-CENT 2015) through the creation of customer experiences. Both the P-CMM and the UNE-CEN/TS 16880 standard contribute to the development of the service culture that guides the conduct and behaviour of people in the organisation towards an efficient provision of and improvement to the quality of the service with which the customer is provided (Ueno 2012).

Each dimension of the proposed model was, in turn, divided into *key factors* (Fig. 2) that grouped the processes related to that factor and object from the dimension. The processes in each dimension and key factor are described in Tables 2, 3, 4, 5. For each process, we indicate the internal reference code (*Ref.*) and its objective (*Purpose*). A description of the origin of each of the processes identified with respect to the models/frameworks considered as a basis is provided in Appendix.

The *People* dimension (Table 2) manages all the processes related to the contracting, permanence, pay, intra and inter-team communication, training, etc. of the people in the organisation.

The *Customers and Consumers* dimension (Table 3) manages the communication and activities related to the customers' and consumers' experiences and perceptions
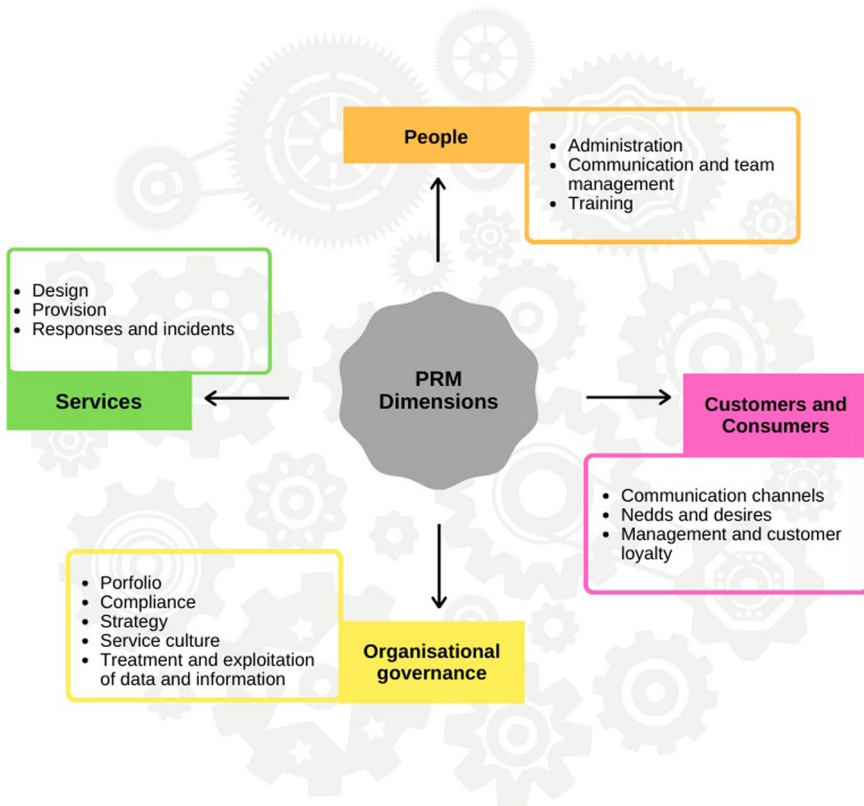

Fig. 2 Key factors of the PRM

Table 2 Processes in the People dimensión

Key Factor	Ref	Processes	Purpose
Administration	PM0	*Manage personnel/collaborators (workforce) according to legislation*	To fulfil **legal recruitment requirements**
	PM1	*Manage incorporation, remuneration and dismissal of personnel*	To have personnel contracting, remuneration and dismissal criteria
	PM2	*Manage productivity and performance*	To carry out **productivity and performance measurements**
Communication and team management	PC0	*Manage informal communication*	To communicate the organisation's **daily activities**
	PC1	*Coordinate and define communication criteria*	To establish the transmission of the knowledge and formal communication of activities carried out on a daily basis with the objective of improving work performance
	PC2	*Manage work teams (inter/intra communication)*	To improve personnel's communication and performance, fomenting **teamwork** and aligning the objectives with **organisational performance** and the business objectives
			To promote the **participation culture and responsibility** among teams
	PC3	*Manage emotions*	To work on **individual, intra and inter-team emotions** in order to improve performance
Training	PT1	*Provide a training plan*	To **train and capacitate** people in accordance with the needs that arise
	PT2	*Facilitate development of professional career*	To proactively capacitate the personnel for **current and future tasks and responsibilities** by means of professional training activities

Table 3 Processes in the Customers and Consumers dimension

Key Factor	Ref	Processes	Purpose
Communication channels	CCh0	*Manage casual interaction*	-To provide the end consumer with the service
	CCh1	*Manage contact points with customers/consumers*	To define the **means** by which **customers will contact the company**
	CCh2	*Manage communication policies*	To make available *bidirectional communication policies* that will allow the standardisation of fluid interaction between the company and its customers and consumers
Needs and wishes	CN0	*Cover basic needs*	To provide the services, covering basic needs without identifying or analysing new needs
	CN1	*Identify needs and desires*	To define which methods will be used to **identify** the customers' and consumers' **needs and wishes**
	CN2	*Manage and resolve needs and desires*	To provide **effective responses** to the customers' and consumers' needs and wishes
	CN3	*Satisfy customer and consumer*	To provide services that **exceed the customers' and consumers' expectations**
Customer loyalty management	CL0	*Manage the gaining of customers*	To administrate the **attainment and retention of customers**
	CL1	*Define loyalty strategies*	To define and administrate strategies with which to attain **customer loyalty**
	CL2	*Manage customer loyalty*	To define procedures with which to **implement the loyalty strategies and measure the results**

Table 4 Processes in the Organisational Governance dimensión

Key Factor	Ref	Processes	Purpose
Portfolio	GP1	*Define the service portfolio*	*To define a service portfolio* according to the needs of the services
	GP2	*Proactively manage the portfolio and communicate it*	*To manage the service portfolio*, aligning it with the organisational objectives, adapting to changes in the market
			To define *Marketing strategies* (internal/external) in order to extend services and knowledge
Compliance	GCo1	*Manage behaviour*	To promote the desired behaviour of all personnel in and outside the organisation
			To define *management conduct* criteria, focused on leadership
	GCo2	*Comply with regulations*	To function according to the standards established by the legal frameworks
	GCo3	*Manage competitiveness and confidence*	To manage organisational transparency and generate market confidence
	GCo4	*Manage risks*	To identify risks and mitigate the probability of their occurrence
Strategy	GS0	*Define differentiating ideas*	To define ideas that will differentiate between the organisation's services and those of its competitors
	GS1	*Define service strategies*	To generate *strategies* that will contribute to achieving the *organisational objectives*, though the services provided by the company
	GS2	*Manage service strategies and their financial aspects*	To define an *implementation plan* for the service *strategies*
			To incorporate *financial aspects* into the strategies
	GS3	*Manage organisational leadership*	To define *differentiating activities* at an organisational level and leadership strategies in the market
			To communicate and promote the *organisation's values* from the inside out
			To implement the professional ethics aligned with the organisational code of conduct

Table 4 (continued)

Key Factor	Ref	Processes	Purpose
	GS4	*Manage the commercial plan*	To define and manage the **business plan**, which will make it possible to discover the competition and opportunities
			To define and manage the **commercial plan** using the strategies in order to demonstrate the fulfilment of the services proposed
			To analyse markets and propose **strategic competitive alliances**
Service culture	GC0	*Deal with the customer*	To deal with the customer/consumer without conduct guidelines or attention policies
	GC1	*Define customer attention criteria*	To establish behaviour as regards **customer attention**
	GC2	*Establish a service culture*	To define **actions** that will allow the organisation's people, services and processes to develop, **focusing on the consumer** or end customer
Treatment and exploitation of data and information (Digitalisation)	GD0	*Fulfil basic protection and data and information treatment requirements*	To comply with **legal requirements regarding the treatment of data**, which are obligatory for all companies
			To define **data protection policies**
	GD1	*Establish minimum digitalisation levels*	To establish basic **computing tools** with which to record data (calculation tables, text processors, etc.)
			To identify **technological channels** for the promotion of services
	GD2	*Manage Global Digitalisation*	To define organisational **digitalisation protocols** that will involve all the dimensions
	GD3	*Define information exploitation policies*	*To analyse the data and information obtained from the various computing tools and detect opportunities*

in order to provide personalised services and assist in customer delight, while simultaneously attaining their loyalty and commitment to the company.

The *Organisational Governance* dimension (Table 4) defines general guidelines and uses them to coordinate the functioning of the entire organisation, ensuring that all the dimensions act in accordance with them. This dimension indicates the organisation's aim.

The *Services* dimension (Table 5) administrates all the activities related to the services that the company provides, covering the design, provision, maintenance and updating of the services.

3.2 Process assessment model (PAM)

Business process management is an integrated set of corporative capacities related to strategic alignment, governance, methods, technology, people and culture (Brocke and Rosemann 2015). The relationship among business processes and capabilities lies in the fact that the processes are composed of specific activities that an organisation carries out in order to achieve something, while capabilities are a company's ability to carry out activities in a coordinated manner using the resources at its disposal with the objective of attaining predetermined goals and objectives (Helfat and Peteraf 2003). Managing organisational capabilities could be considered a key differentiating factor and influence performance and competitiveness (Mithas et al. 2011; Ying Lu and K. Ramamurthy, 2011).

The objective of this work is to provide organisations with an exact view of their current capability and to identify their strengths and points that could be improved. We, therefore, propose a PAM that will contribute to establishing a continual improvement approach and that can be used to verify improvements over time.

The process assessment models are the basis employed to obtain proof and to rate the characteristics of the processes (ISO/IEC, 2015c). They incorporate evaluation indicators that make it possible to judge the performance and the capability level of the processes, i.e. to understand and evaluate the extent to which the processes fulfil the requirements considered in the process reference model.

It is important to stress that the ratings given to the capability levels do not guarantee that the organisation is developing its processes at a particular capability level. They simply indicate that the organisation is capable of carrying out its processes at that level. A level cannot be reached without having attained the one below it.

The PAM of *LightSME* is founded on the ISO/IEC 33000 standard and was created by focusing on SMEs, thus promoting a simpler and more lightweight evaluation that is adapted to their circumstances, and specifically reducing the process capability levels and modifying the scale used to evaluate the processes. It is necessary to highlight that these adaptations came about thanks to the suggestions made by experts in a Focus Group (details of which will be provided in the following section).

The six-point ordinal scale with which to assess the process ***capability levels*** that is defined in the ISO/IEC 33020 standard (ISO/IEC, 2015d) has accordingly been reduced for *LightSME*, and only the first four capability levels are employed. The

Table 5 Processes in the Services dimension

Key Factor	Ref	Processes	Purpose
Design	SD0	*Devise services*	To devise and provide services using own criteria
	SD1	*Create the service*	*Creation of services* according to the Customers'/consumers' *needs, wishes and expectations*
	SD2	*Design the service and carry out tests*	To carry out a *service design* process
			To carry out service tests by simulating real and potentially probable situations in order to reduce possible errors
Provision	SP0	*Process requests and provide the service*	To receive service *requests* and *provide the service*
	SP1	*Establish a provision plan*	*To plan the provision of the* service
	SP2	*Measure the results of the provision*	To obtain quantitative *results* regarding the provision of services that will allow corrective actions to be taken
Response and incidents	SR0	*Register complaints and incidents*	To note down suggestions, incidents and/or complaints related to the service, but not make any changes
	SR1	*Manage changes to the service demanded*	*To adjust the current service* according to incidents and customers' or consumers' requests if the continuation and provision of the service is threatened
	SR2	*Plan changes and improvements according to customers' needs*	Proactively manage the *changes and improvements* to the current services
			Propose *new services*

Table 6 Capability levels in *LightSME*

Capability levels	Description
Level 0—incomplete	The process is not implemented, or fails to achieve its process purpose. At this level, there is little or no evidence of any systematic achievement of the process purpose
Level 1—performed	The implemented process achieves its process purpose
Level 2—managed	The previously described Performed process is now implemented in a managed fashion (planned, monitored and adjusted) and its work products are appropriately established, controlled and maintained
Level 3—established	The previously described Managed process is now implemented using a defined process that is capable of achieving its process outcomes

Table 7 Example of SD2 process of *LightSME*

Process	SD2: *Design the service and carry out tests*
Purpose	Carry out a service design process using well-known techniques and methodologies
	Test the service by simulating real and potentially probable situations in order to reduce possible errors
Activities	SD2.1: Create a customer journey of the services, detailing all the steps that the customers should follow during their experience with the service
	SD2.2: Create the service blueprint (customer's actions, back-end and front-end activities, support processes), including the expected results (measurable)
	SD2.3: Prototype and test the services. Make decisions accordingly
Results/products	Customer Journey Map of the services
	Blueprint of the services
	Test protocol of the services
	Record of results expected and obtained
	Services tested and ready for implementation
	Portfolio updated

scale for the process capability level comprises: level 0 *"Incomplete"*, level 1 *"Performed"*, level 2 *"Managed"* and level 3 *"Established"*. Table 6 shows a summary of the levels proposed and a description based on the ISO/IEC 33020 standard.

In order to obtain the process capability levels, it is necessary to observe and assess evidence that the processes have been achieved. According to the ISO/IEC 33020 standard, the measurement of capability is based upon a set of process attributes (ISO/IEC, 2015d). In order to simplify/lighten process measurement, the rating scale proposed in the framework of this work is based on the degree to which the *activities* of which the process is composed are carried out (Table 7 shows an example of process "SD2: *Design the service and carry out tests",* along with a description and its activities).

The ordinal **rating scale** of *LightSME* used to calculate the process capability level is based on the four levels defined in the ISO/IEC 33020, but the number of

Table 8 Ordinal rating scale employed to obtain the capability levels

Ordinal	Description
0 *"Not achieved"*	There is little or no evidence that the activities in the process defined have taken place. Less than 30% of the activities have been completed
1 *"Partially achieved"*	There is some evidence that the activities in the process defined and evaluated have been carried out. Between 30 and 71% of the activities in the process have been completed
2 *"Fully achieved"*	There is evidence that the activities in the process defined have been carried out. No significant weaknesses have been identified. Between 71 and 100% of the activities in the process are carried out

levels has been reduced to three: 0 *"Not achieved"*, 1 *"Partially achieved"* and 2 *"Fully achieved"*. The description of this rating scale is presented in Table 8. The ordinal scale could also be understood in terms of the percentage of the achievement of the activities.

LightSME obtains the process capability levels by means of a spreadsheet that gathers together the evaluations of each of the activities comprising the processes using a rating scale.

3.3 Maturity model (MM)

An organisation's maturity is measured according to the maturity of its processes, i.e. the extent to which its processes improve. Maturity models originated in the field of Software Engineering (SE) and serve to measure the quality of processes (Wendler 2012). The degree of the quality of processes determines the different levels of maturity that an organisation can attain (ISO/IEC, 2015e). It is for this reason that the MM proposed is considered to be of a prescriptive type, since it is focused on improving the performance and maturity of organisations by managing its processes in order to achieve continuous improvement (de Bruin et al. 2005).

The maturity model in the ISO/IEC 33000 standard (ISO/IEC, 2015e) consists of five levels that vary from *Basic*, at which the organisation cannot provide evidence of the effective implementation of good practices addressed by the process reference model, to the *Innovation* level, at which the company can provide evidence of improvements to the processes, and the implementation of innovation in the processes is primordial as regards achieving the business objectives. The MM proposed in this work is based on that defined in the ISO/IEC 33000 standard but with three differentiating characteristics that resulted from the validation that took place with representatives of companies and specialists from the service sector.

These three peculiarities are oriented towards the simplicity and flexibility of the framework, in addition to promoting the ease of implementation of the model in SMEs.

The first differentiating characteristic is the definition of *four maturity levels* (Fig. 3), since the reduction of levels makes their application simpler in SMEs. The second characteristic of the MM is its relationship with the PRM which contains *specifics processes* adapted from and specifically created *for general services* and

Dimensions	Maturity levels			
	Immature	Basic	Intermediate	Advanced
People	PM0 PC0	PM1 PC1 PT1	PC2 PT2	PM2 PC3
Customers and Consumers	CCh0 CN0 CL0	CCh1 CN1 CL1	CCh2 CN2 CL2	CN3
Organisational governance	GS0 GC0 GD0	GP1 GCo1 GS1 GC1 GD1	GP2 GCo2 GS2 GC2 GD2	GCo3 - GCo4 GS3 - GS4 GD3
Services	SD0 SP0 SR0	SD1 SP1 SR1	SD2 SP2	SR2

Fig. 3 Maturity level by dimensions

which are *oriented towards their application in SMEs*. Finally, the third important characteristic of the proposed MM is the evaluation of *maturity by dimensions*. According to the experts who collaborated in the refinement and validation process (Sect. 4), evaluation by dimensions allows SMEs to discover their strengths and to identify their weaknesses and threats in order to consequently focus their improvement efforts.

The proposed MM is presented in Fig. 3, which shows the four **maturity levels** (*Immature*, *Basic*, *Intermediate* and *Advanced*) and the processes that should by achieved for each maturity level according to the dimensions established.

The aim of each maturity level are described as follows:

- *Immature Maturity level*: at this level, the organisation implements basic PRM processes for service management in all its dimensions. The following specific processes are taken into account:

PM0   Manage personnel/collaborators (workforce) according to legislation.
PC0   Manage informal communication.
CCh0   Manage casual interaction.
CN0   Cover basic needs.
CL0   Manage the gaining of customers.
GS0   Define differentiating ideas.
GC0   Deal with the Customer.
GD0   Fulfil basic protection and data and information treatment requirements.

SD0	Devise services.
SP0	Process requests and provide the service.
SR0	Register complaints and incidents.

- *Basic Maturity level*: at this level, the organisation can provide evidence that it is implementing and managing not only the processes indicated in the previous maturity level, but also the following PRM processes:

PM1	Manage incorporation, remuneration and dismissal of personnel.
PC1	Coordinate and define communication criteria.
PT1	Provide a training plan.
CCh1	Manage contact points with customers/consumers.
CN1	Identify needs and desires.
CL1	Define loyalty strategies.
GP1	Define the service portfolio.
GCo1	Manage behaviour.
GS1	Define service strategies.
GC1	Define customer attention criteria.
GD1	Establish minimum digitalisation levels.
SD1	Create the service.
SP1	Establish a provision plan.
SR1	Manage changes to the service demanded.

- *Intermediate Maturity level*: the company can provide evidence that both the processes from the previous maturity levels and those shown below have been established (implemented using a defined process), and can assure that the objectives of the proposal are being fulfilled:

PC2	Manage work teams (inter/intra communication).
PT2	Facilitate development of professional career.
CCh2	Manage communication policies.
CN2	Manage and resolve needs and desires.
CL2	Manage customer loyalty.
GP2	Proactively manage the portfolio and communicate it.
GCo2	Comply with regulations.
GS2	Manage service strategies and their financial aspects.
GC2	Establish a service culture.
GD2	Manage Global Digitalisation.
SD2	Design the service and carry out tests.
SP2	Measure the results of the provision.

- *Advanced Maturity level:* the organisation can provide evidence that the following processes are also at the established capability level and fulfil their objectives:

PM2	Manage productivity and performance.
PC3	Manage emotions.
CN3	Satisfy customer and consumer.
GCo3	Manage competitiveness and confidence.
GCo4	Manage risks.
GS3	Manage organisational leadership.
GS4	Manage the commercial plan.
GD3	Define information exploitation policies.
SR2	Plan changes and improvements according to customers' needs.

In order to know what maturity level an organisation has, it is, therefore, necessary to know the capability level of each process. Table 9 shows the relationship between the established capability levels defined in *LightSME* and the maturity levels defined. As mentioned previously, in order to attain the *Immature* maturity level, all the processes defined in this maturity level should attain capability level 1; to attain the *Basic* maturity level, all the processes in this level and in the previous level should attain the objectives established in capability level 2; to attain the *Intermediate* maturity level, the processes comprising this level and the previous levels should attain the objectives defined in capability level 3. In the case of the *Advanced* maturity level, the *LightSME* framework maintains the demands of capability level 3 for the processes comprising this maturity level. That is to say, all the processes in this maturity level should also attain capability level 3.

With regard to maturity by dimensions, it is also necessary to fulfil the conditions mentioned previously. For example, an organisation will be at a *Basic* maturity level in the *People* dimension if all the processes defined in the *Immature* and *Basic* maturity levels for this dimension (PM0, PC0, PM1, PC1 and PT1) have attained the objectives defined in the capability level 2. Note that when observing the maturity by dimensions, it may occur that an organisation is at a basic maturity level, but narrowing the lens to only one dimension, see, for example, although the *Organisational Governance* and *People* dimensions are at a *Basic* maturity level, the *Services* and *Customers and Consumers* dimensions may be at *Intermediate* or *Advanced* maturity levels.

Assessing maturity by dimension is an advantage for SMEs, since they do not usually have the resources/capacities to attain high levels of quality and innovation for all their processes throughout the organisation. This differentiating characteristic of the proposed MM makes it easier for SMEs to quickly identify their strengths and points that can be improved.

Table 9 Relationship between maturity levels and capability levels in *LightSME*

		Maturity level of *LightSME*				
		Level Immature	**Level Basic**	**Level Intermediate**	**Level Advanced**	
Capability Level	**Level 1 Performed**	Objective for fulfilment of ML Immature	PM0, PC0, CCh0, CN0, CL0, GS0, GC0, GD0, SD0, SP0, SR0	PM1, PC1, PT1, CCh1, CN1, CL1, GP1, GCo1, GS1, GC1, GD1, SD1, SP1, SR1	PC2, PT2, CCh2, CN2, CL2, GP2, GCo2, GS2, GC2, GD2, SD2, SP2	PM2, PC3, CN3, GCo3, GCo4, GS3, GS4, GD3, SR2	**Processes**
	Level 2 Managed	Objective for fulfilment of ML Basic					
	Level 3 Established	Objective for fulfilment of ML Intermediate					
		Objective for fulfilment of Maturity Level Advanced					

4 Research methodology

The research methodology employed in this work is based on Design Science Research (DSR). The DSR provides consistent, coherent and valid guidelines that orient the development of research works for the construction of useful solutions, known as artefacts, towards a specific problem in a particular domain (Hevner et al. 2004; Peffers et al. 2007). DSR artifacts are constructs, models, methods and instantiations (i.e. applications of artifacts) that are innovative and valuable in such a way that they provide a research contribution (Hevner et al. 2004; March and Smith 1995). The DSR methodology comprises 6 steps: *Problem identification and motivation, Objectives and proposed solution, Design and development of solution, Demonstration, Evaluation, and Communication.* The principal phases of the DSR process followed in this research are shown in Fig. 4 and described below:

Identify problem and motivation: this phase consisted of carrying out a Systematic Literature Review (SLR) (Feversani et al. 2022) to identify the models most commonly used by service companies to manage their internal processes. We also sought to identify the type/size of companies that most frequently use these models in order to find gaps in their use. The SLR made it possible to discover that the existing proposals are principally related to services associated with Information Technologies (IT services) and oriented towards large companies. This shows that SMEs lack process management models or standards with which to improve the quality of the services with which their customers are provided. The findings of the SLR and the analysis of the proposals presented in related works section of this work show the gap and the problematic covered by this work. After the systematic review, a meeting took place with service sector experts, who stated also the importance of having proposals in the context of general service SMEs.

*Define the objectives of a solution***:** the results obtained in the previous phase were used as the basis on which to propose means to fill the gaps identified. This was done by defining a *complete framework for evaluation and improvement processes in service management* that integrates characteristics from highly representative service management models (EFQM, VeriSM, ISO/IEC 20000–1, ITIL and CMMI-SVC). It is focused on the *management of general services*; and, it *promotes values of lightness, flexibility and adaptability* when applied in organisations, which is a *key aspect as regards facilitating its application in SMEs*. This framework is intended to be a roadmap for companies that wish to set out on the road towards evaluating and improving their internal processes.

Solution design & development (the artefact): DSR focuses on understanding organisational phenomena in context and on advancing research by creating and evaluating dual-purpose artefacts that solve organisational, real-world problems and advance a field's knowledge base, i.e. provide a research contribution (Gregor and Hevner 2013; Hevner et al. 2004). The context of this research is service sector SMEs, and the artefact provided, and research contribution of this work, is the proposed framework (*LightSME*). The framework, which is composed of a process reference model, a process assessment model and a maturity model, is novel research contribution that provides solutions to a real-world problem in the context of SMEs by means of a lightweight evaluation and maturity model that focuses on customer services, the service culture and capturing the customers' needs and expectations. This first design of the proposed framework was examined by using refinement cycles, iterating as many times as necessary until the expected results were obtained (Peffers et al. 2007).

Demonstration: two Focus Group sessions and a Case Study in a real setting took place in this stage in order to demonstrate the validity and applicability of the proposed framework and to contribute to resolving the problem identified.

Evaluation: this phase made it possible to discover the extent to which *LightSME* can be considered a solution to the problems identified. The feedback obtained in each Focus Group meeting, in which the participants were principally experts and representatives from service sector companies (including SMEs), and the results obtained from the Case Study (which took place in a SME of the service sector) allowed us to refine and adjust the proposal.

The demonstration and evaluation phases made it possible to confirm that the *LightSME* framework fills the gaps identified in the Identify problem phase.

Communication: we began to communicate, at a scientific level, the results of the methodology to academics and professionals from various areas, thus allowing us to obtain different points of view regarding the research. Moreover, we intend to eventually divulge the results obtained in conferences and scientific publications.

4.1 Focus groups 1 and 2

The Focus Group (FG) technique is a social method with which to obtain research data regarding a specific subject through informal group discussions (Nili et al. 2017; O'hEocha et al. 2012). This technique can be used alone or in combination
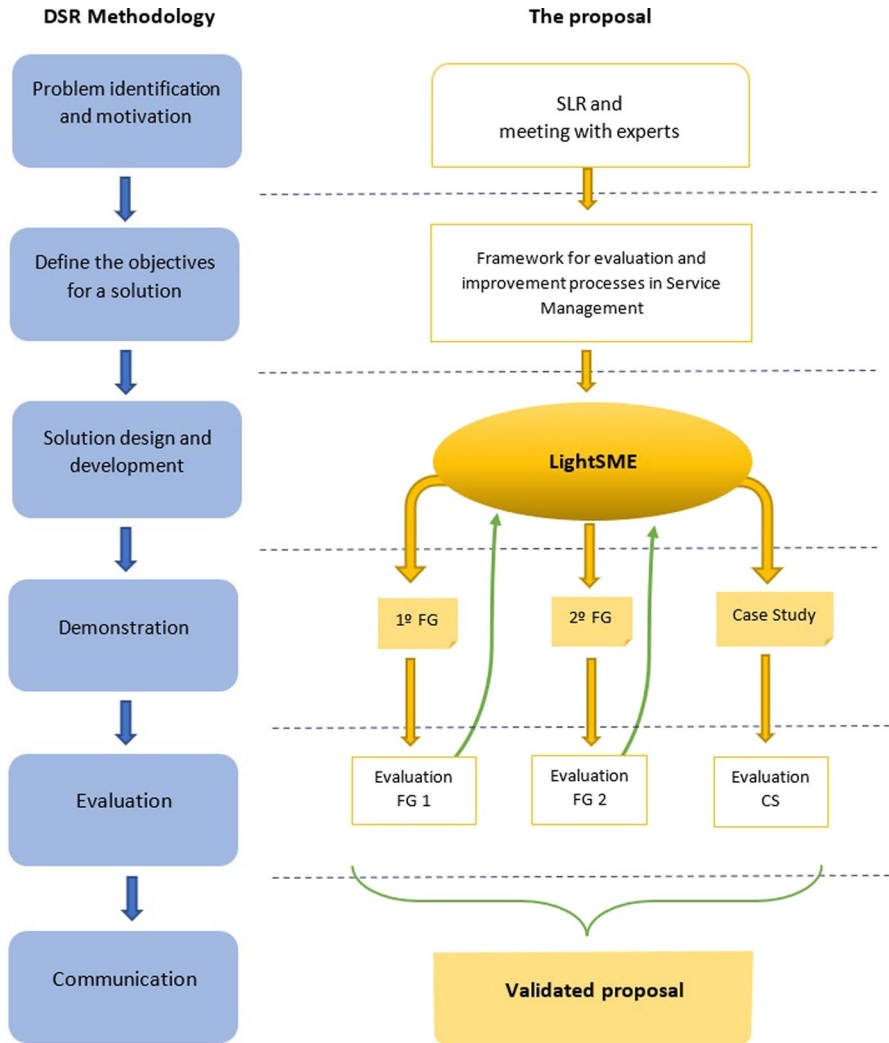
Fig. 4 Design Science Research methodology

with other methods, and the data obtained provide important information regarding how people think, feel or act with regard to a specific subject (Freitas et al. 1998). It is necessary to clarify that the purpose of the FG is not to teach concepts, test skills and/or attain the participants' consensus, but rather to discover the diversity of the participants' opinions as regards the subject in question, which will contribute to the construction of a useful and applicable solution (Krueger et al. 2001).

The FGs were carried out by respecting the three-phase structure (Freitas et al. 1998): (1) *Planning* (Table 10): the definition of the FG's objectives, the subjects that would be dealt with, how the sessions would be developed, how the data would be registered and how appropriate participants would be selected for each session,

etc.; (2) *Conduct the interviews* (Table 11): aspects related to how each meeting would be chaired were defined, and (3) *Analysis of the data* (Table 12): the data obtained were analysed and documented at the end of each session.

Two FG sessions were carried out in order to refine and validate the proposal. The two sessions that took place will be described as follows according to each stage of the FG.

The results of the two refinement and validation sessions are summarised in Fig. 5, which shows the modality used (virtual, presence-based), the number of participants, the entities that they represented or the sectors to which their companies belonged. It also shows the strengths and weaknesses of the proposal as perceived by the participants.

Finally, it is necessary to highlight that testimonies that strengthen the contributions of this work were obtained during the meetings carried out in the framework of the FG. Some of these were the following:

> "The framework provides processes that are easy to understand and apply, without the need for external assessment, as occurs with recognised certification".
> "Its application would assist SMEs to know what their current processes are, incorporate the processes required and compete with other companies in the market in better conditions, bearing in mind the fact that the majority of SMEs have few resources".
> "The models taken as a reference in order to create the *LightSME* Framework are internationally recognised, but were created principally for large corporations from the world of technology".
> "The requirements defined at each maturity level appear to be accessible and to suit the type of companies for which they were designed (SMEs)".

4.2 Case study

The Case Study (CS) technique is an empirical investigation applied in a real-life context in order to study a specific subject (Yin 2009). The *LightSME* proposal was applied in a real company with the objective of demonstrating its validity and usefulness as regards solving the problems identified.

4.2.1 SEIM

Company is a small enterprise that has provided several European companies with market study and marketing services since 2015. Its workforce consists of 10 people, including management and personnel, and it is framed in the category of micro-company (up to 10 people). Its principal differentiating factor is its customer service culture, which has allowed it to achieve their loyalty. The Case Study was carried out by following the sequence of steps describes as follows:

Table 10 Planning phase

Stage: Planning	FG 1	FG 2
Objective of the session and methodology	(a) Show the proposal to representatives from service companies (b) Work in small groups to carry out a detailed analysis of models comprising framework and validate proposed maturity model	(c) Define future evaluation of framework in real case study
Duration	120 min	
Modality	Presence-based	Dual
Participants	Total: 9 people. 3 organisers (1 main chair, 1 co-chair, 1 assistant chair for support and to record the session), 2 researchers and 4 specialist experts in business (human resources, services, marketing and market research)	Total: 12 people. 3 organisers (1 main chair, 1 co-chair, 1 assistant chair for support and to record the session), 6 experts from SMEs and 3 representatives from service sector companies with a macro vision (multi-national financial service, technological service and facility service company)
Means used to record data	Recording (audiovisual), photographs, note taking	

Table 11 Conducting the interviews phase

Etapa: Conducting the interviews	FG 1	FG 2
Introduction	The main chair welcomed the participants Permission was sought to take photographs and record data The objectives of the session and the work methodology that would be developed at the meetings were described	
Discussion	3 sub-groups of participants were formed in order to analyse the reference and maturity models, paying particular attention to the processes seen in the previous session. This activity lasted 30 min	
Debate (reaching an agreement)	Each group shared its observations regarding the model analysed. All participants then exchanged ideas and opinions together	
	Focused on refining processes and reducing maturity levels	Focused on recovering processes in maturity levels
Closing questions	Open and closed questions leading to validation and refinement of models	
End of session	The chair stated the next steps to follow in order to validate and refine the framework	

4.2.2 Design the case study

The importance of this CS is that of making an innovative and contribution in the context of SMEs, principally as regards the management of processes in the sphere of general services.

- The *main objective* of this CS is to validate the *LightSME* framework in order to verify that the proposal is effectively appropriate anduseful as regards addressing real-world problems or challenges, and can also be implemented to fill the gap identified in the SME context.
- The *unit of analysis* defined comprises all the company's processes, which are focused on and organised according to the four dimensions proposed in the framework: *Services, Customers and Consumers, People* and *Organisational Governance*.
- The *place in which the CS was carried out* was at the company, where it was possible to discover the way in which it implemented and managed its processes and daily activities.
- The *people who participated* in the development of the CS were the management and personnel, who interactively participated by answering questions and providing evidence. The researchers also participated in order to coordinate and manage the meetings and to document the data obtained.

4.2.3 Development of case study

The development of the CS lasted a total of eight hours, split into four encounters. The first encounter consisted of a meeting with the management, during which the *LightSME* was described, the three models were presented and information regarding the activities that would take place in the subsequent meetings was provided.

In the second encounter, the company participated directly in the form of its management and personnel in order to review, analyse and evaluate the company's processes in relation to the processes comprising the *Services* and *Customers and Consumers* dimensions of the PRM.

The steps shown below were followed in the same order as in the PRM model:

- Each process was described, along with its respective activities, and all the participants together verified its applicability and relevance for the company.

Table 12 Analysis of the data phase

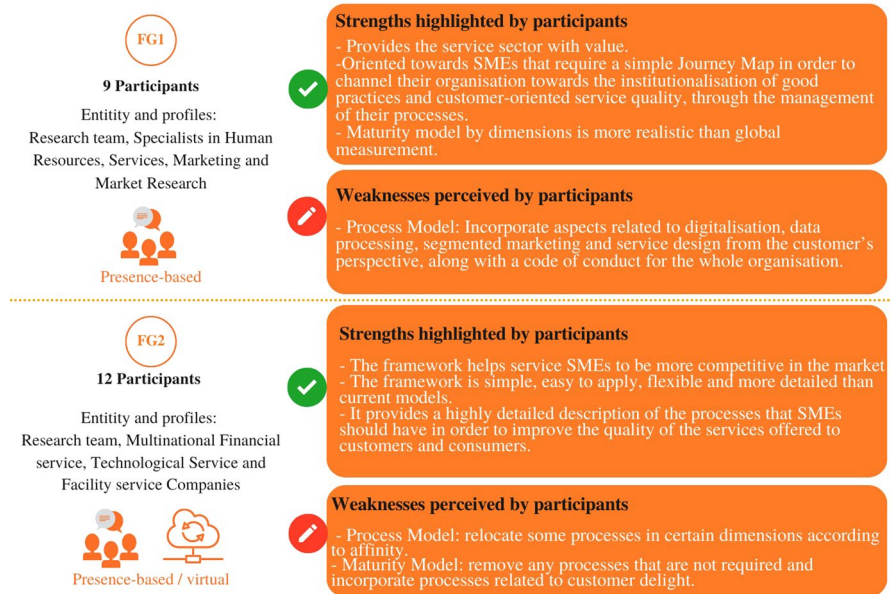| Stage: Data analysis	FG 1	FG 2
	With regard to writing the reports, the narrative style combined with illustrative figures and tables summarising the ideas of main characteristics prevailed in order to make the visualisation and understanding of the results more agile. The reports were later reviewed by the main researchers in order to validate them	

Fig. 5 Summary of Focus Group sessions

- Each activity was placed in a table and marked with the values: 0 *"Not achieved"*, 1 *"Partially achieved"* or 2 *"Fully achieved"* (Table 8), according to the degree to which it had been fulfilled and the evidence to support this (documents, tables, etc.).

In the third encounter, the processes in the *People* and *Organisational Governance* dimensions were evaluated, following the same sequence of steps mentioned above.

In the fourth encounter, a meeting then took place with the management in order to inform them of the results of the evaluation of the processes and to indicate the strengths and weaknesses identified thanks to the *LightSME* framework.

After rating these activities, it was possible to discover the capability level of each of the company's processes, which were rated as: L0 (Incomplete), L1 (Performed), L2 (Managed) and L3 (Established) as shown in Table 6.

The following tables provide a summary of the results of the evaluation of the processes corresponding to the dimensions *Services* (Table 13), *Customers and Consumers* (Table 14), *People* (Table 15) and *Organisational Governance* (Table 16), respectively. These tables provide a visual map of the company's current situation, which contributed to identifying its strengths, along with the aspects of its processes that needed to be improved.

Finally, it is necessary to highlight that the participants in the CS stated that *"the evaluation process took an acceptable amount of time, the results reflect the reality of our company, and it is easy to identify the points for improvement on which we*

Table 13 Evaluation of processes—Services dimension

Dimensions	Immature		Basic		Intermediate		Advanced	
Services	SD0	L3	SD1	L3	SD2	L1		
	SP0	L3	SP1	L3	SP2	L2		
	SR0	L3	SR1	L3			SR2	L2

Table 14 Evaluation of processes—Customers and Consumers dimension

Dimensions	Immature		Basic		Intermediate		Advanced	
Customers and Consumers	CCh0	L3	CCh1	L3	CCh2	L1		
	CN0	L3	CN1	L2	CN2	L2	CN3	L2
	CL0	L3	CL1	L3	CL2	L3		

Table 15 Evaluation of processes—People dimension

Dimensions	Immature		Basic		Intermediate		Advanced	
People	PM0	L3	PM1	L3			PM2	L2
	PC0	L3	PC1	L1	PC2	L1	PC3	L1
			PT1	L2	PT2	L1		

Table 16 Evaluation of processes—Organisational Governance dimension

Dimensions	Immature		Basic		Intermediate		Advanced	
Organisational governance			GP1	L2	GP2	L3		
			GCo1	L3	GCo2	L3	GCo3	L3
							GCo4	L3
	GS0	L3	GS1	L3	GS2	L3	GS3	L3
							GS4	L1
	GC0	L3	GC1	L2	GC2	L2		
	GD0	L2	GD1	L2	GD2	L2	GD3	L2

should work, along with those that are better positioned". At the end of the evaluation, they also stated how important it was for them to carry out this type of evaluation, since as a micro SME (up to ten people), it is *"almost impossible to pass other ISO-type certification processes,"* which are, moreover, in some cases required or recommended by customers or partners.

4.2.4 Analysis and conclusions of case study

The application of *LightSME* to a real case study has been used to evaluate the processes and to know the maturity level of the organisation and its maturity by dimensions.

The PAM makes it possible to state that the organisation is at the *Basic* maturity level.

With regard to the *Service* dimension (Table 13), the organisation attained the *Basic* maturity level. With regard to the *Customers and Consumers* dimension, according to the evaluation model, the company has a *Basic* maturity level (Table 14), but is, however, moving towards the *Intermediate* maturity level, although this point requires an additional explanation: when carrying out the evaluation it was noted that the customers represent the company's 'reason for existing', and it focuses all its efforts on not only complying with their requests, but also exceeding their expectations. We, therefore, consider that the reason why this 'low' rating was attained was because of the characteristic of the micro-company itself, since practically all the personnel interviewed take part in the activities and place emphasis on the customers rather than on documenting alignments and protocols. With regard to the *People* dimension, the company has an *Immature* maturity level, but is moving towards the *Basic* maturity level (Table 15). Two factors that influence the rating were observed in this dimension: the first, as mentioned previously, is that the size of the company makes documentation and protocol activities difficult, while the second concerns team management – the company recognises this weakness and is working to improve it. Finally, the *Organisational governance* dimension has a *Basic* maturity level (Table 16), although the results show that the company places emphasis on the service culture (processes located in the *Advanced* maturity level).

The results obtained after applying the *LightSME* framework in a real CS make it possible to identify the points that could be improved: repetitive/duplicated activities in some of the PRM processes, processes that are not applicable for this company, or a lack of specific processes for this type of company (that were then incorporated). With regard to the favourable points, we positively verified that the time spent by the company during the evaluation process was appropriate. The company did not need to prepare reports or create documentation for the evaluation process, since this material already existed and was corroborated using the resources available.

It was generally possible to verify that the *LightSME* framework is really lightweight and that the results are obtained immediately; so it is not necessary to contract external personnel to carry out the evaluation because the activities and processes are easy to understand, etc. We verified that the proposal helped the company to identify points that needed improving and provide the processes with which to do so (by means of the PRM). *LightSME*, therefore, facilitates the work of those SMEs that set out on the road towards having well-managed processes that comes with growth and continuous improvement.

5 Conclusions and future work

The volatility, uncertainty, complexity and ambiguity of the present-day market affects all organisations, but especially *Small and Medium-sized Enterprises* (SMEs), because they do not have the resources that will allow them to adapt to

challenges or to innovate not only the services with which their customers are provided, but also their management practices and processes. There are universal one-size-fits-all models and standards that assist with this activity, but they are principally viable only for large organisations, since the resources required to apply and implement them tend to be excessive for smaller companies. There is, therefore, a need for a contingent approach with which to propose service management models that are capable of providing SMEs with a solution.

This work is, therefore, a response to a need detected at both theoretical and practical levels, and presents a lightweight framework for service management evaluation in SMEs (*LightSME*) that is based on the ISO/IEC 33000 family of standards, but adapted to the needs of SMEs. Its purpose is to define the three models of which it is composed: a Process Reference Model (PRM), a Process Assessment Model (PAM) and a Maturity Model (MM).

The objective of the proposed framework is to be a roadmap containing consistent and formalised processes that will accompany SMEs on the road towards improving the quality of their customer-oriented services by managing their processes.

The proposed framework has been validated using the Design Science Research methodology. The design, demonstration and evaluation phases were carried out iteratively. The first design began with a first version of the framework, which was defined on the basis of the principal standards and models used for service management (EFQM, VeriSM, CMMI-SVC, ITIL, ISO/IEC 9001, ISO/IEC 20000–1 and FitSM). This was then reviewed and validated by means of Focus Group sessions with experts and representatives from service sector companies, and the framework was subsequently applied in a real case study in a service SME.

The principal objective of the framework is to assist in the sustained success of SMEs by evaluating the management of their internal processes. The framework provides a simple and flexible maturity model whit three differentiating characteristics: *4 maturity levels*, since the reduction in the number of levels makes their application simpler in SMEs; based on *specifics processes* for SMEs of the service sector; and, providing *maturity by dimensions* which allows SMEs to discover their strengths, weaknesses and threats in order to consequently focus on their improvement efforts.

The research results of our study provide important theoretical and managerial contributions. At a theoretical level, the current service management models are, according to literature, unsuitable for SMEs. This work presents the *LightSME* framework, which is a reference model for the evaluation of service management in SMEs. It is a contingency-based approach that takes the particular characteristics of SMEs into account as regards their limited resources and the specificity of their processes. It contributes to the literature on service management models by overcoming the limitations of the approaches employed in universal one-size-fits-all models. Furthermore, from the perspective of the DSR method, our contribution is the definition of a framework that covers real needs in a specific context, i.e. SMEs, with the objective of generating new artefacts and knowledge regarding how things can and should be constructed or designed in order to achieve a desired set of goals (referred to as design knowledge). The design knowledge generated in the service management area includes: knowledge on how to manage processes in the context

of SMEs, how to align these processes with the organisational strategy (which processes, results and activities are relevant in the sphere of service sector SMEs), and how to evaluate them for effective decision making. Beyond the information systems field, DSR is a central research paradigm in different domains, including other information technology-related disciplines, such as service management for the creation of novel solutions to relevant design problems (Becker et al. 2015).

As managerial contribution, our framework will prove useful for practitioners and provide specific guidance and lessons learned on how to adapt values and practices in contexts outside of information technology-dominated businesses. *LightSME* provides SMEs with a service management model adapted to their characteristics, which will make it easier for management to make decisions. Practitioners will benefit from systematically documented experiences regarding emergent practices that are prepared to be understandable, interpretable, and adaptable for SMEs. They will know which processes are suitably established and which need to be improved by paying attention to the evaluation structure. The use of an appropriate decision-making method will allow organisations to continuously diagnose their current situation and recognise the need to change. Developing a more rational service management will, therefore, allow SMEs to propose and develop their corporative strategy.

As future work, we intend to incorporate agile values and principles that will contribute to increasing the flexibility and adaptability of the framework in such changing environments. We also intend to create a multiplatform computing tool in order to make the evaluation and attainment of results more agile.

Appendix

Origin of the processes

The Reference Process Model (RPM) proposed integrates characteristics from highly representative service management models. Once the reference processes models that would be used as a basis for our proposal had been identified, the first version of the RPM was constructed by selecting and adapting those processes that were appropriate to manage services in SMEs in terms of simplicity and lightness. A list of the proposed processes organised for the dimensions, along with the origin of each one with regard to the models/frameworks considered, is shown in Table 17 below. The processes marked in the Focus Group column are those that were incorporated or modified thanks to recommendations from the experts who participated in the various Focus Groups.

Table 17 Origin of processes

Dimensions	Processes of the RPM	ISO/IEC 20000-1	CMMI-SVC	ITIL	EFQM	VeriSM	ISO/IEC 9001	P-CMM	UNE-CEN/TS 16880	Focus Group
People	PM0 – Manage personnel/collaborators (workforce) according to legislation				✓			✓		✓
	PM1 – Manage incorporation, remuneration and dismissal of personnel				✓			✓		
	PM2 – Manage productivity and performance		✓		✓			✓		
	PC0 – Manage informal communication							✓		
	PC1 – Coordinate and define communication criteria		✓					✓		
	PC2 – Manage work teams							✓		
	PC3 - Manage emotions							✓		✓
	PT1 – Provide a training plan							✓		
	PT2 – Facilitate development of professional career				✓			✓		
Customers & Consumers	CCh0 – Manage causal interaction									✓
	CCh1 – Manage contact points with customers/consumers					✓				
	CCh2 – Manage communication policies						✓			
	CN0 – Cover basic needs		✓		✓	✓	✓		✓	
	CN1 - Identify needs and desires						✓	✓		
	CN2 – Manage and resolve needs and desires					✓		✓		
	CN3 – Satisfy customer and consumer		✓					✓		
	CL0 – Manage the gaining of customers				✓	✓				
	CL1 – Define loyalty strategies		✓					✓	✓	
	CL2 - Manage customer loyalty				✓	✓		✓		
Organisational	GP1 – Define the service portfolio	✓	✓	✓		✓				
	GP2 – Proactively manage the portfolio and communicate it		✓	✓		✓				
	GCo1 – Manage behaviour									✓
	GCo2 – Comply with regulations									✓
	GCo3 – Manage competitiveness and confidence									✓
	GCo4 – Manage risks									✓
	GS0 - Define differentiating ideas				✓	✓				
	GS1 – Define service strategies					✓				
	GS2 – Manage service strategies and their financial aspects			✓						
	GS3 – Manage organisational leadership				✓	✓				
	GS4 – Manage the Commercial Plan									✓
	GC0 - Deal with the customer					✓				
	GC1 – Define customer attention criteria					✓				
	GC2 – Establish a service culture					✓			✓	
	GD0 – Fulfil basic protection and data and information treatment requirements									✓
	GD1 – Establish minimum digitalisation levels.									✓
	GD2 – Manage Global Digitalisation									✓
	GD3– Define information exploitation policies									✓
Services	SD0 – Devise services									✓
	SD1 – Create the service									✓
	SD2 – Design the service and carry out tests	✓	✓	✓		✓				
	SP0 – Process requests and provide the service	✓	✓	✓	✓	✓				
	SP1 – Establish a provision plan				✓	✓				✓
	SP2 – Measure the results of the provision	✓	✓	✓						
	SR0 – Register complaints and incidents				✓	✓				
	SR1 – Manage changes to the service demanded		✓	✓						
	SR2 – Plan changes and improvements according to customers' needs				✓	✓				

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval This paper does not contain any studies with human participants or animals performed by any of the authors.

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