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How does IATF 16949 add value to ISO 9001? An empirical study

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Abstract

This article analyses the added value of IATF 16949 - a standard for quality management in the automotive sector - with respect to ISO 9001, the most popular standard for quality management worldwide. An exploratory qualitative study was carried out based on a multiple case study. Eight companies operating at different levels of the Spanish automotive sector supply chain were analysed and 27 interviews were conducted - 17 with managers of these companies and 10 with auditors and consultants. Multiple internal and external sources of documentation were also analysed. The findings show that IATF 16949 adds value to a more flexible ISO 9001 in five main areas: market, customer service in the supply chain, operational performance, staff, and technology. Overall, IATF 16949 is seen as a 'license to operate' for automotive sector suppliers, for whom ISO 9001 seems to have lost its signalling value. This study sheds light on the raison d'être of sectoral standards for QMSs such as IATF 16949 and contributes to the literature on the neo-institutional approach to QMSs and explains some of the main weaknesses of ISO 9001.

Keywords – ISO 9001, IATF 16949, meta-standards, Quality Management Systems, Automotive Sector

1. Introduction

The adoption of Quality Management Systems (QMSs) based on third-party certifiable management system standards - also referred to as meta-standards - has become common practice throughout globalized manufacturing supply chains (Heras-Saizarbitoria and Boiral, 2013). ISO 9001 has been the most widespread meta-standard for QMSs (Chiarini, 2019), with more than one million certificates issued around the world.

ISO 9001 was designed for organizations of any sector and size (Karapetrovic and Willborn, 1998; Magd, 2008; Franceschini *et al*., 2018). This standard was also launched with the aim of reducing third-party audits against sectoral meta-standards (Heras-Saizarbitoria and Boiral, 2013). Nevertheless, due to their breadth, the requirements of ISO 9001 may appear too non-specific and general (Casadesús and Karapetrovic, 2005). As a result, other QMS meta-standards have been launched to cover the specialized needs of certain industries. This is the case of the AS9100-series for aerospace (Diong, 2017), the TL 9000 for telecommunications (Dai *et al*., 2014), and the QS 9000 and the IATF 16949 for the automotive sector (Lin *et al.,* 2004; Liu, 2009; Neves *et al*., 2018).

IATF 16949 replaced the ISO/TS 16949 in 2016 as the definition of QMS requirements for organizations in the automotive industry. Certification against this meta-standard has experienced continuous growth. ISO/TS 16949 was fostered and launched in 1999 by the International Automotive Task Force (IATF). It was supported by various stakeholders, including the main automotive manufacturers, trade associations, and the International Organization for Standardization (ISO), in order to meet the special needs of the sector (Singh, 2014). Its goals were to harmonize the quality management requirements of the

different original equipment manufacturers (OEMs) with regard to their supply chain and to replace several sectoral meta-standards and certifications, including QS9000, VDA6, EAQF, and AVSQ (Başaran, 2016). The IATF 16949:2016 meta-standard combines basic ISO 9001:2015 requirements with particular addenda for the automotive sector (Chiarini and Vagnoni, 2018). However, some authors believe that this new version is lighter and it does not include some aspects of ISO 9001 (Ahidar *et al.*, 2019).

As most of the companies certified against ISO/TS 16949 or IATF 16949 were previously certified against ISO 9001 (Punnakitikashem *et al.*, 2010), these specific standards must provide added value understood as new or greater benefits to the certified companies beyond those obtained with ISO 9001. Besides, the internalisation of the adoption of the QMSs and its influence in the added value obtained by the companies have been measured for the case of ISO 9001 (Allur et al., 2014). However, these issues have not been further researched for the case of IATF 16949 in the scholarly literature. Previous empirical research has essentially analysed a set of aspects related to the adoption of the ISO/TS 16949 standard (Ostadi *et al*., 2010; Bevilacqua *et al.*, 2011; Cauchick-Miguel *et al*., 2011; Singh, 2014; Yeh *et al.*, 2013; Pai and Yeh, 2013; Pop and Elod, 2015; Chiarini and Vagnoni, 2018; Neves *et al*., 2018), but not its advantage over other meta-standards. As reviewed in more depth in the next section, very few empirical articles have analysed the adoption of ISO/TS 16949. Ostadi *et al*. (2010), Yeh *et al.* (2013), and Chiarini and Vagnoni (2018) studied empirically the outcomes of ISO/TS 16949, while Liu (2009) analysed empirically the linkage between ISO/TS 16949 and Six Sigma. Nevertheless, the analysis of the alleged better signalling value of the specialized meta-standard have been overlooked.

Considering this gap in the literature, the aim of this paper is to assess the added value provided by IATF 16949 over ISO 9001. This article contributes to the scholarly literature

in at least in two ways. First, the paper sheds more light on the *raison d'être* of sectoral standards for QMSs in highly demanding manufacturing sectors, such as the automotive industry. This analysis is based on two of the complementary theoretical approaches proposed to study meta-standards—namely, the decentralized institutions and signalling models, and the neo-institutional perspective (see next section). Second, the article helps to explain some of the main weaknesses of ISO 9001 for specific industrial sectors, including the decline of its signalling value, which is suggested in both the scholarly literature (e.g. Anttila and Jussila, 2017; Heras-Saizarbitoria and Boiral, 2019) and the practitioner literature (e.g. Paris, 2015; Nemeth-Harn, 2017).

The rest of the article is organized as follows. After this introduction, the literature review and the research question are presented. The research methodology is described in Section 3, the results are shown in Section 4, and the discussion and conclusions are summarized in Section 5.

2. Literature review

The scholarly literature has analysed the adoption of certifiable meta-standards to implement QMSs from rather diverse theoretical perspectives. (For a review, please see Heras-Saizarbitoria and Boiral, 2013).

One important perspective, especially in the case of sectors of activity with complex supply chains, such as the automotive industry, is that of decentralized institutions and signalling models (King and Toffel, 2009; Terlaak and King, 2006; Montiel et al., 2012). This theoretical perspective analyses the role of meta-standards and their certification in the elimination of asymmetries in information: certifiable meta-standards are signals of supplier characteristics that lower search and monitoring costs in the supply chain (Christmann and Taylor, 2001; King *et al.*, 2005). From this perspective, certifiable meta-

standards for QMSs, such as ISO 9001, reduce information asymmetries between potential exchange partners (Terlaak and King, 2006). Various scholarly works have analysed, either theoretically or empirically, this central signalling power of certifiable meta-standards. (For a review, please see Heras-Saizarbitoria and Boiral, 2013).

Another interesting theoretical approach to analyse meta-standards is based on the neo-institutional perspective. According to this approach, organizations search for legitimacy by conforming to the dominant practices and institutional rules within their organizational field (Heras-Saizarbitoria and Boiral, 2013, 2015). Corporations seek support and legitimacy in their institutional field by adopting practices such as meta-standards which are perceived to be the rational and legitimate. More critical approaches along the same lines point out that the adoption of meta-standards can be symbolic, superficial, and mostly intended to improve corporate image and legitimacy rather than internal effectiveness (Heras-Saizarbitoria and Boiral, 2013, 2015). In this perspective, these certifiable standards to implement management systems may also represent a sort of organizational degree recognized internationally and whose development is driven by institutional and commercial pressures rather than internal needs (Boiral, 2012).

In the particular case of the ISO/TS 16949 or IATF 16949 sectoral standard, few studies have investigated this issue from a theoretical perspective. For example, Frascescini *et al*. (2011) considered ISO/TS 16949 as an entrance barrier for doing business with automotive manufacturers. Similarly, Singh (2014) pointed out that ISO/TS 16949 represents a stronger signal than ISO 9001 for international buyer-supplier transactions, but this point has not yet been investigated empirically. These works underlined that the main driver to adopt ISO/TS 16949 is related to market signalling, because the certificate sends a quality signal of superior performance in a complex and demanding supply chain. The automotive industry, which comprises the automobile and auto component sector,

is strongly stratified (Punnakitikashem *et al.*, 2010; Singh, 2014). From this perspective, auto component supplies for further processing are made in the lower tiers (upstream suppliers) and passed to higher tiers, with Tier 1 companies supplying parts, modules, systems, and components directly to OEMs, Tier 2 supplying sub-assemblies and parts to Tier 1, and Tier 3 providing transformed raw materials (e.g. aluminium tubing, electronics, plastic, and steel). Auto component producers can play diverse roles and operate at different tiers for different items (e.g. Tiers 1 and 2).

OEMs are interested in having their entire supply chain certified, including their Tier 2 and Tier 3 subcontractors. For export sales, ISO/TS 16949 certification plays a major role, because many global OEMs and even some Tier 1 auto component firms consider the certification of their suppliers mandatory, especially for the purchase of key components (Singh 2014). Ryan and Eyers (2017) stated that IATF 16949 puts particular emphasis on defect prevention and on reducing variation and waste in the supply chain, but they did not produce empirical evidence. Yeh *et al.* (2013) and Singh (2014) also mentioned, from a theoretical perspective, the added benefits related to the improvement of quality consistency of the processes and the development of a common language in the supply chain for the understanding customer requirements. More recently, Reid (2017) and Trofimova and Panov (2019) pointed out that the latest version of IATF 16949 adds more prescriptive requirements for supplier qualification and selection, and underlines the importance of supplier quality, which can include monitoring and development.

Nevertheless, to our knowledge, these issues have not been analysed empirically. A few empirical articles have analysed the adoption of either ISO/TS 16949 or IATF 16949, but with no specific focus on the issue of the alleged better signalling value of the specialized meta-standard. For example, Liu (2009) carried out a survey of 52 certified companies

and highlight that ISO/TS 16949 has significant effects on the key success factors of Six Sigma. Ostadi *et al*. (2010) carried out a survey of 32 ISO/TS 16949-certified firms and found that this standard eliminates redundancy, costs, and administrative burdens imposed by multiple standard requirements for improving the coordination between different tiers in the manufacturing process. They also pointed out that this standard provides core tools to assist automotive companies to better comply with customer specific requirements (CSR). Similarly, based on a study of 23 external and internal auditors of ISO/TS 16949 in Taiwan, Yeh *et al.* (2013) found that the most remarkable improvement factor associated with this sectoral meta-standard is the identification of internal suppliers who meet the requirements for completing the product. Recently, Chiarini and Vagnoni (2018) analysed an online questionnaire answered by 135 Italian quality managers, consultants and auditors, and found that the IATF 16949 had a strong effect on the implementation of certain tools for operations management that are quite widely disseminated in this sector, such as the problem-solving methodology, 5S, and tools for improving the management of material flows. They also found that the meta-standard did not facilitate the implementation of other improvement tools, such as the Single Minute Exchange of Die (SMED) tool and the Total Productive Maintenance (TPM) methodology.

Beyond these few articles based either on surveys or on multiple case studies, the other articles reviewed in the literature focused on single case studies of ISO/TS 16949 adoption with only limited findings. For example, Bevilacqua *et al.* (2011) carried out an in-depth case study of a company that supplies stainless steel tubes for the automotive sector. This study analysed an applied perspective on ISO/TS 16949 adoption from the shop floor level. These authors found that ISO/TS 16949 led to a number of corrective actions, such as increasing controls. Similarly, Cauchick-Miguel *et al*. (2011) analysed

how a multinational company moved from ISO 9001 to ISO/TS 16949. These authors found that the previous implementation of ISO 9001 facilitated the adoption of ISO/TS 16949.

Considering the findings from the scholarly theoretical literature and the gap in the empirical scholarly literature reviewed, the aim of this paper is to shed more light on the following research question: *How does IATF 16949 add value to ISO 9001?*

3. Methods

Taking into account the objectives of this study and the level of development of the empirical scholarly literature, an exploratory qualitative study was designed. It was based on a multiple case study methodology because that is suitable for exploring new and complex issues (Eisenhardt, 1989; Yin, 2003), specifically the adoption of QMSs in the automotive sector, where diverse agents and actors interact.

Eight case studies (two of each group of companies, namely OEMs, Tier 1, Tier 2, and Tier 3) were carried out for companies certified against ISO/TS 16949 or IATF 16949, or in the process of adopting the new IATF 16949, but not yet certified. The purpose of selecting two companies from each level was to analyse the different perspectives and difficulties experienced in the automotive supply chain.

The fieldwork started in January 2017 and ended in February 2019. Semi-structured interviews about the value of ISO 9001 and the added value of IATF 16949 were conducted in each studied company (see the semi-structured interview guide included as an appendix to the article). Overall, 17 management systems managers (MSM) and management systems technicians (MST) were interviewed in order to gather different perspectives from each company. The research team collected evidence through direct observation, inquiries, and analysis of documents. More specifically, the researchers had

access to many sources of documentation such as the following: internal working procedures, working instructions and contracts with suppliers. Similarly, during the fieldwork researchers had access to internal information systems of the studied firms to analyse their responses to real-time problems in operations management. All of these data sources were used to classify companies by their internalisation level. The internalisation of the QMS was assessed following the findings of previous studies (e.g. Allur et al., 2014; Heras-Saizarbitoria and Boiral, 2015). For instance, the type of documentation included in the company's QMS, and the availability and use of this documentation by employees were analysed as evidence of internalisation of the meta-standard. In all, 27 people were interviewed for this research, including 10 auditors and consultants (see Table 1). For reasons of confidentiality, reference is only made to the position of the company in the supply chain and the position of the experts in the firms, as shown in Table 1. No more case studies or interviews were added, as those described here provided theoretical saturation (Denzin and Lincoln, 2005) - i.e. progressively fewer ideas were gathered as the last case studies and interviews were conducted. This point of saturation—which raises frequent doubts and concerns among scholars (Carlsen and Glenton, 2011)—was assessed following an iterative process of discussion among the researchers that had carried out the fieldwork.

The data collected were triangulated, analysed and classified as suggested in the literature of qualitative research and case studies with an inductive perspective (Yin, 2003; Denzin and Lincoln, 2005). More specifically, the interviews were transcribed and classified by two independent researchers with the help of a categorization grid. In this grid other meaningful and relevant information obtained from other means (e.g. observation, inquiries, and analysis of documents) was included. As recommended in the literature (Yin, 2003) the validity of factors was assured using diverse sources of information such

as the interviews, direct observation and documentation. The following findings are structured around the main themes and aspects arising in the cross-sectional analysis of case studies, with the aim to answer the research question. As suggested in the literature (e.g. Yin, 2003; Denzin and Lincoln, 2005) illustrative quotes from the interviews are included as they are representatives of the respondents' statements. Similarly, a set of tables are included in the following section that summarize the main findings of the exploratory analysis.

Table 1: General information on the cases and stakeholders studied

4. Results

4.1. The declining value of ISO 9001

Most of the interviewees were of the opinion that ISO 9001 fails to meet the needs of the automotive sector. The OEMs pointed to a lack of technical requirements of this standard. For example, the MSM of the OEM 1 highlighted the following: "Knowing that our product has a high degree of demand for quality and safety, the requirements of ISO 9001 are not enough, because ISO 9001 puts technical requirements aside. There are other more stringent and specific standards in the automotive sector." The MST of the OEM 2 added: "If a company tells them that it is certified against the ISO 9001 standard, it means that this company has something controlled. However, ISO 9001 is too general and due to the characteristics of the automotive sector, such as the launch of new vehicles, elements or systems for the industrialization, a more specific standard for this sector is necessary."

The other tiers agree with this perception. For example, the MSM of T32 pointed out: "ISO 9001 is not enough because it is mandatory to ensure that all processes are under control." The T22 MSM believes that in terms of flexibility versus rigidity, "There is not so much difference between ISO 9001 and IATF 16949, but the IATF 16949 demands

something more than ISO 9001." However, contrary to what the upstream companies think, the T31 MST believes that, "For their company, having only the ISO 9001 certification would be enough. Obviously, it is necessary to pass customer audits to demonstrate compliance with the client's requirements, but for their daily operations, it is enough."

4.2. The added value of IATF 16949 over ISO 9001

4.2.1. For the market

The interviews conducted demonstrated that IATF 16949-certified suppliers have a clear competitive advantage because this standard tends to be considered an entrance barrier (see Table 2). For the OEMs, it is essential that suppliers have the basic QMS practices adapted to their requirements. In general terms, the suppliers indicated that they are certified because the certification is a 'license to operate' in the sector; it is a requirement to sell and be competitive in the automotive market. The T21 MST and the T31 MST remarked that the huge effort put into the certification process is outweighed by reduction of competition from other sectors and the decrease in customers' audits.

Table 2: The added value of IATF 16949 over ISO 9001 regarding the market

4.2.2. For the supply chain

The managers indicated that an important added value of IATF 16949 is the control level reached by companies when they have enough experience. Normally, there is no delay or lack of information in the supply chain due to IATF 16949. Almost all interviewees agreed that it is possible to renew the ISO 9001 certification by filling out the paperwork at the last minute, which would be impossible for IATF certification.

The suppliers considered CSR to be the strictest requirement. IATF 16949 requires that each tier controls its suppliers. For example, MST T12 showed us a specific order from a

certified supplier in the company's information system. This document included the results of process controls and the adjustments made to this process by the supplier according to the specifications. This type of requirement greatly simplifies quality control in the supply chain for the OEMs. Besides, suppliers considered the demands on their suppliers much more strictly for concepts such as the validation of product design, warranties, and piece returns from the OEMs (see Table 3). Suppliers must also demonstrate to their clients how their processes are controlled in order to avoid failures. Furthermore, IATF 16949 allows each OEM to demand their own control specifications, which are sometimes very different.

Table 3: The added value of IATF 16949 over ISO 9001 regarding the supply chain

4.2.3. For the operational performance

All interviewees agreed that the IATF certification adoption demands many actions to satisfy customer requirements (see Table 4). This standard tends to change various QMS requirements such as the production and treatment of non-conformity. It asks for a more structured system including more evidence related to operations. For example, the Statistical Process Control (SPC) concept clearly appears in IATF 16949. MST T31 showed us some detailed examples of the importance of statistical information used by the company as an outcome of the IATF 16949-based QMS implementation.

OEMs indicate that this standard is useful to increase the stability of their supplier processes, which is considered a key aspect. Furthermore, Process Capability (C_p) appears more important than the Process Capability Index (C_{pk}). Improvements in the operational performance are related to IATF 16949 concepts, including the Production Part Approval Process (PPAP) and the Failure Mode and Effects Analysis (FMEA). Conversely, ISO 9001 ignores these tools.

Some interviewees consider IATF 16949 to be a helpful tool to change the way of thinking in the industry. This standard is actually used to detect and analyse the risks associated with its processes, unlike the ISO 9001 standard, whose requirements in terms of control level are considered too basic.

However, not all interviewees believe in the positive value provided by IATF 16949. Some suppliers criticized this standard because it requires the recording of everything. Some indicators do not have any influence on the product and it is therefore not essential to improve them. For example, T31 MSM affirms that they could work better without IATF certification, by using only ISO 9001 requirements and CSR audits. Moreover, T12 MST thinks that it is not worth having indicators of efficiency and efficacy for all processes. Companies should select only the useful indicators.

Table 4: The added value of IATF 16949 over ISO 9001 regarding operational performance

4.2.4. For the staff

As can be seen in Table 5, workers need special training to work with IATF 16949. They have to internalize all the concepts. The staff from companies having more experience working with this standard have internalized these concepts and are usually more proactive in satisfying the CSRs, to increase control over their tasks, and to improve processes. The experience of the staff is considered a key factor in reducing the difficulties and increasing the scope of the QMS in improving production results. Companies that have internalized the IATF 16949 concepts better control all their processes, including production for other sectors, because the staff considers that it is the right way to do things.

Table 5: The added value of IATF 16949 over ISO 9001 regarding the staff

4.2.5. For technology

According to the IATF 16949-certified companies, the standard requirements can be fulfilled without any software. Nevertheless, the level of control requested drives the use of software and technological improvements. Suppliers believe that their clients should help their suppliers to make this investment because they also benefit from it. For example, in the opinion of the suppliers, instant control represents a significant added value for the customers (see Table 6). It helps to detect changes in the conditions of the processes faster, to inform the staff, and to act to prevent failures. As a result, this technology helps to offer a more advanced service. For instance, in the information system of T12, real-time information corresponding to ongoing processes of its suppliers was observed by the researchers during the fieldwork.

Table 6: The added value of IATF 16949 over ISO 9001 regarding technology

5. Discussion and conclusions

The automotive sector is characterized by its high level of requirements for quality and safety. As a result, the OEM's suppliers have to fulfil many special management requirements to sell systems, parts, components, or materials within the globalized automotive supply chain. In this complex and demanding environment, the signalling value of certifiable meta-standards for QMSs is essential. Although the adoption of ISO 9001 has significantly increased over the last three decades and this standard is now commonly used by the OEMs and their suppliers, this exploratory study shows the limitations of this generic standard. The OEMs believe that ISO 9001 is too general, flexible and easy to obtain. Consequently, the signalling value of ISO 9001 has been significantly diminished, while OEMs and their providers' QMS have to fulfil additional requirements, such as those included in the IATF 16949:2016. OEMs highlight the need to have all the processes of their suppliers under control and stable. Similarly, suppliers

need further evidence of such control, particularly in terms of their relationships and actions to avoid failures to conform. This is considered to be the main reason customers pressure their suppliers to adopt and get their QMS certified against IATF 16949. Compliance with the requirements of this meta-standard simplifies customer audits.

As a result, the IATF 16949 certification is considered an entrance barrier or a 'license to operate' in the automotive market. Supplying companies believe that the internal actions that have to be carried out to get the certificate are demanding and hard, but the IATF 16949 certification makes it easier to retain customers. Actually, all interviewees agree with the conclusions of Benner and Veloso (2008), Francescini *et al*. (2011), and Singh (2014) about the influence of IATF certification on the improvement of their internal competitiveness in a demanding sector of activity. From the perspective of the managers interviewed, the adoption process of the IATF 16949 meta-standard is quite different from that of ISO 9001. Due to its requirements and greater internalisation of QMS needed, companies are forced to a higher use of the QMS in their daily activity. As stated in the scholarly literature (e.g. Naveh and Marcus, 2004; Boiral and Roy, 2007; Jang and Lin, 2008; Allur *et al.*, 2014; Heras-Saizarbitoria and Boiral, 2015), the internalisation of meta-standards - i.e. the daily use and improvement of the procedures and instructions - integrated in the QMSs by employees - is critical to obtain substantial benefits. The managers interviewed note that it is necessary to internalize the requirements of the IATF 16949 meta-standard in the daily work to get certified, as they have to be prepared for an audit at any time. From their perspective, it is possible to prepare for the ISO 9001 audit just in the week before, but this type of external audit suggested in the literature in the case of ISO 9001 (e.g. Boiral, 2012; Heras-Saizarbitoria and Boiral, 2019) would be extremely difficult if not impossible for IATF 16949 audits.

For example, as stated by Ryan and Eyers (2017), IATF 16949 places a particular emphasis on defect prevention, and the reduction of variation and waste in the supply chain. The managers remark that, in their daily work, there are more opportunities to improve because they detect any variation in their processes earlier. IATF 16949 forces suppliers to invest in staff training and technology. It was found that companies with less technological capacity and staff training have difficulties and fewer opportunities in the automotive market. The training required for IATF 16949 is much more demanding than that for ISO 9001. The staff must be prepared to understand the IATF 16949 concepts and to act in compliance with the standard requirements. The importance of the statistical concepts has also been highlighted. Employees working with a QMS based on IATF 16949 are acutely aware that each detail in the operational process is critical to avoid failures to conform, to manufacture valid components and to demonstrate it. It has also been found that, generally speaking, IATF 16949 requires investment in technology for operational processes. Some suppliers work only with paperwork or simple control, but they believe that they must improve the automation of some processes because, even if it is expensive, it will allow quick detection of errors, identify their source, prevent their recurrence, and provide evidence. Similarly, staff training and technological investment are closely related to the degree of internalisation. There are companies with very high (OEMs, Tier 1, and Tier 2) or lower (Tier 3) levels of internalisation. The latter maintains a lower level of control in their operational processes and lose opportunities to obtain internal improvements.

With regard to the initial adoption of IATF 16949, it was found that companies with fewer resources need help to understand some of the main concepts of the meta-standard and to work in compliance with its requirements.

This article contributes to the literature in three ways. First, the paper sheds light on the *raison d'être* of sectoral standards for QMSs such as IATF 16949. The findings show that the main advantage of sectoral standards - at least in the case of IATF 16949 - is related to the need to establish more rigorous and less flexible requirements than those of more generic standards such as ISO 9001. The fact that certified companies underline that the requirements of the IATF standard cannot be fulfilled symbolically just to get certified, but must be used in daily activities, gives a different meaning to the function of a QMS. Second, this paper contributes to the literature on the neo-institutional approach to ISO management standards. As mentioned in the literature review this approach highlights the implications of symbolic versus substantial internalisation of QMSs on organizational practices and performance (e.g. Christmann and Taylor, 2006; Heras-Saizarbitoria and Boiral, 201, 20153; Castka *et al.*, 2015; Iatridis *et al.*, 2016). In many organizations, the adoption of these systems remains quite symbolic and mostly intended to improve corporate image rather than actual internal practices. The effectiveness of QMSs clearly depends on the internalisation of these systems into organizational practices (Boiral 2012; Heras-Saizarbitoria and Boiral 2015). Although this paper gives support to the neo-institutional approach of QMSs, the literature in this area has remained focused on specific standards - essentially ISO 9001 - and has not investigated how differences between QMS standards may influence their level of internalisation. This study shows that the flexible requirements of ISO 9001 are conducive to more superficial and symbolic adoption than is observed for the IATF 16949 standard. Third, this article helps to explain some of the main weaknesses of ISO 9001 and the weakening of the signalling value of this standard. It was found that, three decades after its launch, in at least one of the initial sectors of activity of ISO 9001, this global meta-standard has clearly lost its signalling value. The value of eliminating information asymmetries is lost when the acquisition of

a certificate is too simple for the requirement level for QMSs in a specific sector. Overall, this paper shows the reflexivity and sense making abilities of QMS practitioners who have provided critical and insightful comments on standards commonly used by organizations worldwide.

The main limitations of this research are related to the qualitative method used for the fieldwork. Case studies can be illustrative and relevant to explore new and complex issues. Nevertheless, generalization of the results is limited due to the sample size. This limitation gives rise to potential avenues for further research. Among other things, quantitative studies in different cultural contexts might be carried out in order to analyse the real value added by a sectoral and demanding meta-standard such as IATF 16949 over ISO 9001. This type of research could also shed more light on the possible loss of value of the ISO 9001 certification depending on the sector of activity or regional differences.

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Table 1: General information on the cases and stakeholders studied

Name of the case	*Supply chain main level*	*Number of employees*	*Main activity*	*Internalization*	*Certifications of Management systems*	*Interviewed people*
OEM 1	OEM	5,000 (Plant)	Assemble and make cars	Very high	ISO 9001, ISO 14001, OSHAS 18001, ISO 50001, IATF 16949	*MSM and MST*
OEM 2	OEM	12,671	Assemble and make cars	Very high	ISO 9001, ISO 14001, OSHAS 18001, ISO 50001, IATF 16949	*MSM and MST*
T11	TIER 1	12,812 (Group)	Production of body, transmissions, and gearbox	Very high	ISO 9001, ISO 14001, OSHAS 18001, IATF 16949	*MSM and MST*
T12	TIER 1	575	Production of car suspensions	Very high	ISO 9001, ISO 14001, OSHAS 18001, ISO 50001, IATF 16949	*MSM and MST*
T21	TIER 2	97	Specialists in bar turning parts	Very high	ISO 9001, ISO 14001, OSHAS 18001, EFR, EFQM, IATF 16949	*MSM and MST*
T22	TIER 2	400	Wire assembly for cars	High	ISO 9001, ISO 14001, OSHAS 18001, IATF 16949	*MSM, MST1, and MST2*
T31	TIER 3	23	Bar Turning parts by CNC	Low-Medium	ISO 9001, ISO 14001, IATF 16949	*MSM and MST*
T32	TIER 3	13	Body paint and surface protection	Low-Medium	ISO 9001, (IATF 16949 in process)	*MSM and MST*

Direct Stakeholders	*Experience of direct stakeholders*
Auditor 1	Internal auditor of ISO 9001 and ISO/TS 16949 in an OEM company and external auditor for Bureau Veritas and SGS.
Auditors 2, 3, 4	Freelance external auditors of ISO 9001 and ISO/TS 16949 for several years, mainly auditing small companies.
Consultants 1, 2, 3, 4, 5, 6	The selected consultants have long experience in helping companies to be certified with various management system standards such as ISO 9001, ISO 14001, ISO 50001, ISO/TS 16949, IATF 16949, and so on.

Source: Developed by the authors. Note: MSM: management systems manager; MST: management systems technician.

Table 2: The added value of IATF 16949 over ISO 9001 regarding the market

Supply Chain Level	*Comments*
OEMs	"Having IATF 16949-certified suppliers provides competitive advantage because they can sell in different countries to different OEMs with just one certification. Having only ISO 9001, suppliers are submitted to stricter audits with each client because ISO 9001 doesn't require production process control." (OEM 2 MST)
TIERs 1	"Tiers 2 and 3 acquire much greater advantages than us in the market because companies of their size have more problems to obtain the certification and start working in this sector." (T11 MST)
TIERs 2	"It's very difficult for a company from another sector to enter into the automotive sector, despite the difficulty of getting certified against IATF [16949]. It's a mandatory CSR." (T21 MST)
TIERs 3	"Due to the adoption of IATF 16949 and the higher level of control of the production process obtained, we've been able to enter into other sectors." (T32 MSM and MST, and T31 MST)
Auditors and Consultants	"Apart from having a greater control, companies are able to work for automotive customers. Besides, it's much easier to retain customers because the IATF certification is a very important entrance barrier for new competitors." (Auditor 1) "The market is more closed because not all the companies can reach the level of IATF certification requirements. The OEMs have more difficulties to find substitute suppliers." (Consultant 3)

Source: Developed by the authors

Table 3: The added value of IATF 16949 over ISO 9001 regarding the supply chain

Supply Chain Level	*Comments*
OEMs	"In our opinion, most of the problems are originated downstream (Tier 2, 3). A robust control over all the supply chain is needed. Our dealers must prove how they do it and ISO 9001 doesn't require it" (OEM 2 MST) "IATF 16949 compels companies to control their suppliers. Key Performance Indicators have to be capable of evaluating the quality of the service provided, if this particular service affects our product." (OEM 1 MSM) "ISO 9001 is not enough for some requirements, but IATF [16949] is not enough either. Customer audits are essential for CSR." (OEM 1 MSM) "IATF 16949 is also a rather general management standard. For instance, VDA 6.3 [German Automotive Standard] controls better the processes and is much closer." (OEM 2 MSM)
TIERs 1	"ISO 9001 is too general. IATF 16949 is more intensive in the validation of product design, warranties, and piece returns. The customers ask to their suppliers: How do you analyze it? How do you avoid this defect in the future?" (T12 MSM)
TIERs 2	"The requirements of the IATF standard are similar to the customer requirements, but ISO 9001 is far away." (T21 MSM) "The IATF certificate is a minimum requirement to enter into the automotive industry because it ensures OEMs that the supplier has its processes controlled. OEMs are reassured because it's much more demanding than ISO 9001 in terms of control of manufacturing processes." (T22 MSM) "When the customers approve our ability to make a product, they measure our delivery capabilities in terms of quantity and quality. If you experience any problem, you must solve it quickly. Then, you have to guarantee that this will not happen again. It's necessary to explain the corrective actions. ISO 9001 would never reach that level." (T21 MST)
TIERs 3	"The IATF certification helps companies to pass Customer Audits because they have the basis for that. However, ISO 9001 is not valid for that." (T32 MSM and MST) "We're working without the ISO/TS 16949 certification. In our case, I think that ISO 9001 gives us enough control because you have to take into account that we're submitted to customer specific audits." (T31 MSM)
Auditors and Consultants	"A lot of companies enter into the world of ISO 9001 because their customers ask for it. In these cases, there's no sincere belief in it. For them, it's more a problem than a way to improve. With IATF 16949, this problem doesn't exist anymore because the level of service that you have to provide to your customers has to be more serious and effective. Otherwise, the company cannot work in this sector." (Auditor 2)

Source: Developed by the authors

Table 4: The added value of IATF 16949 over ISO 9001 regarding operational performance

Supply Chain Level	*Comments*
OEMs	"ISO 9001 doesn't have enough requirements and ISO/TS 16949 neither. For this reason, the IATF is introducing new rules in the newest version. We've had to call the suppliers many times to request measures, but this is still a real problem." (OEM 1 MSM) "We give great importance to the stability of the process. If a supplier has all the values within the tolerance level, it doesn't mean that the process is stable, because its values can vary a lot. It's better to have a good C_p than a good C_{pk} and having constant values within the tolerance level, even if it's not well centered. ISO 9001 doesn't reach this level of statistics." (OEM 2 MSM) "The spirit of the IATF standard is that trust is good but control is better (with ISO 9001, you usually trust their data)." (OEM 1 MSM) "For example, one of our IATF-CSRs is about a security screwdriver. It requires to register the data for 15 years because, if a customer has an accident, it is necessary to demonstrate if the car was assembled in the right conditions. ISO 9001 doesn't take into account these requirements." (OEM 2 MSM)
TIERs 1	"IATF 16949 asks for a PPAP. It's required to present a FMEA, a control plan, a dimensional measurement tool, and so on. This is not required by ISO 9001." (T11 MST) "If they've been trained with the IATF certification, they reply in 24 hours maximum, they carry out a cause analysis in only one week, and they understand the complexity or necessity of what we demand. Moreover, it's not enough to replace 5 bad products with 100 new ones. It's another way of thinking." (T12 MSM) "In our opinion, we are sometimes wasting time because the standard asks for indicators of efficiency and efficacy for all the processes. This is not logical because the measures are not applicable to all the processes." (T12 MST)
TIERs 2	"We always maintain the same level of control. For this reason, we are ready to be audited on any day of the year. The IATF certification asks for this." (T22 MST) "We always have to be at the top level of operational performance in all areas because we must be an IATF-certified company. ISO 9001 only requires to review some specific aspects of the management system each year and the entire management system every three years. The mentality is different." (T22 MSM) "With ISO 9001, the auditors can ask for a General Control Plan. You just have to show it to them and they give you the OK. During an IATF-CSR audit, they ask you to show them the actual control plan and how it was made." (T22 MSM) "During our last ISO 9001 audit, they asked us to show them the general cleaning control. If it would have been an IATF 16949 audit, they would have asked us to justify how we keep the brooms, where we keep them, or if the product is manufactured in a clean room." (T22 MST 1) "During an IATF 16949 audit, they asked to see how we controlled the temperature of the plant. Is it really necessary? Here the average temperature is stable. I believe that they could ask it for the comfort of the staff but it is not a requirement for the product. It would never have been analyzed in an ISO 9001 audit." (T22 MSM)
TIERs 3	"IATF 16949 analyzes if the process can go out of control and if you can actually detect it. ISO 9001 covers this theoretically but not in practice." (T32 MSM)

	"The reduction of variation in processes and the minimization of risks in products and services are critical aspects in the adoption of IATF 16949. They help for the growth and the improvement of the company. Before, only with ISO 9001, it wasn't like that at all." (T32 MSM) "ISO 9001:2015 doesn't require a contingency plan, while IATF 16949:2016 does require it (paragraph 6.1.3) and, for us, it's complicated because it's a qualitative step. On the other hand, ISO 9001:2015 talks in general terms about audits (point 9.2) but IATF 16949:2016 details the type of system, process, and product audits." (T31 MST) "The audits of the IATF certification are much stricter." (T32 MST)
Auditors and Consultants	"To understand the control dimension of the IATF certification, the audit in an OEM takes 3-4 days at 8 hours a day for 2 auditors, whereas an ISO 9001 audit can be carried out in one day by only one auditor." (Auditor 1) "In a QMS based on ISO 9001, we can talk about the control of raw material. If it is based on IATF 16949, they will control raw materials and their traceability. It's necessary to make more quantitative and qualitative inspections and to have everything registered." (Consultant 1) "The IATF 16949 audits are much stricter than the ISO 9001 ones. If there are three failures of the same type, the auditors only give you an observation in an ISO 9001 audit, while you would fail an IATF 16949 audit. The company is much more controlled and it obtains much more capacity to detect opportunities for improvement." (Consultant 5) "In an IATF 16949 QMS, everything is recorded. It is mandatory to register everything in detail and to control everything, even the intermediate tests. For example, the design of any product has to be tested and validated using the appropriate tests. In an ISO 9001 QMS, the manufacturer validates it without any test. The IATF certification is much more exhaustive." (Consultant 6) "(About the cleanliness) The IATF 16949 QMS needs evidence that the production process is kept clean. It's necessary to explain how it has been kept clean. In an ISO 9001 QMS, if they didn't receive any complaint, it's enough." (Auditor 1) "The adoption of IATF 16949 changes the concepts associated with the QMS requirements. For example, the concept of the production and processing of non-conformities is different. A system with a bigger structure and with more evidence of the operations is required. SPC concepts are critical in IATF 16949." (Auditor 2) "During IATF 16949 audits, I have seen companies willing to receive non-conformities because they thought that they would help them to improve. However, during ISO 9001 audits, it's usually the opposite. When the auditor gives the final report of an IATF 16949 audit, the whole Board of Directors is present to discuss it, which is not the case for an ISO 9001 audit." (Auditor 3)

Source: Developed by the authors

Table 5: The added value of IATF 16949 over ISO 9001 regarding the staff

Supply Chain Level	*Comments*
OEMs	"Our suppliers have a display at the production exit to see what is failing and they're trained to act." (OEM 1 MSM) "We always focus on the factories with more failures and we ask them to improve. We plan training activities for them. If their system is based on ISO 9001, we look for other solutions." (OEM 2 MSM)
TIERs 1	"We have small suppliers experiencing difficulties to understand the IATF 16949 standard. It's also necessary to have a minimum qualification of people and structure. It's very hard for them but, at the same time, their services have a significant bigger added value." (T11 MSM)
TIERs 2	"ISO 9001 doesn't help to define the training well. I've seen companies without clear criteria for training. Being proactive is necessary but not enough. They only know the basic quality management tools, such as the 5 why's or the Ishikawa diagrams." (T21 MSM) "During the IATF 16949 audit, they were asked to maintain at least two trained people in each position. When they looked at it, they had 2, 4 or even 7 workers in some positions. In a QMS based on ISO 9001, this is not required." (T22 MSM)
TIERs 3	"The ISO 9001 standard is very easy to internalize because it doesn't include complicated technical words. To internalize the IATF 16949 concepts, you need a lot of training. I've been trained for a year because they ask for very concrete things, such as statistical tools, but I still need more training to use correctly the quality management tools." (T32 MSM)
Auditors and Consultants	"In the market, ISO 9001 is not accepted because the required training in statistical requirements is not enough. The IATF 16949 requirements are much more demanding." (Auditors 1 and 2) "IATF 16949 auditors need a much more demanding training and the requirements of the internal and external auditors are much stricter. For these reasons, the external auditor of IATF 16949 charges more than the double per hour." (Auditor 2) "The workers of IATF 16949-certified companies are actually trained to control everything. It's impossible to get certified against IATF 16949 by preparing the paperwork for the audit a week or even a month before." (Consultant 1)

Source: Developed by the authors

Table 6: The added value of IATF 16949 over ISO 9001 regarding technology

Supply Chain Level	*Comments*
OEMs	"In an IATF 16949 QMS, it's not enough to have the predictive or corrective maintenance written on a piece of paper. Corrective maintenance must be exploited to try to become preventive and to avoid more manufacturing Non-Conforming parts. Technology helps to gain efficiency." (OEM 2 MSM) "Within our QMS based on the IATF standard, we focus a lot on how they perform maintenance, how the maintenance management has been designed through the software. Using only ISO 9001 requirements, it would have been impossible to obtain." (OEM 2 MST)
TIERs 1	"The industrialization concept of the Automatic Control for Quality and Productivity (ACQP) in IATF 16949 is a big difference. When you get an order to manufacture a piece, you have to follow the whole process on behalf of your customer. First, you present samples. Second, the client has to approve them. Finally, you can start making the pieces. It's a very important difference. A specific software is needed." (T11 MSM) "ISO 9001 tells you that you only need preventive and corrective maintenance, but this sector requires predictive maintenance. The Total Production Maintenance (TPM) for a list of critical spare parts is necessary. The IATF standard asks for a list of more industrial aspects. The documentation has to be recorded using the specific industrial way and technology." (T11 MSM)
TIERs 2	"IATF 16949 has particular requirements. There are series of normative, technology or process elements perfectly identified in the automotive world, for example, the ACQP." (T21 MST)
TIERs 3	"The technology required by IATF 16949 is more advanced. We now have to do it on paper and the workers must fill out the paperwork. When we can afford the investment in technology, it will be very beneficial for us." (T32 MSM and MST)
Auditors and Consultants	"In its Infrastructure section, ISO 9001 only asks you to have the necessary infrastructure. IATF 16949 asks for a plan, facilities and equipment, and the auditors have to see your planning. The companies have to explain the contingency plans. It is much more complex." (Auditor 4)

Source: Developed by the authors