

Process Management Models in Service Enterprises: A Systematic Literature Review

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Abstract. Improvements to business processes influence the quality of services with which the customer is provided. This principle is the basis of the Total Quality Management approach. This paper presents a systematic literature review carried out in order to identify the most commonly used models in service companies to manage their internal processes. In addition, the type/size of companies that most frequently use these models are identified to find gaps in such utilization to contribute to the service science field. The review process made it possible to identify 1507 studies, 74 of which were eventually classified as primary studies. The results showed that the most widely used models are the European Foundation for Quality Management (EFQM) for organisational management, and the Capability Maturity Model Integration for Services (CMMI-SVC), which is employed to determine the organisation's maturity, evaluate processes and improve services. The use of ISO/IEC 20000 standards for IT service management and ISO/IEC 9001 for product and service quality management was also identified, as were proposals such as the ITIL framework with best practices in IT service management.

With regard to the type of organisations that implement these solutions, large companies prevail and small and medium-sized enterprises (SMEs) are underrepresented.

Keywords: Processes management, quality of services, systematic literature review

1. Introduction

Improvements to internal processes influence the quality of the services that industrial and service companies offer to customers [1], [2]. This principle is the basis of the Total Quality Management (TQM) approach [3], and it would appear to be commonly accepted that the quality of internal processes influences and is a key collaborator in *external services* [4]. Some of the frequent consequences of the bad quality of internal processes as the result of a lack of organisational practices and standardised procedures and processes are delays in the execution of tasks, the inadequate management of staff, etc.

The service sector is particularly influenced by the continuous dynamism that promotes the accelerated expansion of the market and technological advances. This rapid evolution forces organisations to be in a position to be able to adapt to these changes, designing services analysing and understanding consumer needs, measuring the performance of services, optimizing service performance, etc. are particularly important to advance in the services field

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[5]. Business processes should be managed efficiently in order to improve the quality of the services offered to customers [6]. Strategies related to business excellence, whose objective is to provide guidelines and organisational management criteria as a basis for continual improvement, have consequently emerged from the business world and the scientific sphere. These strategies force companies to reconsider the way in which they are organised and managed, with quality and innovation becoming key elements in the business philosophy. These guidelines may appear in the form of standards and/or models that can be implemented by organisations in order to manage their processes [7] and allow companies to provide products and services that satisfy consumer needs [8]. The processes that intervene in the company's activities should be detailed using a *reference model* [9]. It is also important to measure the degree to which the processes satisfy the company's objectives and to know what level it is at, which is done by employing a *maturity model* [10]. Moreover, discovering the level of organisational maturity through the use of an *evaluation model* makes it possible to detect the organisation's weak points and work to improve them [11].

Several systematic literature reviews dealing with maturity models and their implementation in organisations going through a digital transformation currently exist [12]. Others focus on the ISO 9001 standard and its relationship with organisational output [13]. There are also reviews concerning the history of the management of the quality and classification of models and methods [14], or the difference between the maturity and capacity of business processes [15], etc.

However, at the time of writing this article, systematic reviews that summarize the models most used by companies, in the service sector, to manage their internal processes were not found. The objective of the present paper is, therefore, to fill this gap by presenting a systematic review of the scientific studies in this field in order to detect any omissions and to serve as a basis for future research. In addition, in order to contribute to the field of service science and serve as a basis for future research, this work has the goal of identifying the most used models, know the type / size of companies that use these models and pinpoint the sectors where the models are most used.

This systematic literature review was carried out by following the guidelines provided by Kitchenham [16], which were originally developed for software engineering. The protocol proposed by Biolchini [17] was also considered in order to propose a series of consecutive steps grouped in three phases. These are: *Planning*, during which the need to carry out the review is identified, and in which the research questions, search string, research sources, inclusion and exclusion criteria and study quality evaluation protocol are defined; *Execution of the review*, during which the primary studies are selected and relevant data are extracted from them, and finally, the *Analysis and discussion of the results* phase, during which the results of the review are published.

This work is structured as follows: Section 2 provides details of the methodology employed, while Section 3 shows and discusses the results obtained. Finally, the authors' conclusions and future work are shown in Section 4.

2. Methodology

2.1. Planning

The objective of carrying out the systematic literature review was defined in this phase. This consisted of identifying the different models employed by service sector companies through which manage their internal processes. The type/size of the companies that most frequently use them was also identified.

In order to achieve the aforementioned objective, it was necessary to define the research questions (RQs) that would guide the systematic literature review process and that would be dealt with throughout the research:

RQ1: Which models or standards do organisations use for the management and quality of their services? The objective of this question is to discover the existing regulations and models currently employed by service companies in order to improve the quality of their services.

RQ2: In which sectors are these proposals applied? The response to this RQ made it possible to attain knowledge regarding the market sectors in the service industry in which the proposals identified are implemented.

RQ3: What types of companies apply these proposals? The objective here was to identify the size of the organisations that are currently working with models and/or regulations in order to improve the quality of their services.

RQ4: On which of the organisation's spheres are these proposals focused? The aim of this RQ was to discover on which spheres (processes, people, services, etc.) the organisation focuses in order to improve the quality of its services.

RQ5: In which type of model are these proposals framed? Several models and standards can be used to manage an organisation's processes [11]. This question sought to classify the proposals according to their type: reference, maturity, validation, evaluation or improvement. It also served to discover the models and standards most frequently employed and the sectors in which they are applied.

The search string was created by considering key words connected to the business process models utilised in the sphere of services. These key words were then combined with the Boolean operators AND and OR, and the resulting search string was employed in order to search for papers and was formatted according to the specific syntax of each search engine employed. The search string used was the following:

("maturity model" OR "reference model" OR "assessment model" OR "excellence model" OR "process improvement model") AND ("service"),

and was executed in the following databases: WebOfScience, ACM Digital Library, Scopus, EBSCO, IEEE Xplore, Google Scholar and Science Direct.

When processing the search for documents in the electronic databases, categories related to “electronics, electricity and service technologies” were not employed, since they had no direct relation with the topic of interest in this work. Studies focused on software development or the creation of products and/or manufacturing were also excluded, as were those that were principally focused on service technologies (e-services, web services, mobile services, etc.). When selecting papers, we included those written in English that evidenced the use of models for process and service sector management and/or to improve the quality of external services. Papers in which the sphere of application was the service sector were also included.

It was considered important to evaluate the quality of each of the papers [18] with regard to the objectives of this work. This led to the definition of Quality Assessment questions (QAs), which were employed in order to provide the studies with scores. The responses to each QA could attain the following values: 0 = (N) Not fulfilled, 0.5 = (P), partially fulfilled and 1 = (S) Fulfilled.

The QAs and their possible scores are:

- *QA1. Is the objective of the research clearly defined?* Yes (1), the study has clearly defined objectives. Partial (0.5), the objectives are defined, but not clearly. No (0), the objectives of the work are not defined.

- *QA2. Is the research work coherent?* Yes (1), the work developed is coherent with the proposed objective. Partial (0.5), there is little coherence between the objectives and the work developed. No (0), there is no coherence between the objectives and the work developed.

- *QA3. Is the research process or method clearly defined?* Yes (1), the study clearly defines the methodology used. Partial (0.5), the study employs a methodology but it is not clearly defined. No (0), the study does not provide a definition of the research methodology employed.

- *QA4. Is the research applied to a practical case or a real scenario?* Yes (1), the study is validated in a real environment. Partial (0.5), the study is partially validated in a real environment and partially validated in a conceptual environment. No (0), the study is not validated using a real case.

- *QA5. Are the limitations of the work clearly documented?* Yes (1), the limitations of the study are clearly defined. Partial (0.5), the limitations of the study are not clearly defined. No (0), the limitations of the study are not defined.

- *QA6. Does the study contain relevant quality references?* Yes (1), the study contains relevant references that are recognised and/or related to process management in organisations. Partial (0.5), the study references some relevant sources. No (0), the study does not reference any recognised, relevant or quality sources.

2.2. Carrying out the Review

Each of the data sources listed in Section 2.1 was searched using the search string shown in the same subsection. This led to the attainment of the 1507 initial documents shown in Table 1 in the “Found” column. This list was then refined by eliminating repeated studies, which led to the attainment of the 1052 studies as shown in the column entitled “Not repeated” in Table 1. Each study was subsequently verified according to the inclusion criteria (138 relevant studies), after which it was necessary to verify whether or not they fulfilled any of the exclusion criteria. This resulted in 74 primary papers, representing 54% of the relevant studies. The primary studies were then enumerated (see Table 2), after which the process of extracting and analysing the data contained in them began.

Table 1: studies found

Sources	Studies				%
	Found	Not Repeated	Relevant	Primary	
WebOfScience	501	408	42	21	28%
ScienceDirect	150	130	15	7	9%
ACM Digital Library	208	173	21	7	9%
Scopus	321	192	30	16	22%
IEEE Xplore	205	123	17	12	16%
Google Scholar	50	15	5	3	4%
EBSCO	72	11	8	8	11%
Total	1507	1052	138	74	100%

This was done using the Mendeley computing tool in order to extract information such as: title, authors, year of publication, country of publication, DOI, type of work (journal or conference), and the conclusions and abstract of each paper [18].

In order to respond to each of the RQs (defined in Section 2.1), a table in which to gather together the relevant information was created, after which the process of extracting and analysing the data contained in the primary studies (Table 2) began. As will be noted in Table 1, 28% of the primary studies were obtained from the WebOfScience database, while 22% were from Scopus, 16% were from IEEE Xplore, 11% were from EBSCO, 9% were found in both Science Direct and ACM Digital Library, and 4% were from Google Scholar.

Table 2: Primary studies

Study ID	Source
S1	Standardizing delivery processes to support service transformation: A case of a multinational manufacturing firm [19]
S2	Management of service supply chains with a service-oriented reference model: the case of management consulting [20]
S3	Service improvement: Lessons from the UK financial services sector [21]
S4	A service innovation framework for start-up firms by integrating service experience engineering approach and capability maturity model [22]
S5	High-maturity levels: achieving CMMI ML-5 in a consultancy company [23]
S6	Assessing partially outsourced processes-lessons learned from TIPA assessments [24]
S7	Maintenance process improvement model by integrating LSS and TPM for service organisations [25]
S8	Business Process Maturity in Public Administrations [26]
S9	An Application of Business Process Method to the Clinical Efficiency of Hospital [27]
S10	Establishment and application of Enterprise management maturity model based on multimedia data information systems [28]
S11	Reference Process Flows for Telecommunication Companies An Extension of the eTOM Model [29]
S12	An exploratory study of common issues and key differences between the European Foundation for Quality Management and the United Arab Emirates P. [30]
S13	Met4ITIL: A process management and simulation-based method for implementing ITIL [31]
S14	Study of Information and Communication Technology (ICT) maturity and value: The relationship [32]
S15	A consensus support model based on linguistic information for the initial-self assessment of the EFQM in health care organizations [33]
S16	Developing a maturity model for service systems in heavy equipment manufacturing enterprises [34]
S17	Fuzzy linguistic approach to quality assessment model for electricity network infrastructure [35]
S18	Process standardization to support service process assessment and re-engineering [36]
S19	Logistics maturity model for service company - theoretical background [37]
S20	Service development in product-service systems: a maturity model [38]
S21	Impact of performance indicators on organisations: a proposal for an evaluation model [39]
S22	Comparison of the 14 deadly diseases and the business excellence model [40]
S23	Devising appropriate service strategies for customers of different value: an integrated assessment model for the banking industry [41]
S24	Applying the EFQM model to golf course management [42]
S25	Self-assessment for measuring business excellence: The MUSABE method [43]
S26	Quality Management and Excellence in the third sector: examining European Quality in Social Services (EQUASS) in non-profit social services [44]
S27	A Sector-Oriented Methodology for the Development of Business Excellence Model- An Application in the Greek Hotel Industry [45]
S28	Exploring capability maturity models and relevant practices as solutions addressing information technology service offshoring project issues [46]

S29	Aspects regarding the application of the quality principles in the university library [47]
S30	Organisational culture and quality improvement [48]
S31	Exploring the possible reasons why the UK Government commended the EFQM excellence model as the framework for delivering governance in NHS [49]
S32	Innovation in public service management [50]
S33	Self-assessment processes: The importance of follow-up for success [51]
S34	Towards a human-oriented metrology for improvement and change [52]
S35	ISO/IEC 15504 measurement applied to COBIT process maturity [53]
S36	Utilisation of business excellence models: Australian and international experience [54]
S37	Exploring differences between private and public organizations in business excellence models [55]
S38	EFQM model's application in the context of higher education A systematic review of the literature and agenda for future research [56]
S39	The paradigm shift to business excellence 2.0 [57]
S40	Designing conceptual model of after-sales services, in companies producing the capital goods, with the idea of value co-creation [58]
S41	Can emotional scaling methods improve quality in services? [59]
S42	Assessment of TQM implementation level in Palestinian healthcare organizations: The case of Gaza Strip hospitals [60]
S43	The evolution of quality processes at Tata Consultancy Services [61]
S44	Comparative study for PMBOK & CMMI frameworks and identifying possibilities for integrating ITIL for addressing needs of IT service industry [62]
S45	A Process Optimization Method for High Maturity Process Improvements [63]
S46	Analyzing Key Process Areas in Process Improvement Model for Service Provider Organization, CMMI-SVC [64]
S47	Developing the Maturity Model for Gig Economy Business Processes [65]
S48	Adapting Service-CMM to risk management improvement in ERP II project [66]
S49	The development of an ISO 9000 quality management system to meet the requirements of the EFQM model [67]
S50	Beyond Service Management: The Next Performance Advantage for All Disciplines [68]
S51	Representation of knowledge in information technology Service Capability Maturity Model (IT Service CMM) [69]
S52	Measuring the core competencies of service businesses: A resource-based view [70]
S53	Business Process Optimization in Cross-Company Service Networks: Architecture and Maturity Model [71]
S54	A Quality-Distinction Model of IT Capabilities: Conceptualization and Two-Stage Empirical Validation Using CMMi Processes [72]
S55	Application of CMMI in Innovation Management [73]
S56	Preparing Jordanian University services to implement a quality Self-Assessment methodology [74]
S57	Business Excellence in the Indian Scenario [75]
S58	Developing a service performance assessment system to improve service quality of academic libraries [76]
S59	A proposed adaptation of the European Foundation for Quality Management Excellence Model to physical activity programmes for the elderly [77]

S60	The evolution of quality management in DOKPY, Magnesia - Greece: from basic quality initiatives to EFQM [78]
S61	Human Performance Improvement in the Health Care Organizations. Results of Empirical Study in Poland [79]
S62	Company maturity models: Application to supplier development program in oil & gas sector [80]
S63	Assessing healthcare process maturity: challenges of using a business process maturity model [81]
S64	Information technology service management processes maturity in the brazilian federal direct administration [82]
S65	Service Quality Model Evaluation [83]
S66	Improvement of Business Processes Performances through Establishment of the Analogy: Quality Management System - Human Organism [84]
S67	A descriptive study of the implementation of the EFQM excellence model and underlying tools in the Basque Health Service [85]
S68	Cloud service capability maturity model (cs-cmm): a preliminary study on its conceptual design [86]
S69	Internal customer relationship management (IntCRM) a framework for achieving customer relationship management from the inside out [87]
S70	Maturity Model for IT Service Outsourcing in Higher Education Institutions [88]
S71	New service development maturity model [89]
S72	Striving for continuous improvement: The experience of U.K. local government services [90]
S73	The Comparison of Thai Qualification Framework for Higher Education and Capability Maturity Model Integration for Service [91]
S74	What is CMMI? A model for optimizing development processes: The Capability Maturity Model Integration (CMMI) helps organizations [92]

3. Analysis and Discussion of Results

Each quality assessment question (QA) was evaluated, and each study was awarded only one of the values shown in Section 2.1. The maximum possible weighting for each QA is 6. Of the 74 primary studies analysed, 86% attained a score of 3 or more. The total weighting of the studies according to the QAs is shown in Table 3. QA1 attained a score of 71.5, while QA2 and QA6 each attained 67.5 points. QA3 attained 55 points, QA4 attained 42.5 points and QA5 attained 36.5 points. These scores represent 96.6%, 91.2%, 74.3%, 57.4%, 49.3% and 91.2% of the studies, respectively.

These data make it possible to state that the quality of the studies analysed is very good, since they all attained mean values for the areas studied. That is to say, the objectives of the studies analysed are clearly defined, there is coherence between the development of the work and its objective, the methodology employed is clearly defined and has been validated, the limitations are defined and the bibliographic references are relevant.

Table 3: Quality of studies – Total results

QA Totals	QA1	QA2	QA3	QA4	QA5	QA6
	71.5	67.5	55	42.5	36.5	67.5
% Total by Max QA	96.6%	91.2%	74.3%	57.4%	49.3%	91.2 %

The results obtained as regards the data extraction for each RQ are:

RQ1: The models most frequently employed are EFQM, which focuses on the organisation in general [93], CMMI-SVC and CMMI, which focus on service quality improvement processes [92], and the *Information Technology Infrastructure Library* (ITIL), which comprises good practice guidelines for the management of information technology (IT) services [94]. With regard to regulations, there are the ISO/IEC 20000 standards for IT service management [95] and the ISO/IEC 9001, which is used to improve product and service quality [96].

RQ2: The most representative sectors in which the proposals identified are applied are principally IT and Health, followed by Banking, the Commercial sector and the Industrial and Software Development sectors (Fig. 1). With regard to the IT sector, there are studies that describe a model focused on the evaluation of IT processes [24], methods that can be used to apply ITIL on the basis of the business process management lifecycle [31], an analysis of models applied in the IT industry [62], etc. In the case of the Health sector, there are studies dealing with the management of projects and maturity models [28], support models for consensus through the use of EFQM based on linguistic information [33], etc.

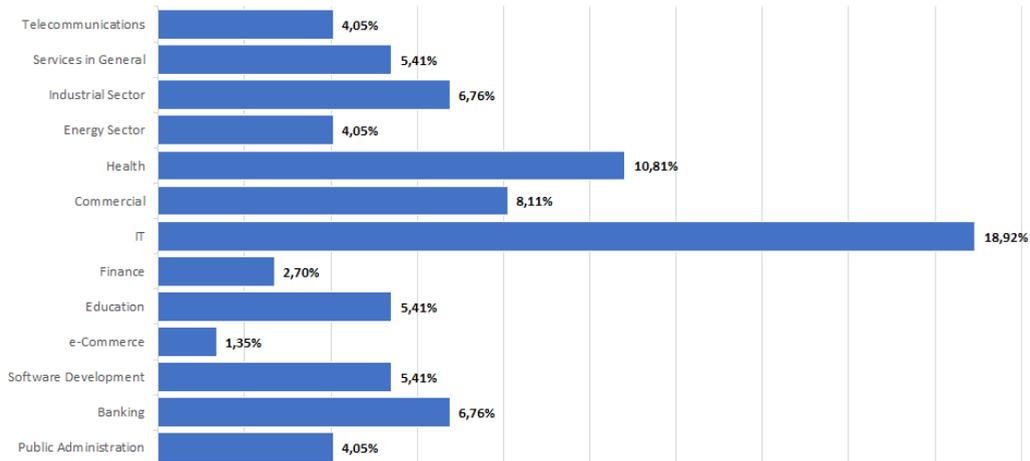


Fig. 1. Sectors in which the proposals are applied

RQ3: Fig. 2 shows that more than 50% of the entities that use the proposals identified are large companies, while only 9% are small and medium-sized enterprises. The fact that SMEs barely employ process management models can be attributed principally to the economic, technological, human resources, etc. required by these proposals for their application [97].

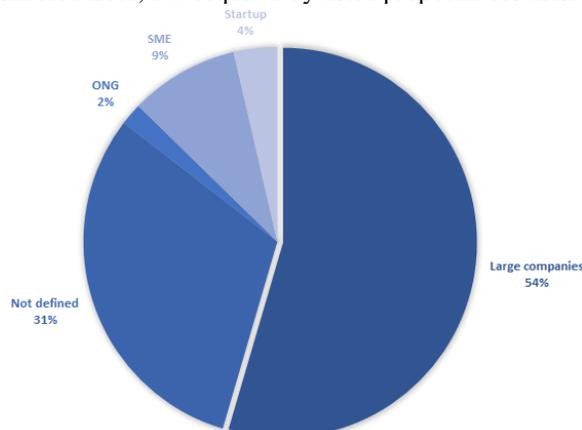


Fig. 2. Type of organisations that employ the proposals

RQ4: Of the 74 studies, 24% represent the sphere of *Models and Practices*, 19% represent the sphere of *Processes* and cover the management and evaluation of organisational processes, 15% represent the sphere of *Customers*, 9% represent the sphere of *Technologies*, and 8% represent *Services* and comprise those studies that tackle service innovation, improvement and suppliers. Moreover, 8% are related to *Internal Management*, with 4% of the studies in the sphere of *External Relations* dealing with outsourcing and social impact. Finally, 2% deal with the sphere of *Projects*.

RQ5: This analysis revealed that the proposals are not exclusive, i.e. they can be framed within more than one type. For example, the analysis revealed that the CMMI model fits into the maturity, evaluation and improvement model (Fig. 3). It is also possible to appreciate the variety and type of proposals implemented by service companies, since these proposals can be classified as regulations, methodologies, models, capacity, reference, maturity, evaluation, excellence and improvement models, and may, moreover, be oriented towards IT and non-IT services and/or general services (It and non-IT).

SERVICE QUALITY		
IT SERVICES	GENERAL SERVICES (IT AND NON-IT)	NON-IT SERVICES
<ul style="list-style-type: none"> • Regulations <ul style="list-style-type: none"> • ISO/IEC 15504 • ISO/IEC 20000 (evaluates the quality of the service). • ISO/IEC 38500 (evaluates IT management). • Framework <ul style="list-style-type: none"> • CMFQ - (Conceptual Model Quality Framework). • COBIT 2019. • ITIL Vx. • ITSM. • TIPA Framework. • Maturity Model <ul style="list-style-type: none"> • CMM (focused on processes related to software development). • CS-CMM (focused on cloud services) • CMMI-SVC (focused on processes and services). • Improvement Model <ul style="list-style-type: none"> • CMMI (focused on processes related to software development). • CMMI-SVC (focused on processes and services). • Reference Model <ul style="list-style-type: none"> • eTOM (Enhanced Telecom Operations Map) • Evaluation Model <ul style="list-style-type: none"> • CMMI (focused on processes relevant for software development). • CMMI-SVC (focused on processes and services). 	<ul style="list-style-type: none"> • Evaluation Model <ul style="list-style-type: none"> • SERVQUAL • EFQM • SCAMPI • Reference Model <ul style="list-style-type: none"> • LEAN SM (Service Management) • Improvement Model <ul style="list-style-type: none"> • SEEM - (Service Engineering Methodology) • Regulations <ul style="list-style-type: none"> • ISO 9001 • Framework <ul style="list-style-type: none"> • RBV - (Resource-based view) • Methodology <ul style="list-style-type: none"> • BS - (balanced scorecard). • PMBOK. • Six-Sigma. • TQM - (Total Quality Management). • QFD - (Quality Function Deployment). • TPM - (Total Productive Maintenance). • Maturity Model <ul style="list-style-type: none"> • CMM-MR (focused on risk management). • Excellence Model <ul style="list-style-type: none"> • EFQM. 	<ul style="list-style-type: none"> • Regulation <ul style="list-style-type: none"> • EQUASS. • Maturity Model <ul style="list-style-type: none"> • aPro model (focused on processes). • BPM (focused on processes). • CoMM. • SICMM - (Service Innovation Capability Maturity Model). • Excellence Model <ul style="list-style-type: none"> • EBEM - (European Business Excellence Model). • GEM - (Government Excellence Model). • Improvement Model <ul style="list-style-type: none"> • CP - (customer pyramid). • Evaluation Model <ul style="list-style-type: none"> • PCOC - (Personal, Customer orientation, Organisational and Cultural issues). • QuAM - Quality Assessment Model (focused on customers' perceptions). • Reference Model <ul style="list-style-type: none"> • SCOR - (Supply Chain Operations Reference Model). • Framework <ul style="list-style-type: none"> • ARIS - Integrated Information Systems Architecture. (business process model). • TQF Framework. • Methodology <ul style="list-style-type: none"> • PCM - (Performance control matrix).

Fig. 3. Classification of the proposals found in the SLR

4. Conclusions and Future Work

The systematic literature review presented herein was carried out with the objective to identify models most used by companies through which manage their internal processes, identifying the type/size of companies that use them most frequently and discover gaps in the use of models in order to contribute to the services science field. Following the guidelines defined by Kitchenham [16] and the protocol proposed by Biolchini [17], 1507 documents initially were found and 74 were selected as primary studies for their subsequent analysis.

The results obtained made it possible to discover that the models most frequently employed are the EFQM, CMMI-SVC, CMMI and ITIL. The most frequently employed standards are, meanwhile, the ISO/IEC 20000 and ISO/IEC 9001.

Regarding to the gaps detected, it was identified that small and medium-sized enterprises (SMEs) in the service sector which wish to manage their internal processes through models, are highly unrepresented. Only 9% of the studies analysed consider SMEs, while more than 50% are oriented towards and applied in large companies. Moreover, the majority of the proposals are focused on IT, software development and telecommunications services.

It is for this reason that as the future work is related to considering the possibility of proposing an internal processes management framework that will be oriented to small and medium-sized service companies.

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