

ISO 9001 maintenance, decertification and recertification: A systematic literature review

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Abstract

Previous research on ISO 9001 certification maintenance, decertification and recertification is fragmented and lacks an integrated theoretical framework. Thus, the aims of this study are to provide an overview of current research, develop an integrated framework, and identify research gaps. The research methodology consists of a systematic literature review (SLR) which starts with the definition of a research protocol, proceeds with searches in Web of Science and Scopus, and selects a final sample of 32 articles for analysis. Results show that the research interest in certification maintenance, decertification and recertification is growing, but is still scarce. Extant research focus on certification maintenance factors, benefits, and frameworks; decertification reasons and consequences, and recertification impact on efficiency. There is a lack of consensus on these topics, but the data extracted from the literature is used to develop a theoretical framework of what companies do in the post-certification period. The framework identifies the main variables involved in certification maintenance, decertification and recertification, and establishes the main relationships between them. This is the first SLR conducted on these topics, which provides the first integrated framework of the research phenomena, a comprehensive list of research gaps to guide future studies, and relevant management recommendations.

Keywords: cancellation, certification, ISO 9000, quality management, renewal, revocation, total quality management.

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1. Introduction

Despite some research concluding that ISO 9001 does not bring benefits to certified organisations (Kakouris and Sfakianaki, 2018), most of the extant research concludes that it does (e.g.: Corbett *et al.*, 2005; Djekic *et al.*, 2014; Aba *et al.*, 2016; Sfredo *et al.*, 2021; Siougle and Dimelis, 2021). For instance, Fonseca *et al.* (2021) consider that the ISO 9001 standard can help organizations expand to international markets, improve their operational performance, reduce internal costs, improve efficiency, and increase profitability. In addition, Lukichev and Romanovich (2016) note that ISO 9001 certification can help to keep a long-term trusting relationship with consumers. Consequently, many companies consider ISO certification as an opportunity to achieve competitive advantage and increase market share. Previous research emphasises precisely this point: that ISO 9001 certification can improve competitive advantage, customer's satisfaction, and organisational performance (Tari *et al.*, 2012; Djekic *et al.*, 2014; Aba *et al.*, 2016; Gonçalves *et al.*, 2020). As a result, the adoption of ISO 9001 grew considerably worldwide (Prajogo, 2008; Psomas and Kafetzopoulos, 2014; Wiengarten *et al.*, 2017), with the number of certified sites surpassing one million. However, recent studies show that the number of certified companies has somewhat stagnated (Mastrogiacomo *et al.*, 2021) and, most importantly, that the number of decertified companies has been increasing considerably (Cândido *et al.*, 2016; Clougherty and Grajek, 2023). The most recent data available on decertification from ISO shows that around 60,000 companies lose their certification every year (ISO, 2015a; Ferreira and Cândido 2021). Recent research points also to a decrease in the number of certified organisations (Marimon *et al.*, 2009; Mastrogiacomo *et al.*, 2021). This certification loss is due to several reasons, which include cost of the certification, time invested in the certification process, and erosion of customers' interest in certification (Lo and Chang, 2007; Chiarini, 2019).

Despite the decertification of organizations having become an almost global phenomenon (Marimon *et al.*, 2009; Mastrogiacomo *et al.*, 2021), most companies continue to maintain and recertify their management processes. In fact, Basir *et al.* (2011) argue that ISO 9001 certified firms should maintain their certification effectively since it can help organizations improve their performance. However, the consequences of certification maintenance, recertification and decertification are still unclear. Current research on the period after certification focus essentially on how firms maintain the ISO 9001 certification (e.g., Water, 2000; Lo and Chang, 2007; Wahid and Corner, 2009; Castka, 2018), why firms decertify from ISO 9001 (e.g., Alič, 2014; Simon and Kafel, 2018; Chiarini, 2019), and what is the impact of ISO 9001 recertification (e.g., Nurcahyo *et al.*, 2020). This literature, addressing what happens in the post-certification period, is still scarce and, therefore, has several research gaps to explore. An important gap is that there is no general framework of what happens to certified companies in the post-certification period (Chiarini, 2019; Ferreira and Cândido, 2021). Current research on maintenance, decertification and recertification is fragmented, since no research has yet attempted to consider these topics together. The existing literature is also contradictory, non-conclusive (Ferreira and Cândido, 2021), and in need of a supporting framework (Chiarini, 2019) to guide future research and management decision concerning ISO 9001 maintenance, decertification and recertification. Management, in particular, needs better guiding theory and a supporting theoretical framework, given the lack of clarity about what firms do after the certification, why, and with what results (Castka, 2018; Chiarini, 2019; Clougherty and Grajek, 2023).

To contribute to filling these gaps in the literature, this article conducts a systematic literature review (SLR) on these topics. To guide the SLR, three research questions have been formulated: (1) What are the main results of the research on maintenance, decertification, and

recertification? (2) Is it possible to develop a conceptual framework from the extant research on these topics to explain what companies do in the post-certification period? And (3) What are the main research gaps on these topics that can help to guide future research?

Currently, there is no systematic (or non-systematic) literature review on maintenance, decertification and recertification. Previous ISO 9001 literature reviews (approximately 20 in Web of Science and Scopus) have mostly addressed specific topics such as performance impact, diffusion, innovation effect, process management, and internalization (e.g., Astrini, 2021; Demir, 2021; Manders *et al.*, 2016; Sfreddo *et al.*, 2019, 2021; Tari *et al.*, 2020); and some reviews have addressed the ISO 9001 literature in general (e.g., Hussain *et al.*, 2020), but none of these reviews touched the topics addressed in this SLR. Thus, given the research gaps already identified, there is opportunity and need for a SLR on the ISO 9001 post-certification period.

The structure of the paper is as follows. Section 2 defines the three fields of interest of the study. Next, Section 3 explains the methodology adopted in the research. Then, Section 4 starts to answer the first research question by presenting the research results. After that, Section 5 analyses the research results, offers a framework of the research that has been conducted in the three topics, and identifies the research gaps, which answers the last research questions. This section also presents research implications for management. Finally, Section 6 addresses the limitations of the study and Section 7 concludes the paper.

2. Defining the field of interest: ISO 9001 certification, maintenance, decertification, and recertification

2.1. ISO 9001 certification

The International Organization for Standardization (ISO) is responsible for the development of standards and guidelines that organisations can adopt for several purposes, including the certification of quality management systems (QMS). The most popular family of standards is the ISO 9000 family (Wiengarten *et al.*, 2017), composed of four standards, namely, ISO 9000:2015, ISO 9001:2015; ISO 9004:2009 and ISO 19011:2011. These standards contain the concepts, requirements and tools to guide companies that wish to implement QMSs to meet the needs of their customers (Fonseca *et al.*, 2021). Any type of organization, regardless of their size, nature, or activity field, can adopt the ISO 9001 standards. The standards are organised around a set of major quality principles, including, management leadership, fact-based decision-making, customer focus, relationship management, personnel empowerment, process management, and continuous improvement (ISO, 2015b). Adoption of these principles and standards is motivated by the potential benefits that organizations can reap from the certification process (Arauz and Suzuki, 2004; Corbett *et al.*, 2005; Djekic *et al.*, 2014; Aba *et al.*, 2016; Cai and Jun, 2018; Hernandez-Vivanco *et al.*, 2019; Siougle *et al.*, 2019; Liu *et al.*, 2021; Sfreddo *et al.*, 2021; Siougle and Dimelis, 2021). The organizations interested in attaining certification must plan and implement several changes in their management processes to comply with the ISO 9001 principles and requirements (Esgarrancho and Cândido, 2020). When ready, the chosen certifying body makes a certification audit and, in case the organization has complied with all the standards, concludes the process by issuing the certificate valid for three years. The main assumption of the certification process is that companies that adopt the ISO 9001 requirements increase their chances of success by providing their customers with quality products and services that meet their demands (Ong *et al.*, 2015; Basir *et al.*, 2017). The degree of success, however, depends on several factors, including the quality of the help provided by the certification body



(Castka, 2018), the motivations of firms to attain the certification (Ferreira and Cândido, 2021), the degree of internalization of the standard achieved by the certified organizations (Cai and Jun, 2018; Tari *et al.*, 2020) and other factors (*Cf.* Bravo *et al.*, 2017; Chiarini *et al.*, 2020).

2.2. ISO 9001 certification maintenance

After attaining the initial certification, organizations must be regularly audited on an annual basis (surveillance audits), and more thoroughly so, at the end of the three-year validity period (certification audit). In these occasions, the external auditing entity inspects the QMS to verify whether it continues to comply with the ISO 9001 standard. For continuance of compliance, the QMS needs to be constantly monitored by management, controlled, improved, and internally audited, to make sure that the company can be successfully awarded the recertification after the external certification audit (Bamber *et al.*, 2002; Basir *et al.*, 2011; Lindlbauer *et al.*, 2016; Castka, 2018). Furthermore, to adequately maintain (and improve) the QMS, several other maintenance activities should be regularly performed in the certified organisation. These include, for instance, data collection and analysis, performance measurement, management reviews, corrective and preventive actions, streamlining of the auditing processes, benchmarking between business units, continuous improvement, and others (Wahid and Corner, 2009; Castka, 2018). There are also other additional internal and external factors that can have a substantial impact on the QMS maintenance activities and their corresponding results. These include the top management commitment, employee involvement, teamwork, company-wide ISO recognition, and other technical and socio-cultural aspects (Low and Omar, 1997a; Cheng and Tummala, 1998; Basir *et al.*, 2017).

Adequate QMS maintenance is important because it helps to keep the quality initiative alive in the organization, prevents the stagnation of the quality management system, and allows the continuity of the benefits from the ISO 9001 certification (Lo and Chang, 2007).

Despite these benefits, some organizations are still reluctant to maintain ISO 9001 certification, because of the perception that keeping certification is time-consuming and costly, because of a poor understanding of the maintenance stages of certification, and because of the perception that the ISO 9001 quality system may be a mere minimum requirement for a QMS (Lo and Chang, 2007; Castka, 2018).

Unfortunately, little attention has been given to these issues of ISO 9001 maintenance, in favour of other ISO 9001 research topics (Basir and Davies, 2018). Specifically, few attempts have been made at exploring the reasons why companies fail to maintain the QMS (Lo and Chang, 2007) and why they withdraw from the certification (Cândido and Ferreira, 2023).

2.3. ISO 9001 decertification

ISO data on certification show large numbers of firms withdrawing from certification (Alič, 2014). On average, 330,000 companies must decide every year whether they should renew their certification or not; and approximately 60,000 of these companies lose or cancel their certification annually (approximately 18.2%; ISO, 2015a; Ferreira and Cândido, 2021). Thus, research on the reasons why companies decertify has become an important (but exiguous) part of the research on ISO 9001. Current research points out several motives why companies lose the certification. Cândido *et al.* (2016), for instance, suggest that when companies internalize the benefits of certification, they may be inclined to decertify their management processes. Firms may also be inclined to decertify when they notice that the costs of renewing the certification are higher than the benefits, or when they anticipate that the certifying body

may not renew their certification (Cândido *et al.*, 2016). Montiel *et al.* (2021) further suggest that decertification depends on the dilution of the legitimacy of private standards over time and on the corresponding dilution of the certification benefits. Alič (2014) adds that low marketing attractiveness of the certification and the negative effects of improper implementation of the ISO 9001 standard can equally contribute to decertification. Lastly, Simon and Kafel (2018) identify several additional reasons why companies lose ISO 9001 certification. These reasons are related with internal financial problems, internal organizational changes, replacement of the ISO certification by other certifications, and other motives. In general, these results show that there is no consensus amongst the authors concerning the decertification reasons, which suggests that more research on this topic is necessary (Cândido and Ferreira, 2022, 2023).

2.4. ISO 9001 recertification

Although a considerable proportion of companies opt for decertification of their QMS (18.2%), most companies (79.8%) continue to choose recertification. Despite these numbers, studies on ISO 9001 recertification are even scarcer than those on ISO 9001 decertification. So far, only two studies have been carried out on the research topic of recertification (Lindlbauer *et al.*, 2016; Nurcahyo *et al.*, 2020). This scarce number of studies does not accompany the growing interest of this topic for practicing managers, which must decide whether to recertify or not in a context of growing decertification and lack of consensus on whether certification is indisputably a requirement for maintaining product quality and customer satisfaction (Ferreira and Cândido, 2021). More studies need to be carried out to help companies to make better informed decisions on whether to recertify or not.

3. Research methodology

Given the relevance of ISO 9001 certification maintenance, decertification and recertification – and the lack of research on these topics – a SLR was carried out to answer the research questions raised in Section 1. A SLR research method consists essentially in carefully and systematically identifying, selecting, critically appraising, and summarizing previous research to understand the state of the art and guide future research (Tranfield *et al.*, 2003; Needleman *et al.*, 2005; Rojon *et al.*, 2021). It constitutes a ‘rigorous, systematic, transparent and comprehensive approach to analysing, evaluating and synthesizing literature’ (Rojon *et al.*, 2021). In accordance, this study aims to: (1) collect and analyse the evidence from this literature on ISO 9001 maintenance, decertification and recertification; (2) offer a clear and unbiased picture of the current state of art in the field; (3) identify the research gaps in the literature to be filled with future research; and (4) provide background knowledge so that future research activities can be more appropriately positioned (*Cf.* Tranfield *et al.*, 2003; Needleman *et al.*, 2005; Rojon *et al.*, 2021).

For these purposes, a protocol for the literature review was first established. This protocol includes the research questions, the search strategy, and the methods for the analysis of the search results. With the research questions formulated (Section 1), the search strategy was established to identify all published articles on ISO 9001 maintenance, decertification, and recertification. This search was conducted in two databases – Web of Science (WoS) and Scopus – with the help of several keywords. These databases were selected because they are major sources of scholarly peer-reviewed materials from multiple academic journal publishers and are widely used by researchers (*e.g.*, Hussain *et al.*, 2020). The keywords used to facilitate the search were all related to ISO 9001 certification maintenance, recertification, and decertification. For the topic of maintenance, the combination of keywords was ISO

900*, maint*, preserv*, continuat*, conserv*, prolong*, perpet*. For the topic of decertification, the combination of keywords was ISO 900*, withdr*, los*, abandon*, maint*, revok*, suspend*, cancel*, decerti*, resign*, quit*, drop*, rescin*, abdicat*, terminat*, renounc* and de-adopt*. Lastly, for the topic of recertification, the combination of keywords was ISO 900*, recertif*, re-certif* and renew*. All searches were conducted on article title, article keywords, and abstract.

Several selection criteria were then considered. The inclusion criteria were: (1) articles with the search keywords in title, article keywords, or abstract, (2) articles included in the WoS or Scopus databases, (3) articles written in English, and (4) articles published in any year.

The exclusion criteria were considered next: (1) articles that did not aim to study ISO 9001 QMS maintenance, decertification, or recertification and did not address nor discuss these issues in the main body of the text (for instance, longitudinal studies on certification that did not explicitly address nor discuss *recertification*), (2) articles that did not meet the quality criteria of: (a) clear research objectives or research questions, (b) adequate literature review, (c) appropriate research methodology described in sufficient detail, and (d) appropriate implementation of the selected research methodology (*Cf. Sweeney et al., 2019; Rojon et al., 2021*); and (3) articles that were not published in journals indexed in WoS or Scopus (*Cf. Boiral, 2012; Kannenberg & Schreck, 2019; Sweeney et al., 2019*). Articles published in conference proceedings included in the databases were considered, if they passed the inclusion and exclusion criteria.

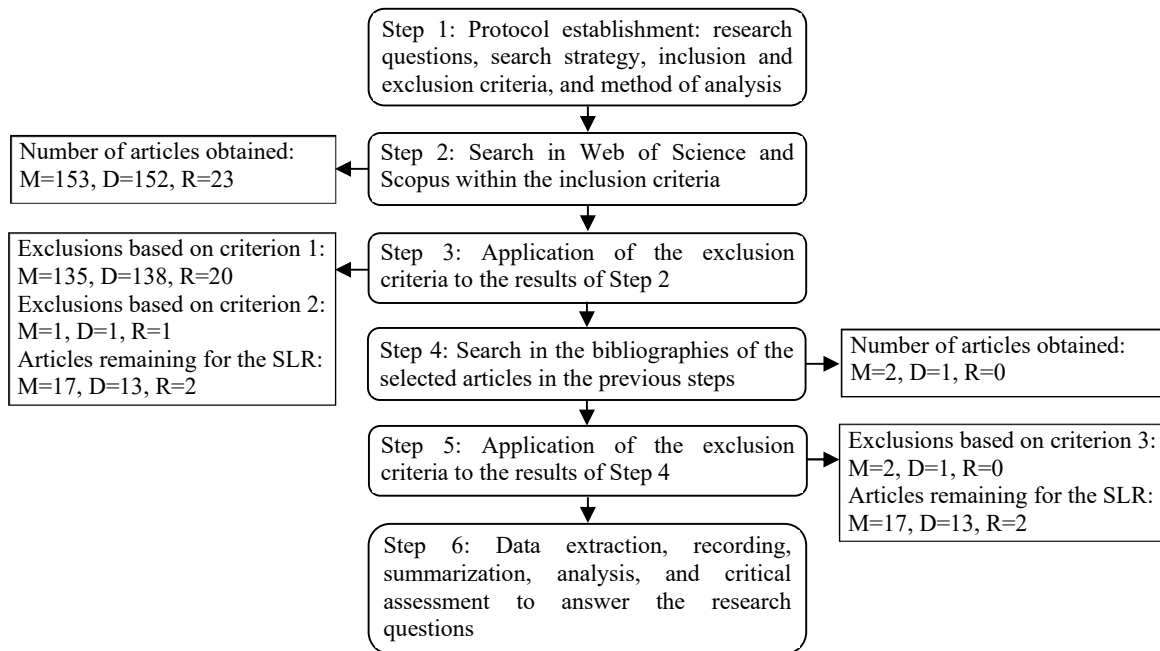
The results of the search were a total of 153 articles on maintenance, 152 on decertification and 23 on recertification, which totalized 328 articles. After applying the exclusion criteria, 293 articles were removed, based on criterion 1, and three additional articles were further removed, based on criterion 2. A total of 32 articles were retained for analysis, 17 on maintenance, 13 on decertification and two on recertification (See Figure 1). One of the selected articles was considered as addressing both ISO 9001 certification maintenance and decertification and, as such, was considered both in maintenance and in decertification.

The researchers conducted an additional search in the bibliographies of the selected articles to identify any other relevant document. This search resulted in the identification of three new articles, two on maintenance and one on decertification. However, these articles did not pass the exclusion criteria and were removed from the SLR (see Figure 1).

After data collection, the researchers proceeded with data extraction from the selected articles. Information on authors and year of publication, study purpose, method, main findings, supporting theory and future research directions were extracted from the selected articles and recorded. Bibliometric data was also collected for the analysis. The method used to analyse the gathered data consisted of (1) careful (re)reading of the final list of articles, (2) identification, classification and extraction of the relevant data, (3) recording and organising of the extracted data on data tables, (4) preparation of summary charts, (5) further summarisation of the data in the final versions of the Tables (1 to 5) and charts (Figures 2 to 5), and (6) analysis.

In the preparation of the conceptual framework of the extant research, represented in Figure 5, the authors first developed a catalogue and a database of all relationships that had been previously studied. From this catalogue and database, the authors individually elaborated two independent initial versions of the framework. These were then discussed and improved, in an iterative process, until a final version was reached, with the agreement of both authors.

Figure 1. Synthesis of the systematic review procedures



Legend: ISO 9001 maintenance (M), decertification (D) and recertification (R)

In the identification of the directions for further research, the authors collected first the recommendations contained in previously published research and summarised them in a database (last column of Tables 2, 3, and 4). Next, the authors considered these recommendations and the limitations of previous research to make a summary of the gaps already identified in the literature (Gaps 11 and 12, Section 5.2). Finally, and most importantly, from the analysis of (1) previous research, (2) Tables 2 to 4, and (3) the conceptual framework of extant research (Section 5.1), the authors identified all areas of potential interest to the field that have not been researched yet, in order to prepare groundbreaking recommendations, for future investigation, that have not been identified in previous research (Gaps 1 to 10, Section 5.2). These research steps were all iterative and both researchers participated, with divergences being discussed and agreement sought before proceeding.

4. Research results

4.1. Bibliometric analysis

The bibliometric analysis considers the sources of the articles (journal or conference titles), evolution of the number of articles per year, number of articles per topic, and types of research methodologies/approaches adopted. Table 1 presents the summary information on sources of the articles. There is a total of 18 journals and one conference proceedings with articles on ISO 9001 certification maintenance, decertification, or recertification. Most of these sources have published only one article on any of the three topics of interest.

Total Quality Management & Business Excellence, with seven articles, three of them on maintenance and the remaining four on decertification, holds the highest number of articles, followed by the International Journal of Quality and Reliability Management, with five articles, all of them on maintenance. The International Journal of Production Economics and Production Planning and Control come in third place, with two articles each. The former journal includes one article on maintenance and another on decertification, the later journal,

two articles on decertification. The International Journal of Production Research published one article that addresses both certification maintenance issues and decertification (Lo and Chang, 2007) and was considered in both accounts. The remaining sources published one article each.

Table 1. Article sources

No.	Source title	Maint.	Decert.	Recert.	Total
1	Total Quality Management & Business Excellence	3	4	0	7
2	International Journal of Quality & Reliability Management	5	0	0	5
3	International Journal of Production Economics	1	1	0	2
4	Production Planning & Control	0	2	0	2
5	International Journal of Production Research	1	1	0	2*
6	African Journal of Business Management	1	0	0	1
7	Building Research and Information	1	0	0	1
8	European Journal of Operational Research	0	0	1	1
9	Human Factors and Ergonomics in Manufacturing & Service Industries	1	0	0	1
10	Innovar	0	1	0	1
11	International Conference on Management and Service Science (Proceeds)	1	0	0	1
12	International Journal for Quality Research	0	1	0	1
13	International Journal of Operations & Production Management	0	1	0	1
14	International Journal of Productivity and Performance Management	0	0	1	1
15	Journal of Higher Education Policy and Management	1	0	0	1
16	Quality Innovation Prosperity	0	1	0	1
17	Quality Management Journal	1	0	0	1
18	Research Policy	0	1	0	1
19	The Service Industries Journal	1	0	0	1
Total		17	13	2	32*

Note: * One article classified in two areas.

Figure 2 details the evolution of the published articles over the years. Publication started in 1997 and has been growing from an average of less than one article per year (0.8) to approximately two articles per year (1.9). The most productive year was 2018, with three articles. From 1997 to 2011, all articles, with only one exception, were on certification maintenance. The first article on decertification was published only in 2007 and, the first one on recertification, in 2016. From 2012 to 2023, the research interests seem to have shifted from certification maintenance to decertification and, less conspicuously, to recertification. Dividing the period of analysis into smaller periods of five years, Figure 2 shows a clear growth in the number of publications in the three fields of interest, and the shift of major research interest from maintenance to decertification. (The last period, 2017-2023, is slightly longer, with six years and three months, from 01 January 2017 to 31 March 2023.)

Figure 2. Evolution of the number of articles

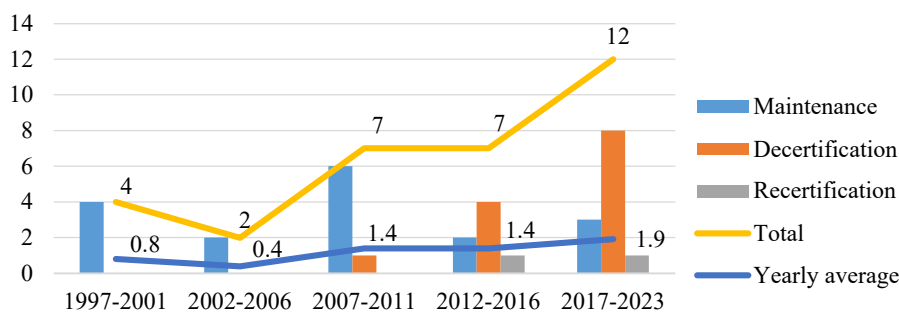
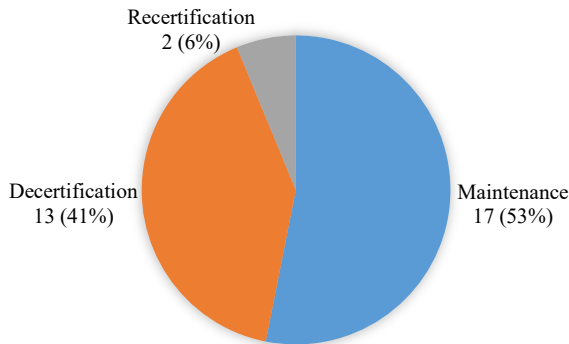


Figure 3 shows a comparison between the totals of articles published in the three topics of research. Up until 2023, a total of 17 articles (53%) have been published on certification maintenance, the most popular topic, 13 articles (41%) on decertification, and only two

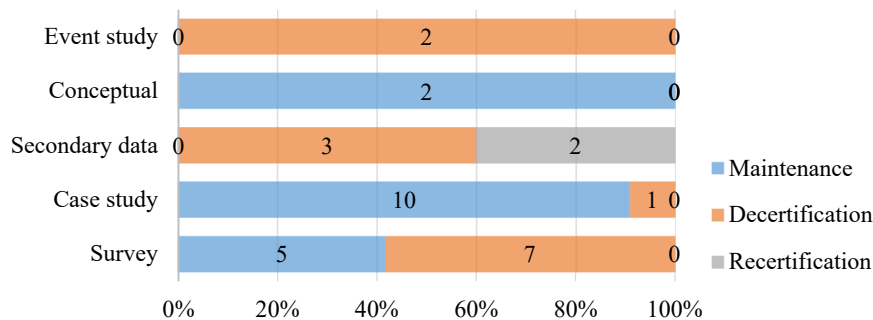
articles (6%) on recertification, the most recent and least published topic.

Figure 3. Relative weights of maintenance, decertification, and recertification



Lastly, Figure 4 shows the research methodologies adopted by these articles. Among the adopted methodologies, there are surveys, case studies, event studies, conceptual papers, and other methods/approaches using secondary data. There is a clear predominance of surveys (12 articles) and of case studies (11 articles) over the remaining methodologies. The preference for surveys and case studies, to the detriment of other methodologies/approaches, combined with the relatively small number of total publications, represent a significant opportunity for research on these topics adopting a vast array of other available methodologies.

Figure 4. Methodologies adopted in the selected articles



4.2. Results of data extraction from the selected articles

This section summarises the results of the data extraction from the articles selected with the methodology outlined in Section 3. Table 2 presents the results from studies addressing ISO 9001 maintenance. The Table is divided into seven columns, including author and year of publication, study purpose or objective, theory supporting the research, methodology of the study, main findings of the research, main findings about the financial impact of certification maintenance, and directions for future research on ISO 9001 QMS maintenance.

Table 2. Research on ISO 9001 quality management system (QMS) maintenance

Author, year	Study purpose/objective	Supporting theory	Method	Main findings/ results	Financial impact	Future research directions
Low and Omar, 1997a	Study motivations, obstacles, approaches, and measures for maintaining the ISO 9001 QMS	None	Survey, interviews	Maintenance critical success factors (CSFs) are top management commitment, technical aspects, socio-cultural aspects, and productive relationships. Maintenance obstacles are related with structure, attitudes, lack of resources, coordination, communication, training, and supervision. Measures to overcome the obstacles are also identified.	n/a	There is a need for more research on the maintenance stage of ISO 9001 certification



Low and Omar, 1997b	Study the need, problems, approaches, and measures for maintaining the ISO 9001 QMS	None	Case study	Maintenance in practice is based on the technical approach (i.e., the standard requirements, or the hard QMS). Proper maintenance depends also on non-technical aspects (i.e., human aspects, or the soft QMS). Identifies maintenance problem areas and recommends measures to overcome them.	n/a	Need for more research on maintenance
Cheng and Tummala, 1998	Study the employee involvement strategy at all levels in ISO 9001 maintenance	None	Case study, interviews, survey	Establishes a strategy and activity plan (framework) for the participation of employees at all levels of the organisation and at each of three stages of ISO 9001 implementation and maintenance.	n/a	n/a
Water, 2000	Design a model to determine and specify the maintenance of quality management	None	Conceptual	Defines several maintenance concepts and develops a framework within which the organisation can discuss and specify the ISO 9001 QMS maintenance to be performed.	n/a	Calls for research on maintenance to 'kill the criticism that TQM does not function'.
Arauz and Suzuki, 2004	Identify factors that influence perceived performance of ISO 9001 maintenance	None	Survey, factor and regression analysis	Identifies several maintenance activities. Organizational performance significantly depends on ISO 9001 QMS maintenance activities, but only in medium and large companies.	Assesses the perception of maintenance impact	Analyse the performance impact of the integration of ISO 9001 with Six Sigma.
Prado <i>et al.</i> , 2004	Develop a method for ISO 9001 maintenance based on improvement teams	None	Case study	Proposes a methodology based on improvement teams that contributes to personnel involvement and maintenance of the ISO 9001 QMS.	n/a	n/a
Lo and Chang, 2007	Compare perceived benefits between firms that maintain the certification and those that lose it	None	Survey, MANCOVA	Firms that maintain the certification are firms that have higher perceived certification benefits.	Assesses the perceived benefits of certification	Consider the newer version of the standard for a similar analysis.
Prajogo, 2008	Compares motivations, benefits, and success factors of implementation with those of maintenance	None	Case study, interviews	Having internal motivations is fundamental for successful ISO 9001 maintenance. Success factors for the implementation are mostly the same for successful QMS maintenance. Most implementation benefits are sustained during maintenance.	n/a	Consider larger samples to access generalizability of these results.
Pan <i>et al.</i> , 2009	Develop a model to guide the implementation and maintenance of ISO 9001 QMS	None	Survey, CB-SEM	The structural model proposed is largely supported by the data. Pre-implementation planning significantly influences employee empowerment. Both variables significantly influence maintenance activities, which in turn have a significant impact on operational performance.	Assesses the perception of certification cost reduction	Consider other factors and examine the model in other settings.
Wahid and Corner, 2009	Identify CSFs for ISO 9001 maintenance, problems, and measures to overcome the problems	None	Case study, interviews, thematic analysis	Maintenance CSFs are top management commitment, employee involvement and participation, teamwork, continuous improvement, reward system, understanding of ISO 9001, performance measurement, and communication. Most important problems are changing culture and attitude of employees and suppliers. Measures to overcome the problems are also identified as well as maintenance benefits.	n/a	There is a lack of research on the post-certification period
Basir <i>et al.</i> , 2011	Develop a framework of the elements of organisational culture that influence the maintenance of ISO 9001	None	Conceptual	Identifies elements of organizational culture that affect ISO 9001 maintenance: teamwork, recognition, incentive schemes, top management commitment, staff loyalty, and motivation for continuous improvement.	n/a	Increasing need to research ISO 9001 QMS maintenance
Wahid <i>et al.</i> , 2011	Analyse QMS maintenance and outcomes	None	Case study, interviews, thematic analysis, survey	Identifies maintenance motivations, benefits, and CSFs. CSFs are top management commitment, internal communication, training, adequate resources, quality culture, rewards, recognition, empowerment, and supplier relationships.	n/a	QMS maintenance CSFs, challenges, problems, benefits, impact, reasons for failure, and others.
Wahid, 2012	Investigate the success factors and problems of ISO 9001 maintenance	None	Case study, interviews	Identifies the CSFs and problems of ISO 9001 maintenance. Suggests a framework for ISO 9001 maintenance in service organisations.	n/a	Investigate 'how ISO 9001 can be more effectively maintained'
Ong <i>et al.</i> , 2015	Examine the role of practitioners' perception and belief in the behavioural intention to maintain ISO 9001	Theory of reasoned action, technology acceptance model	Survey, CB-SEM	Develops a model of practitioners' beliefs and QMS maintenance. Intention to maintain QMS depends on peer and management support, understanding of ISO 9001 requirements, perceived ease of use, and perceived usefulness.	n/a	Organisational and social aspects of QMS maintenance, including linkages between organizational levels.
Basir <i>et al.</i> , 2017	Investigate the influence of the elements of organisational culture on ISO 9001 maintenance in universities	None	Case study, interviews, direct observation	Four cultural elements influence ISO 9001 maintenance in universities: academic freedom, individualism, professionalism and collegiality	n/a	Influence of organizational culture on ISO 9001 QMS maintenance.
Basir and Davies, 2018	Understand the measures needed for effective ISO 9001 maintenance	None	Case study, interviews	Six measures identified: documentation control, internal audits, data analysis and feedback, management review, training, and corrective and preventive actions.	n/a	'Impact of human factors on ISO 9000 maintenance.'



Castka, 2018	Examine the patterns of activities and interventions that firms pursue to maintain their certifications	Configurational theory	Case study, fuzzy set qualitative comparative analysis, interviews	Identifies causal configurations (models) of variables influencing the complexity and intensity of activities to maintain the certification.	n/a	Use the configurational theory in future research.
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Table 3 is similar to Table 2 and shows the results from the studies addressing ISO 9001 decertification. Table 3 has seven columns, author and year of publication, study purpose or objective, theory supporting the research, research method employed, main findings regarding the decertification motivations and antecedents, main findings regarding the withdrawal repercussions (financial or otherwise), and directions for future research on ISO 9001 QMS decertification.

Table 3. Research on ISO 9001 QMS decertification

Author/ Year	Study purpose/ Objective	Supporting theory	Method	Results: decertification motivations and antecedents	Results: withdrawal consequences	Future research directions
Lo and Chang, 2007	Compare perceived benefits between firms that maintain the certification and those that lose it	None	Survey, MANCOVA	Identifies decertification motivations: time, cost, paperwork, and ISO 9001 is a minimum requirement. Concludes that firms that lose certification are firms that have lower perceived benefits.	n/a	Consider the newer version of the standard in the analysis.
Alič, 2014	Study organisations that lost the certificate and how they operate after decertification	None	Longitudinal survey	Suggests decertification motivations: effects of inadequate implementation, and low attractiveness of the certification	Negative repercussion on performance although some organisations might already be in financial difficulties before losing the certification	Conduct research in other countries to generalize the findings.
Kafel and Nowicki, 2014	Determine motives and repercussions of decertification	None	Case study	Identifies decertification motivations: cost, low benefits, customers ceasing to demand certification	(Part of) the quality management system continues to operate. Identifies the parts of the QMS that continue to operate.	Correlate the maturity level of the QMS with the motivations to decertify
Sansalvador and Brotons, 2015	Determine the value of the real option to abandon certification	None	Secondary data, fuzzy real options	Identifies decertification motivations: low benefits, savings from decertification, no internalisation of ISO 9001	Reduction of the company value	Consider including intangibles in future valuations
Cândido <i>et al.</i> , 2016	Determine the impact of decertification on performance	None	Event study, secondary data	Identifies decertification motivations: standard already internalized, cost, company does not expect to pass the audit	There is no statistically significant repercussion of decertification on economic and financial performance	Conduct research in other macroeconomic settings to generalize the findings.
Kafel and Simon, 2017	Assess the financial performance after decertification and its relationship with the decertification motivations	None	Secondary data	Identifies decertification motivations.	Financial problems, absence of profits, or ROA below industry average. Concludes that there is no relation between type of decertification motivation and financial performance.	Relationship between type of post-decertification QMS and performance. Relationship between motivations to certify and decertify.
Simon and Kafel, 2018	Determine the motives for decertification	None	Survey data, descriptive statistics	Identifies decertification motivations: company already in financial distress, no competitive advantage from ISO 9001, certification not demanded by customers, alternative standards or QMS	n/a	Analyse the correlations between (1) decertification and economic cycle, (2) performance after decertification and size and sector.
Chiarini, 2019	Determine the motives for decertification	None	Delphi method, survey	Identifies decertification motivations: customers not interested in certification, no management commitment, lack of improvement measures, cost	n/a	Use multivariate statistics to analyse the relationships between variables.
Cândido <i>et al.</i> , 2021	Determine whether underperformance is the decertification reason	None	Event study, secondary data	Concludes that low economic performance is <i>not</i> the reason why companies decertify. Identifies decertification motivations: standard already internalized, and not a rare and inimitable resource.	n/a	Consider how issues related to ISO 9001 implementation (preparation, fraud, obstacles...) may lead to decertification.

Ferreira and Cândido, 2021	Develop a comprehensive model of ISO 9001 QMS decertification propensity	None	PLS-SEM, survey data	Worldwide decertification propensity is 18%. To understand this decertification propensity, the aspects relating to pre-certification, certification, decertification, and post-decertification must be considered together. This involves certification motivations, barriers, benefits, decertification motivations, and EPAD.	Proposes an explanation to the contradiction in the field concerning the withdrawal repercussions. Introduces the concept of EPAD.	Consider other settings, research methodologies, and internal and external variables, such as those suggested in the article.
Cândido and Ferreira, 2022	Develop a model to identify the antecedents of expected performance after decertification (EPAD)	None	PLS-SEM, survey data	Main antecedents of EPAD are external decertification motivations and internal certification benefits. Internal benefits have a U-shaped relationship with EPAD. Negative direct effect of external benefits on EPAD counterbalance the positive indirect effect.	EPAD may be a better predictor of decertification (and of its consequences) than past certification benefits.	Consider other settings, research methodologies, and antecedent variables, such as those suggested in the article.
Cândido and Ferreira, 2023	Develop a model to determine the antecedents of internal decertification motivations	None	PLS-SEM, survey data	Certification barriers do not disappear after certification and are a much stronger antecedent of internal decertification motivations than low benefits.	n/a	Consider other settings, research methodologies, and antecedent variables, such as those suggested in the article.
Clougherty and Grajek, 2023	Study the relationship between innovation and decertification	Transaction costs theory, signalling theory	Secondary data, regression analysis (probit)	Radical innovation is a decertification motivation. Incrementally-innovate organisations are less likely to decertify than radically-innovative organisations.	n/a	Research that differentiates between radical and incremental innovation or focus on other organisational characteristics.

Note: Expected performance after decertification (EPAD).

Lastly, Table 4 is similar to both of the previous tables and summarizes the data extracted from studies on ISO 9001 recertification. This table includes information on the author and year of publication, study purpose or objective, theory supporting the research, research method adopted, main findings of the study, and directions for further research on ISO 9001 QMS recertification.

Table 4. Research on ISO 9001 QMS recertification

Author/ year	Study purpose/objective	Supporting theory	Method	Main findings/ results	Future research directions
Lindlbauer <i>et al.</i> , 2016	Examine whether certification and recertification have an impact on efficiency	None	Secondary data, DEA, genetic matching, regression	Efficiency is negatively related to ISO 9001. There is a 'significant negative impact on efficiency ... in the year of recertification and the year after that'.	Measure the impact of QMS certification on financial performance and on service quality
Nurcahyo <i>et al.</i> , 2020	Examine the impact of ISO 9001 recertification on efficiency	None	Secondary data, DEA	Recertification does not have a significant impact on efficiency, nor does it act as a catalyst to improve an organization's QMS.	Analyse other contexts and the new version of ISO 9001:2015

5. Analysis of the data extracted, discussion, and contributions

The data extracted from the selected articles (Tables 2, 3 and 4) is used for an analysis and discussion aimed at shedding light on the evidence collected and to answer the first research question presented at the beginning of the study. Table 5 begins by classifying the selected studies into six groups, according to their research aims and main research results. Some studies were classified in more than one group in this table, because there is considerable overlapping of the topics addressed. Other less significant overlapping between papers (not manifest in Table 5) is reported in the analysis and discussion that follows.

Regarding ISO 9001 certification maintenance, two distinct groups can be identified. The first group of studies (nine articles, 28%) is concerned with the identification of the (1) critical success factors (CSFs) for ISO 9001 QMS maintenance, (2) motivations to maintain the QMS, (3) activities to perform to maintain the QMS, (4) maintenance problems/obstacles

felt, (5) measures to overcome the problems/obstacles, and (6) maintenance benefits. The most significant part of these studies addresses the CSFs for ISO 9001 QMS maintenance (Low and Omar, 1997a, 1997b; Prajogo, 2008; Wahid and Corner, 2009; Basir *et al.*, 2011; Wahid *et al.* 2011, Wahid, 2012; Ong *et al.*, 2015). These studies underline the importance of top management commitment, employee involvement, personnel training, reward systems, organisational culture, teamwork, and other critical factors to maintain the QMS alive (Cf. Table 2). Prajogo (2008) notes that most of these CSFs are similar or identical to the ISO 9001 implementation critical factors. Other studies focus on the types of maintenance activities to perform (or initiatives) to keep the QMS in place and to continuously improve it (Arauz and Suzuki, 2004; Basir and Davies, 2018; Castka, 2018). The studies in this first group address also the related issues of maintenance motivations (Prajogo, 2008; Wahid *et al.*, 2011), maintenance problems/obstacles (Low and Omar, 1997a; Wahid and Corner, 2009; Wahid, 2012), measures to overcome the problems (Low and Omar, 1997a, 1997b; Wahid and Corner, 2009), perception of maintenance benefits in general (Prajogo, 2008) and perception of the financial impact of ISO 9001 maintenance (Arauz and Suzuki, 2004; Lo and Chang, 2007). Consistently, these studies stress the idea that possessing the CSFs and performing the maintenance activities are necessary conditions for an adequate maintenance of the ISO 9001 QMS, which, in turn, is a necessary condition to achieve the benefits of ISO 9001. However, these conclusions require more empirical research to support them, in particular, quantitative and inductive research that supports these claims. Quantitative and inductive research is not numerous and is in fact a minority in the maintenance literature (Cf. Table 2).

Table 5. Grouping research on ISO 9001 QMS maintenance, decertification, and recertification

Topic area	Group	Main aim and results	Authors	No.	%
ISO 9001 certification maintenance	1	Identification of critical success factors, maintenance motivations, maintenance activities, maintenance problems, measures to overcome the problems, and maintenance benefits	Low and Omar (1997a, 1997b), Arauz and Suzuki (2004), <i>Lo and Chang (2007)</i> , Prajogo (2008), Wahid and Corner (2009), Wahid <i>et al.</i> (2011), Basir <i>et al.</i> (2017), Basir and Davies (2018)	9	28
	2	Development of prescriptive and/or explanatory maintenance models/ frameworks/ systems	Cheng and Tummala (1998), Water (2000), Prado <i>et al.</i> (2004), Pan <i>et al.</i> (2009), Basir <i>et al.</i> (2011), Wahid (2012), Ong <i>et al.</i> (2015), Castka (2018)	8	25
ISO 9001 decertification	3	Identification of reasons for decertification	<i>Lo and Chang (2007)</i> , <i>Kafel and Nowicki (2014)</i> , Simon and Kafel (2018), Chiarini (2019), Cândido <i>et al.</i> (2021), <i>Cândido and Ferreira (2023)</i> , Clougherty and Grajek (2023)	7	22
	4	Identification of consequences of decertification (economic-financial or otherwise)	Alić (2014), <i>Kafel and Nowicki (2014)</i> , Sansalvador and Brotons (2015), Cândido <i>et al.</i> (2016), Kafel and Simon (2017), <i>Cândido and Ferreira (2022)</i>	6	19
	5	Development of empirical models of decertification	Ferreira and Cândido (2021), <i>Cândido and Ferreira (2022, 2023)</i>	3	9
ISO 9001 recertification	6	Assessment of the recertification impact on efficiency	Lindlbauer <i>et al.</i> (2016), Nurcahyo <i>et al.</i> (2020)	2	6
Total				32*	100*

Note: * Four studies (Lo and Chang, 2007; Kafel and Nowicki, 2014; Cândido and Ferreira, 2022, 2023) were classified in more than one group because they address more than one topic with similar emphasis.

The second group of articles on maintenance aim at the definition of general models or frameworks of ISO 9001 QMS maintenance (eight articles, 25%). The first three studies in this group are practice oriented and markedly prescriptive (Cheng and Tummala, 1998; Water, 2000; Prado *et al.*, 2004), two other studies aim to contribute to theory development through case studies (Wahid, 2012) or thorough theoretical conceptualization (Basir *et al.*, 2011), and the remaining works are explanatory and deductive in their approach (Pan *et al.*, 2009; Ong *et al.*, 2015; Castka, 2018). The prescriptive studies aim to provide concrete guidance that can help practitioners implement the maintenance activities and sustain the continuous improvement effort, although these studies may not be fully supported in previous



research. The explanatory/deductive studies aim to establish a better understanding of the relationships between the main variables in the literature (quality strategy and planning, maintenance CSFs, motivations, activities, and benefits) by empirically testing a theory or model that is supported in previous research. Three studies (Pan *et al.*, 2009; Ong *et al.*, 2015, Castka, 2018) conclude that maintenance activities can benefit from having a strategy or a pre-implementation plan, internal motivations, management support, empowered personnel, and an adequate understanding of the ISO 9001 standards. Three other studies (Cheng and Tummala, 1998; Prado *et al.*, 2004; Pan *et al.*, 2009) focus specifically on employee participation and on the favourable conditions to achieve it. Lastly, one of the studies (Pan *et al.*, 2009), together with two other studies from Group 1 (Arauz and Suzuki, 2004; Lo and Chang, 2007), address the relationship between maintenance activities and perceptions of organizational performance, concluding that maintenance activities have a positive impact on this performance. Figure 5 includes a representation of these relationships. There is currently no research addressing the economic-financial impact of maintenance activities in general (as a group of activities) and of many individual maintenance activities.

Regarding ISO 9001 decertification, the first group of articles (Group 3, Table 5) is concerned with the identification of reasons for decertification (seven articles, 22%). There is some considerable overlapping in terms of the motivations identified in these articles, but no consensus. In fact, there is clear disagreement in terms of what are the most important decertification motivations. While some studies stress the high costs associated with certification (Lo and Chang, 2007; Kafel and Nowicki, 2014), others stress the lack of benefits derived from certification (Sansalvador and Brotons, 2015), the implications of improper implementation of the standard (Alič, 2014), the internalization of the standard (Cândido *et al.*, 2016, 2021), the decreasing interest of customers in the certification (Chiarini, 2019), and the complicated financial situation of the organisation (Simon and Kafel, 2018). Other important reasons are the alternative competing certifications in the market (Simon and Kafel, 2018) and the dilution of the competitive advantage provided by the certification because of the growing number of certified competitors (Cândido *et al.*, 2021). To add to the lack of consensus, Chiarini (2019) concluded that costs with certification body and consultants is not a reason why firms lose the certification, and Cândido *et al.* (2021) concluded that low financial performance is also not a reason why firms decertify. The lack of consensus may be explained by several factors, including characteristics of the research (population and sample size) and characteristics of the context (year the study was conducted, industry surveyed, country of the study, proportion of certified organisations in the industries surveyed by the study, stage of the economic cycle at the time of the research, governmental emphasis on certification, and others). However, further research is needed to test this conjecture, and to emphasise which factors are (more) relevant. In the case of decertification research, there is also a need for qualitative research since the majority is quantitative (*Cf.* Table 3).

The second group of articles on decertification (Group 4, Table 5) addresses the organisational consequences of a lost certification (six articles, 19%) and attain similarly contradictory results. One study (Kafel and Nowicki, 2014) addresses the organisational consequences in terms of the functioning of the QMS and concludes that the QMS is not completely discontinued after decertification, as a part of it continues to operate. Most of these studies (four, 67%), however, address the economic and financial consequences of the decertification. Three of the studies (Alič, 2014; Sansalvador and Brotons, 2015; Kafel and Simon, 2017) conclude that the economic and financial situation of decertified organisations worsens after the certification loss. Alič (2014) and Kafel and Simon (2017) conclude that



firms' economic performance drops after losing the certification, and some firms even go bankrupt. Sansalvador and Brotons (2015) similarly conclude that the firms' market value is negatively affected by decertification. Contrasting with these results, Cândido *et al.* (2016) conclude that there is no significant statistical evidence that certificate cancellation results in any economic or financial underperformance. This lack of consensus in terms of economic consequences of decertification may be explained by several factors, just as for the lack of consensus on decertification motivations. One recent article addresses this issue and suggests that differences in certification motivations, decertification motivations and degree of standard internalization can explain the contradictory results (Ferreira and Cândido, 2021). This explanation, however interesting, can benefit from further substantiation.

The fifth group of articles is composed of three studies (9%) that develop and test structural equation models. These studies are the first ones to consider the ISO 9001 decertification phenomenon from a systemic perspective. They adopt structural equation modelling (PLS-SEM) to identify and analyse (1) the antecedents of firm propensity for certification withdrawal, (2) the antecedents of organisations' expectations of performance after certification withdrawal, and (3) the antecedents of internal decertification motivations. These studies aim also at understanding the relationships between other variables involved in the decertification (e.g., certification obstacles, certification benefits, and decertification motivations), which contribute to provide a systemic perspective. These relationships are also included in the Framework in Figure 5 and the main conclusions are reported in Table 3.

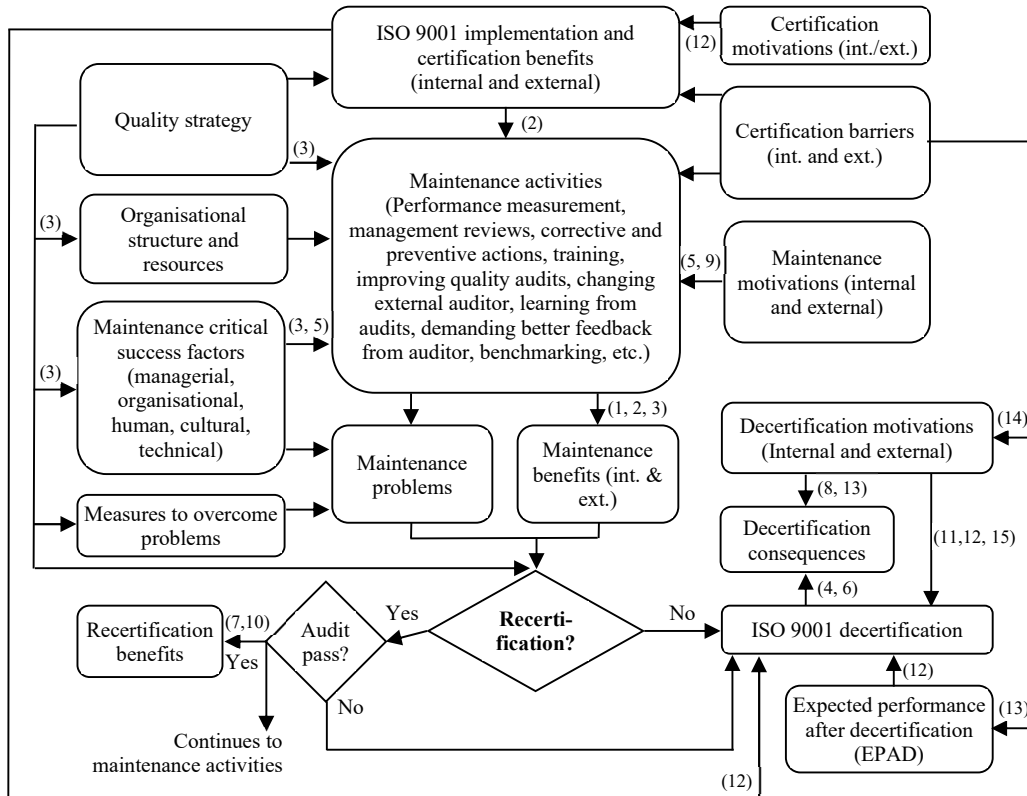
Lastly, regarding the issue of ISO 9001 recertification, there is only one group of studies (two articles, 6%), which is concerned with the impact of ISO 9001 recertification on organisational efficiency. According to both studies, there is no significant positive impact of recertification on firms' efficiency. Nurcahyo *et al.* (2020) conclude that there is no significant impact, and Lindlbauer *et al.* (2016) conclude that the impact is negative (and significant). Nurcahyo *et al.* explain their results with the type of certification aspired by the organisations in their sample, which is mostly 'ceremonial certification' aiming simply at complying with the minimum requirements of ISO 9001. In the second study, Lindlbauer *et al.* explain that the documentation burden and the increase in the quality of services rendered may have been detrimental to the economic efficiency of the surveyed organisations. However, these results are in marked contrast with the results of most research on ISO 9001 certification impact, which conclude that certification has a significant effect on firm economic and non-economic performance (e.g., Hernandez-Vivanco *et al.*, 2019; Siougle *et al.*, 2019; Liu *et al.*, 2021; Sfreddo *et al.*, 2021; Siougle and Dimelis, 2021). There is clearly a need to understand whether the results of these two studies are valid only for the healthcare sector (where both were conducted) or whether the impact of recertification is not significant in general, and distinct from the impact of the initial ISO 9001 certification.

5.1. A conceptual framework of the research: What do organizations do after certification?

The second objective of this paper is to develop a conceptual framework of the extant research on ISO 9001 maintenance, recertification and decertification. The purpose of such a framework is to begin to provide an answer to the question of what do certified organisation do in the post-certification period (i.e., after the certification has been awarded) and why. To answer this question, a general framework of the research reviewed thus far has been prepared based on the methodology explained in Section 3. The framework, represented in Figure 5, brings together, for the first time, all the main elements/variables that have been identified in the literature. These elements/variables are: (1) quality strategy/policy/plan, (2)

organisational structure and resources, (3) certification motivations, (4) certification barriers, (5) implementation benefits, (6) maintenance CSFs, (7) maintenance motivations, (8) maintenance activities, (9) maintenance problems, (10) measures to overcome the problems, (11) maintenance benefits, (12) recertification decision, (13) external recertification audit, (14) recertification benefits, (15) decertification motivations, (16) expected performance after decertification (EPAD), (17) decertification, and (18) decertification consequences for the organisation.

Figure 5. What do companies do in the post-certification period? An ISO 9001 QMS maintenance, decertification, and recertification framework



Legend: Relationships that have been tested empirically in the reviewed literature: (1) Arauz and Suzuki (2004), (2) Lo and Chang (2007), (3) Pan *et al.* (2009), (4) Alič (2014), (5) Ong *et al.*, (2015), (6) Cândido *et al.* (2016), (7) Lindlbauer *et al.* (2016), (8) Kafel and Simon (2017), (9) Castka (2018), (10) Nurcahyo *et al.* (2020), (11) Cândido *et al.* (2021), (12) Ferreira and Cândido (2021), (13) Cândido and Ferreira (2022), (14) Cândido and Ferreira (2023), (15) Clougherty and Grajek (2023).

The framework also brings together, for the first time, all relationships that have been established between these variables in the literature reviewed. Some of the relationships included in the framework have been implied/mentioned/theorised, but not subjected to empirical testing. Those relationships that have been tested with empirical data, and have already been addressed in the previous section, are indicated in the framework with a number which represents the study(ies) where the empirical testing was conducted. There are other possible relationships which are not represented in the framework, because they were not considered in previous research, but which may be worthy of future investigation.

The proposed framework can be read from top to bottom. It is assumed that companies are already ISO 9001 certified. In this case, they may try to maintain the certification through some or all the maintenance activities that have been previously identified (e.g., Arauz and Suzuki, 2004; Basir and Davies, 2018; Castka, 2018). Certification barriers may persist after certification (Cândido and Ferreira, 2023) that might affect the maintenance activities. On the



positive side, certification benefits, a clearly defined quality strategy, an adequate structure and available resources, as well as having secured the maintenance CSFs, can all facilitate the maintenance activities to perform during the three-year certification validity period. However, if there were no benefits derived from the certification, and there were serious maintenance problems, the organisation might not wish to maintain the certification. At the end of the three-year validity period, the organisation will have to decide whether to renew or not the certification. In case the decision is for recertification, the organisation will then have to pass in the external certification audit. Previous research on the benefits of recertification do not seem to suggest a significant impact on efficiency, although they seem to suggest an improvement in quality (Lindlbauer *et al.*, 2016). On the bottom right side of the framework, there is the representation of the decertification aspects of the reviewed research, which includes the influences between six main variables. According to this research, expected performance after decertification (EPAD) may be a better predictor of decertification than previous certification benefits (Cândido and Ferreira, 2022). Nevertheless, both effects are significant (Ferreira and Cândido, 2021) and are included in the framework.

An important conclusion from the analysis of the framework is that the decisions to (1) maintain the ISO 9001 QMS, (2) to recertify or (3) to decertify – as well as the performance impacts of these decisions – are contingent upon several variables, as depicted in Figure 5. This means each organisation should carefully ponder their situation before making any decision. That means also that organisations should not simply follow the example of other organisations in the same country, or in the same industry. Unfortunately, since the research on these topics is still incipient and our understanding of these phenomena is largely incomplete, organisations might find themselves deprived of enough theoretical support for the decision making, and that might lead them to imitating what others are doing, which is precisely what the framework advises not to do.

Another important conclusion from the analysis of the framework is that, so far, the literature has not addressed how the (1) decertification motivations and (2) EPAD might interact with the (3) maintenance activities, (4) maintenance problems and (5) recertification decision (relationships not included in the framework). These are some of the main topics that researchers have not considered yet, which can be addressed in the future. Being the first conceptual framework to integrate into one single model the three subfields of research, the framework can suggest important relationships for investigation that have not been addressed so far. In short, Figure 5 is representation of a conceptual framework of the research in the field, according to the results of the SLR, it is a model of what organisations do in the post certification period, it has relevant management implications, and it also suggests several directions for further research.

5.2. Directions for future research

The identification of research gaps, or directions for future research, is the third and last objective of this work. The analysis of (1) the articles considered in the SLR, (2) the Tables 2, 3 and 4, and (3) the conceptual framework (Section 5.1), shows several issues that deserve research attention, but have not received any (or have received very few). These gaps are all outlined next. First, a ‘general’ gap, identified by the analysis of column three of Tables 2 to 4 (Gap 1); then the gaps on maintenance, decertification, and recertification identified with basis on the complete absence of studies addressing those issues in Tables 2 to 4 (Gaps 2 to 9); next the gaps suggested by the analysis of the research framework represented in Figure 1 (Gap 10); after that, the gaps taken from the research recommendations contained in the articles selected for the SLR (Gap 11) and, lastly, the gaps suggested by the limitations of

these articles (Gap 12).

1. There is a lack of research supported on economic, management, sociologic and other relevant theories. Theories such as, for example, the signalling theory, institutional theory, resource-based theory, or transaction costs theory have been used in research on certification but have yet to be used in research on recertification. Similarly, only one study on decertification (Clougherty and Grajek, 2023) and two studies on certification maintenance (Ong *et al.*, 2015; Castka, 2018) are based on any supporting theories. These studies adopted the transaction costs, reasoned action, configurational and signalling theories. All other theories have been ignored in research on certification maintenance, decertification and recertification. However, these theories can help to develop research hypotheses on ISO 9001 post-certification research, which may in turn contribute to enrich the theories.
2. There is a total absence of research on economic and financial impacts of certification maintenance activities, as a group of activities. And there is scarce research on the perceptions of that impact (Cf. Table 2). With most of the research on ISO 9001 focusing on the impacts/benefits of certification – and a significant part focusing on financial impact – it is surprising that there is no research addressing specifically the financial impact of certification maintenance activities. Such research might also contribute to clarify the contradictory results of the research on ISO 9001 impact on performance (Cf. Kakouris and Sfakianaki, 2018; Lo and Yeung, 2018) if the maintenance activities are considered as an explanatory variable (antecedent, mediating or moderating variable) in the relationship between ISO 9001 certification and performance.
3. There is a lack of empirical studies on the antecedents of ISO 9001 maintenance that use structural equation modeling. With Pan *et al.* (2009) and Ong *et al.* (2015) being the only existing examples, there are ample opportunities for research on this topic, for instance, by introducing antecedent variables that were not considered in these two studies (e.g., barriers, benefits, CSFs, expected performance after maintenance activities, expected performance after *recertification*, EPAD, and others). Research along these lines and based on structural equations can analyse the relationships between variables relevant to certification maintenance and with potential for contributing to the field.
4. There is a need for more research on decertification motivations to clarify the contradictory results achieved so far. Research on decertification motivations is still incipient, particularly when compared with research on certification motivations or benefits.
5. Similarly, there is a need for more research on factors leading up to decertification (antecedents and mechanisms of decertification) that consider variables not yet included in extant research and add to knowledge by considering how they interact. Ferreira and Cândido (2021) suggest several variables to consider in future research. Research methods that might be considered are structural equation modelling, panel data, hierarchical regression, logistic regression, and others.
6. There is a need for more research on decertification consequences. Current research on this topic is contradictory and continues to deserve more research to support, complement (or replace) the only explanation for the contradiction that has been advanced so far by Ferreira and Cândido (2021).



7. There is an absence of studies on the factors leading up to recertification (antecedents and mechanisms of recertification; Cf. Table 4). Although there has been some incipient research on the antecedents of *decertification*, there are no studies on the antecedents of *recertification*. Recertification and decertification might have distinct antecedents and mechanisms, and both need more research on the causes leading up to each of the events.
8. There is lack of studies on the economic and financial impact of recertification using indicators based on accounting or stock market data, such as return on assets, return on sales, return on investment, and others. Although there are some long-term longitudinal studies on certification, most do not explicitly address nor discuss *recertification*. The only existing studies, by Lindlbauer *et al.* (2016) and Nurcahyo *et al.* (2020), used mostly non-financial data. The only financial data used is the amount of expenses on supplies. Methods that can be adopted for future research include for instance event studies, fuzzy real options, and others.
9. There is a lack of research on certification renewal impact on operational efficiency (non-financial). This is also a relevant topic that deserve research attention. Current studies (Lindlbauer *et al.*, 2016; Nurcahyo *et al.*, 2020) have rather unexpected results (Cf. Table 4) and the conditions under which these surprising results might occur require further clarification.
10. There is a dearth of studies analysing the relationships represented in the framework of Figure 5. Some of the relationships have not yet been empirically assessed. And there may be other variables and relationships to consider that have not been addressed in the extant literature, and by consequence, not included in Figure 5. For instance, there is a dearth of quantitative studies analysing the correlations between employees' involvement/ participation/ empowerment/ motivation/ satisfaction, and ISO 9001 QMS maintenance. There are only two case studies and one quantitative study addressing these relationships. Given that employee participation is assumed to be one of the most important CSFs of ISO 9001 QMS maintenance, more research is needed on these topics. In fact, according to Table 2 and the framework in Figure 5, there are only two quantitative studies on the relationships between CSFs and maintenance activities.
11. Previous research has also suggested analysing the relationships between: (1) QMS maintenance and organisational/ cultural/ human factors (Ong *et al.*, 2015; Basir *et al.*, 2017; Basir and Davies, 2018), (2) QMS maturity and decertification motivations (Kafel and Nowicki. 2014), (3) type of post-decertification QMS and firm performance (Kafel and Simon, 2017); (4) certification motivations and decertification motivations (Kafel and Simon, 2017), (5) rate of decertification and economic cycle (Simon and Kafel, 2018), (6) post-decertification performance and firm size and sector (Simon and Kafel, 2018), (7) degree of innovation and decertification propensity (Clougherty and Grajek, 2023), (8) exporter status and proclivity to recertify (Clougherty and Grajek, 2023), (9) position in the supply chain and decertification propensity (Clougherty and Grajek, 2023), and (10) other organisational characteristics and decertification (Clougherty and Grajek, 2023).
12. Finally, most current research addresses one specific country and industry. Thus, besides considering other countries and industries, researchers might also consider multi-country and/or multi-industry studies and include in their analysis a comparison between countries and activity sectors. This would help to create a larger pool of research and help to understand whether the current models (and the framework in Figure 5) are



generalizable to other situations or are context dependent.

5.3. Implications for practice

Given the incipient degree of development of the literature, managers must be especially careful when making decisions regarding the maintenance of ISO 9001 QMS, certification withdrawal or recertification. On the one hand, recertification literature seems to suggest that the decision to recertify has no economic impact (or has a negative impact), suggesting that recertification is not economically appealing. On the other hand, part of the literature on withdrawal suggests that decertification has a negative impact on economic performance, whereas another part suggests that there is no significant impact. Taken together, these studies suggest that if recertification is not especially appealing, the withdrawal should also be avoided. However inconclusive this literature might be, the conceptual framework (Figure 5) seems to provide some help in making some sense of the contradictory results. In fact, the type of impact of these decisions seem to depend on contextual factors. Contingent factors such as the certification motivations, decertification motivations, maintenance activities, internalization degree, the extent to which the competitors have already adopted the certification, and the existence of other alternative standards, among other variables, might affect considerably the performance impact of the decision to maintain, decertify or recertify (Figure 5). Thus, given the incipient development of this research, managers should make their decisions based on an objective and careful consideration of these aspects. Simple imitation of what other organisations in the country, or in the industry, might be a tempting management behaviour, particularly in the absence of sufficient theoretical support for decision making and in the presence of uncertainty (Yang and Kang, 2020). However, simple imitation is clearly not the best type of behaviour, according to this review and the conceptual framework in Figure 5. Similarly, given the unclear impact of recertification and decertification, organisations might refrain from doing something different from what they have been doing in the past (i.e., continuous recertification every three years), which might also not constitute the best option for all organisations, given their circumstances (e.g., motivations, competition, alternative QMS, and quality performance).

Unfortunately, most firms lack a performance assessment system capable of providing information on the cost of quality, cost of poor quality, and benefits of the ISO 9001 QMS (Chiarini, 2019). In fact, the ISO 9001 standard has no requirement for the measurement of the cost of quality (Chiarini *et al.*, 2020). Given their lack of performance measurement systems, firms are also not able to make a rigorous estimate of what would be their performance in case of decertification (EPAD, see Cândido and Ferreira, 2022) or recertification. This means that there is a lack of objective information on quality performance, which, in turn, means that firms are not making maintenance, recertification and decertification decisions based on fact, but on something else, such as intuition, wishful thinking, or what others might be doing. In summary, there is a lack of objective information on the part of these firms to support their decisions on maintenance, recertification and decertification. Thus, besides, more research to be able to provide better management recommendations, firms need to adopt performance management systems capable of helping them to make decisions concerning the maintenance and recertification of their ISO 9001 QMS.

6. Limitations

Despite the contributions of this study, there are some research limitations. First, this study has considered three main topics: maintenance, recertification, and decertification. Future



SLRs might also consider including other related, and less researched topics, such as transition to newer versions of the standard or transition from ISO 9001 to other competing standards. These expansions of the study might allow researchers to contribute to a broader understanding of the subject and to generate more detailed and encompassing frameworks of certification maintenance, decertification, recertification, and transition. Second, the integrated framework that has been developed starts to fill an important gap in the literature. However, given the incipient state of the research, there may be missing variables and relationships in the framework that are yet to be empirically identified by researchers. Thus, the framework can be seen as an important first step towards an integrated framework, but needs further research to be substantiated, completed, and improved. Third, this work has considered only one standard (ISO 9001). Future SLRs might also include other standards, such as ISO 14001, IATF 16949 and others, to consider a broader body of research. Fourth, and last, although WoS and Scopus are two of the most widely used databases, future systematic literature reviews might also include other search engines and/or other types of literature, not considered in this research.

7. Conclusion

This study aimed to (1) provide an overview of the research on ISO 9001 certification maintenance, recertification, and decertification, (2) develop an integrated conceptual framework of these three research fields, and (3) identify major research gaps to guide future investigations. To achieve these aims, the researchers carefully defined an SLR protocol, collected evidence from previous research, and analysed the evidence to provide a clear picture of the current state of art and answer the three research questions defined in the introduction. The main contributions of the study are: (1) an encompassing and organised overview of current research on ISO 9001 QMS maintenance, decertification, and recertification, (2) an original and pioneering integrated theoretical framework of this research, (3) relevant implications and recommendations for management; and (4) several directions for future research that can contribute to further the knowledge in these recent and insufficiently researched areas of ISO 9001.

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