



European Research on Management and Business Economics

journal homepage: www.elsevier.com/locate/ermbe



The influence of motivations and other factors on the results of implementing ISO 9001 standards

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ARTICLE INFO

Article history:

Received 29 November 2016
Accepted 15 February 2017
Available online xxx

JEL classification:

L2
M1

Keywords:

ISO 9001 Standard
Quality Assurance Standards
Quality management
Spanish construction sector

ABSTRACT

The objective of this paper is to analyze the influence that the internal and external motivations, as well as other factors can suppose for the appearance of the benefits derived from the adherence to the ISO 9001 Standards. For this, it has been made a research centered in The Spanish construction sector. This sector is of great importance at both the global and Spanish level, and ISO 9001 Standard is widespread in it. A questionnaire was sent to 302 companies that are part of this sector, obtaining 126 valid questionnaires, whose data have been treated using a multiple linear regression model. The results of this model indicate that the type of internal or external motivation to implement such a regulation, as well as the seniority in adhering to it, are significant variables for the achievement of the positive results that can be derived from ISO 9001. However, the size of the company is not significant for the appearance of such results.

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1. Introduction

The construction sector is one of the most important in the world, representing 12.2% of world GDP in 2012 and it can reach 13.5% of GDP in 2025, which would mean a turnover of 15 trillion dollars.¹ Similarly, in Spain, this sector is one of the most important sectors in the national economy. According to SEOPAN (National Association of Public Works Companies) (2013), this sector accounted for 8% of national GDP in 2011 and 7% of employment (1.1 million employees), taking into account that at the moment of the greatest expansion of the economic cycle (2006), it reached 12.6% of GDP and 13.9% of employment (2.7 million employees).

On the other hand, currently the high competition level of most markets in developed economies is forcing companies toward strong quality development, so that with time, quality management is confused with the very concept of management or business management (Casadesus & Heras, 2005). In this context, quality management systems allow companies to equip themselves with management tools to establish policies and responsibilities, allocate resources and identify key activities (Criado & Calvo, 2009).

In this environment, quality assurance standards arise, among which the ISO 9000 series of Standards, which appeared in 1987, are the most widespread, often constituting the first contact of companies with quality (Martínez, Rodríguez, & Vázquez, 2004). These standards have been widely accepted in companies from different countries, so that by the end of 2013 there were 1,129,446 companies certified worldwide, 485,554 at European level and 42,632 in Spain (ISO, 2014).

The construction sector is one of those affected by the situation of strong competition described above. In addition, this sector was hit particularly hard by the recessive situation of the economic cycle that was experienced in Spain until last year, so that its expansion outside national borders was constituted as a way of survival. In this internationalization environment, standardization appears as a key mechanism that favors exchange and international trade, by eliminating the obstacles derived from the practices of each country (Heras & Boiral, 2013), since the purpose of these standards is to standardize procedures, functions and roles (Braun, 2005; Guler, Guillen, & MacPherson, 2002). Due to all the above, the implementation of ISO 9001 is very widespread within the construction sector, so that in terms of the number of certified companies, the construction sector occupies the third place worldwide, while in Spain it ranks first with a total of 5061 certifications (ISO, 2014).

The implementation of these standards is associated with a number of both initial monetary and maintenance costs (Pires, Cociorva, Saraiva, Novas, & Rosa, 2013), with the expectation of achieving benefits that monetize the investment made, thus

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¹ See "Global Construction 2025": Global Construction Perspectives and Oxford Economics (www.globalconstruction2025.com).

<http://dx.doi.org/10.1016/j.iedeen.2017.02.002>

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compensating these initial costs (Alic, 2014; Heras, Arana, & San Miguel, 2010; Magd, 2008; Sampaio, Saraiva, & Guimaraes, 2010). However, these investments are not always compensated by the positive results achieved (Psomas, 2013). All this seems to indicate that adherence to these standards is not sufficient, but there are certain factors that can condition positive results (Boiral, 2011; Lee, To, & Yu, 2009; Psomas, Fotopoulos, & Kafetzopoulos, 2010).

The objective of this paper is to analyze the possible influence of the following factors on the positive effects of implementation of ISO 9001 in companies in the Spanish construction sector: (a) different types of motivation (internal and/or external) for adherence; (b) the size of the company; (c) the age of adherence to the mentioned Standard.

To do this, once this introduction is finished, the conceptual framework of this work will be developed in the next section of the article, and then the methodology used will be described, which consists of dealing with the data obtained from the questionnaires received, by using a multiple linear regression model. Subsequently, sections four and five will show the results obtained from the model mentioned, as well as the conclusions, limitations and future lines of research that are derived from them.

2. Conceptual framework

Given the objective of this research, a review of the main studies in the area of ISO 9001 has been carried out, both in relation to the positive effects generated by the adherence to this Standard and the influence that the size of the company, the length of time since implementation and the type of motivation (internal or external) for adherence could have on the appearance of such effects.

2.1. Positive effects derived from implementing the ISO 9001 Standard

In previous research, it is generally concluded that this Standard generates positive effects for the companies that implement it, although some studies do not reflect these benefits or at least not in all situations (Boiral & Amara, 2009; Heras, Dick, & Casadesus, 2002; Martínez-Costa & Martínez-Lorente, 2003, 2007; Martínez-Costa, Choi, Martínez, & Martínez-Lorente, 2009; Quazi, Hong, & Meng, 2002; Wilson, Walsh, & Needy, 2003).

With regard to the positive results achieved, several studies (Bernardo, Simón, Tarí, & Molina-Azorín, 2015; Casadesus, Karapetrovic, & Heras, 2004; Douglas, Coleman, & Oddy, 2003; Gotzamani & Tsiotras, 2002; Sampaio, Saraiva, & Rodrigues, 2009; Tari, Molina-Azorin, & Heras, 2012) classify them as positive effects related to “internal aspects” and “external aspects”. Based on these conclusions, these positive effects can be classified as shown in Table 1.

Analyzing the relative importance of the two types of positive effects associated with the adherence to ISO 9001, there is previous research that gives more importance to the “internal aspects” (Bayati & Taghavi, 2007; Bhuiyan & Alam, 2005; Calvo, Redondo, Mora, & Cristóbal, 2016; Lo, Yeung, & Cheng, 2009; Martínez-Costa, Martínez-Lorente, & Choi, 2008; Terziovski & Power, 2007; Wahid & Corner, 2009; Williams, 2004), while other studies emphasize the effects of the “external aspects” (Benner & Veloso, 2008; Corbett, Montes, & Kirsch, 2005; Dick, Heras, & Casadesús, 2008; Martínez-Costa & Martínez-Lorente, 2003; Martínez-Costa & Martínez-Lorente, 2007; Sharma, 2005; Terlaak & King, 2006; Wayhan, Kirche, & Khumawala, 2002). Despite the above, most previous research shows positive internal and external results (Calisir, 2007; Casadesus & Giménez, 2001; Casadesus et al., 2004; Castillo et al., 2014b; Feng, Terziovski, & Samson, 2008; Gotzamani & Tsiotras, 2002; Jang & Lin, 2008; Lo & Chang,

Table 1
Typology of positive effects deriving from adherence to ISO 9001.

Internal aspects	
Organizational aspects	Control of production management, establishment of responsibilities and rules, improvement of coordination with suppliers, increased innovation, improvement of the information system of process management, improvement of the internal control system to detect “non-conformities”, etc.
Implementation of activities	Better use of resources, reduction of inspection costs, improvement of overall efficiency, reduction of logistical and production costs, reduction of non-conformities, improvement in the fulfillment of implementation time, reduction of “non-quality” costs, etc.
Human resource management	Improvement of employee suggestion systems, participation in work teams, reduction of absenteeism, greater satisfaction and motivation at work, etc.
Internal aspects Commercial	Requirement to compete in the sector, as well as for access of new customers and markets.
Financial	Increase in turnover and market share, improvement in turnover per employee ratio, etc.
Customer management	Increase in recruitment with the same customers, decrease of non-conformities or claims, improvement of satisfaction, improvement of the image in the market, etc.

2007; Prado, Castillo, Mercado, & Soto, 2013; Rodriguez-Escobar, Gonzalez-Benito, & Martínez-Lorente, 2006; Zaramdini, 2007).

2.2. Influence of the type of motivation (internal/external) for the implementation of the ISO 9001 Standard on the positive effects derived from its adherence

As for the reasons for adherence to this standard, one way to classify previous studies would be to consider whether the decision to certify a company arises from its environment or itself, i.e. whether the decision is “reactive or proactive” (Rodríguez-Escobar et al., 2006). Reactive motives are related to the implementation of the standard in response to certain pressures or external stimuli, which may consist of government incentives (aid, subsidies, etc.) and regulations to access a market (Sun, 2000), as well as pressure from financial institutions to access credit lines and the market pressure itself generated by competition and the customers themselves (Buttle, 1997; Jones, Arndt, & Kustin, 1997). As for the proactive reasons, that is, when companies decide to implement these standards on their own initiative, on the basis that by having better quality systems, the benefits attributed to certification must be evident (Heras et al., 2010; Sampaio et al., 2010).

In any case, based on previous research, the motivations for adherence to this Standard may be related to “internal aspects” such as improvements in organizational processes, implementing operations, and human resource management, as well as related to “external aspects”, such as improving the image and market position of the company, and other aspects related to commercial pressures, financial improvements and customer relationships (Boiral & Amara, 2009; Corbett et al., 2005; Douglas et al., 2003; Gotzamani & Tsiotras, 2002; Llopis & Tari, 2003; Sampaio et al., 2009; Williams, 2004).

Moreover, it is evident that in the majority of studies, motivations related to external aspects predominate (Bhuiyan & Alam, 2005; Heras & Arana, 2006; Martínez-Costa et al., 2008; Rodríguez-Escobar et al., 2006; Terziovski, Power, & Sohal, 2003), in comparison with those which consider that the motivations related to both types of aspects (internal and external) are balanced

and that even the motivations related to internal aspects prevail (Calvo et al., 2016; Chang & Lo, 2005; Fotopoulos & Psomas, 2010; Gotzamani & Tsiotras, 2002; Llopis & Tari, 2003; Magd, 2008; Prado, Castillo, Mercado, & Álvarez, 2014; Willar, Coffey, & Trigunarsyah, 2015; Yeung, Lee, & Chan, 2003).

On the other hand, with regard to the possible relationship between the predominant type of motivation (internal/external) for the implementation of ISO 9001 and the results obtained from it, there are exceptions to previous studies that indicate that a high level of external motivation produces a higher level of positive effects (Bhuiyan & Alam, 2005), since there is a general agreement that if the predominant objective of adherence to this standard is improvement of the internal aspects of the company, instead of certain pressures (customers/regulators), or simply obtaining improvements from certain external aspects (image enhancement/fashion follow-ups), the overall benefits observed after implementation are higher (Boiral & Roy, 2007; Castillo et al., 2014a, 2014b; Feng et al., 2008; Gotzamani & Tsiotras, 2002; Jang & Lin, 2008; Lee et al., 2009; Llopis and Tari, 2003; Martínez-Costa et al., 2008; Prado et al., 2014; Prajogo, 2011; Rodríguez-Escobar et al., 2006; Sampaio et al., 2009).

According to these investigations, if the only motivations for implementing this Standard are external, there is a high risk that the company will not acquire new capacities or obtain sustainable competitive advantages, except in terms of not being excluded from the market thanks to having the corresponding certification; however, when there are internal motivations, these can generate a higher level of internal development of the principles underlying ISO 9001, achieving operational and organizational improvements, which lead to a greater perception of quality and customer satisfaction, which ultimately lead to financial improvements.

2.3. Influence of the size of the company on the positive effects derived from the implementation of ISO 9001

Previous studies are not conclusive regarding the influence of the size of the company on the positive effects generated by this Standard. On the one hand, there are studies that indicate that it is more difficult to obtain positive results in small enterprises, since they usually lack certain resources that are important for the appearance of positive results (at least as far as internal aspects are concerned) and in addition, the initial costs and investments to obtain certification are proportionally more relevant in this type of enterprise (Gustafsson, Klefsjo, Berggren, & Granfors, 2001; Ismyrlis & Moschidis, 2015; Lee & Palmer, 1999; Nwankwo, 2000; Rodríguez-Escobar et al., 2006).

On the other hand, it is also possible to find numerous studies that indicate that the benefits are similar for all types of enterprises, since the conditions for obtaining positive results are more related to other aspects, such as the intensity of implementation of the Standard, and not so much to the size of the enterprises, although in small enterprises the appearance of positive effects could be slower (Bayati & Taghavi, 2007; Briscoe, Fawcett, & Todd, 2005; Castillo et al., 2014a; Lee et al., 2009; Prado et al., 2013; Psomas et al., 2010; Terziovski et al., 2003; Wilson et al., 2003); even in some situations, the benefits achieved in these type of small enterprises could be higher, since their starting point in terms of quality management is lower, so the opportunities for improvement are higher (Gozamani & Tsiotras, 2001).

2.4. Influence of the time elapsed since obtaining the certification on the positive effects derived from its implementation

In this case, previous research is not conclusive about the influence of this factor on the positive results generated when implementing this Standard. On the one hand, there are studies that

indicate that time is a positive factor for the appearance of these benefits (Castillo et al., 2014a, 2014b; Climent, 2005; Corbett et al., 2005; Fonseca, 2015; Ismyrlis & Moschidis, 2015; Lo et al., 2009; Martínez-Costa et al., 2008; Terziovski & Power, 2007; Wilson et al., 2003). According to these studies, the principles underpinning ISO 9001 as a quality management system need time to be assumed within companies, and in this way fully obtain the derived positive effects.

On the other hand, there are other studies that show that time does not influence the appearance of the positive effects mentioned, or at least not in all cases (Gozamani, Theodorakioglou, & Tsiotras, 2006; Lee et al., 2009; Terziovski et al., 2003), and that it could even cause a reduction of the initial benefits generated by the adherence to ISO 9001 (Casadesus & Karapetrovic, 2005; Casadesus et al., 2004; Karapetrovic, Fa, & Heras, 2010; Sampaio et al., 2009). According to these studies, when the motivation for implementation is almost exclusively to obtain certification so that the company is not excluded from the market, this benefit appears immediately after adherence, so the time elapsed would have no influence.

3. Methodology

3.1. Research objective

This research aims at analyzing the possible influence on the positive effects of the implementation of the ISO 9001 Standard in companies in the Spanish construction sector, of the following factors: (a) different types of motivation (internal and/or external) for adherence; (b) the size of the company; (c) the age of adherence to this Standard.

3.2. Sample

The research work is aimed at companies in the Spanish construction sector, specifically those that develop activities related to “civil engineering” totally or partially, as they usually have a more stable cycle than the construction of buildings, which prevents the conclusions obtained from being biased by the point in the cycle in which those companies can be found when carrying out the research.

In terms of the quantitative dimension of the population to be studied, the CNAE (National Classification of Economic Activities) was codified and the entire Civil Engineering Section 42 (“Civil Engineering”) was selected, as well as 43.1 (“Demolition and Site Preparation”), which belongs to section 43 (“Specialized Construction Activities”), and includes auxiliary activities related to the field of civil works, which are necessary for their implementation, obtaining a first census of 3493 companies.

A segmentation from this census was carried out according to the size of these companies, based on the EU Recommendation (2003/361/EC), whose criteria are shown in the table below, leaving out “small” enterprises (3191), as based on previous studies (Mercado, Castillo, & Mateo, 2005), it was assumed that the level of implementation of this Standard would be quite small in these enterprises, which was confirmed by a telephone survey carried out with 150 of them. Based on this adjustment, the final population consisted of 302 companies (Table 2).

Table 2
Criteria enterprises by size (EU recommendation).

Typology	Employees	Turnover	Annual balance
Large	≥250	>50 M€	>43 M€
Medium	<250 and ≥50	≤50 M€ and >10	≤43 M€ and >10
Small	<50	≤10 M€	≤10 M€

Table 3
Classification of population and responses by size.

	No.	% of total	Responses obtained	% of population
Very large enterprises	12	3.97	10	83.33
Large enterprises	63	20.86	30	47.62
Medium-sized enterprises	227	75.17	86	37.89
Total	302	100.00	126	41.72

3.3. Questionnaire

In order to obtain the necessary data for this research, primary sources of information were mainly used, being a questionnaire the data collection instrument, which was aimed at quality managers or those in fact responsible for this matter, in the construction companies participating in this research. To prepare this questionnaire, a review of those used in previous studies was made (Casadesus et al., 2004; Gotzamani & Tsiotras, 2002), followed by a “pretest” with two companies of the sector, so that once their comments were incorporated, its final version was written. The questionnaire was initially sent in November 2011, and the second time in January 2012 to increase the number of completed questionnaires, by postal mail in all cases and by electronic mail if such information was available in the databases used. Finally, 126 questionnaires were duly completed, broken down by size into the table below, and the data collected on March 1, 2012 processed (Table 3).

In addition, it should be pointed out that the certification level of the companies that completed the questionnaire is 100%, that the length of time since the first certification is more than five years in 73% of the companies, and in 93% of cases they were also certified in all their processes, which reinforces the validity of the conclusions reached in the research. Based on the above data, Table 4 shows the technical specifications of the study.

3.4. Variables and proposed model

In order to be able to analyze the influence of the different factors considered in this research, on the appearance of different positive effects derived from the adherence to ISO 9001, a multiple linear regression model was developed, in which the variables considered are the following:

Dependent variables Y: benefits derived from this Standard, based on the typology described in Table 1 of this study. In the questionnaire completed by the participating companies, these variables could take the following values according to the extent of occurrence of these benefits after the implementation of ISO 9001: 1 – very low, 2 – low, 3 – medium, 4 – high and 5 – very high:

Table 4
Technical specifications of the study.

Population universe	Spanish construction companies with presence in the subsector of civil works, excluding small ones (according to European Union Recommendation 2003/361/EC)
Sampling technique	Random: questionnaire sent to all entities that make up the population universe
Method of collecting information	Postal and online survey
Person surveyed	Quality Manager of the Company or Person Responsible for this matter
Population	302
Sample size	126
Confidence level	95% (z = 1.96; p = q = 0.5)
Sample size	6.7%
Dates of information collection	From November 1, 2011 to February 28, 2012

Variable Y₁: positive internal effects related to organizational processes (BIOrg).

Variable Y₂: positive internal effects related to implementation of operations (BIImp).

Variable Y₃: positive internal effects related to human resource management (BIHR).

Variable Y₄: positive internal effects related to commercial aspects (BECom).

Variable Y₅: positive internal effects related to financial aspects (BEFin).

Variable Y₆: positive internal effects related to customer management (BECus).

Independent variables X:

Variable x₁: Size of the enterprise (Size). In the questionnaire used in this research, this value could take the following values: 1 – medium, 2 – large, 3 – very large (based on the criteria of the EU 2003/361/EC Recommendation).

Variable x₂: Age of adherence to the ISO 9001 Standard (Age). According to the responses obtained in the questionnaire submitted to the participating enterprises, this variable can take the following variables: 1 – 3 years or less, 2 – more than 3 years.

Variable x₃: Average of internal motivations (AvIMot). In the questionnaire completed by the participating enterprises, this value could take the following values, depending on the level of relevance of these type of motivations for adherence to ISO 9001: 1 – very low, 2 – low, 3 – medium, 4 – high and 5 – very high.

Variable x₄: Average of external motivations excluding commercial ones (AvEMotoutC). In the questionnaire completed by the participating enterprises, this value could take the following values, depending on the level of relevance of these type of motivations for adherence to ISO 9001: 1 – very low, 2 – low, 3 – medium, 4 – high and 5 – very high.

Variable x₅: External commercial motivations (EMotCom). These motivations were introduced in the model separately, as according to previous research analyzed, they could have a more reactive component (customer pressures and/or demands) than the rest of the motivations which involve a more proactive approach. Therefore, it was considered appropriated to analyze their effect on the results of the ISO 9001 implementation separately. In the questionnaire completed by the participating enterprises, this value could take the following values, depending on the level of relevance of these type of motivations for adherence to ISO 9001: 1 – very low, 2 – low, 3 – medium, 4 – high and 5 – very high.

The following multiple linear regression model was constructed based on these variables:

$$y_i = \beta_0 + \beta_1 * x_{1,i} + \beta_2 * x_{2,i} + \beta_3 * x_{3,i} + \beta_4 * x_{4,i} + \beta_5 * x_{5,i} + u_i$$

4. Results

Table 5 shows the results of the multiple linear regression model developed in order to respond to the objective of this research, that is, to analyze the influence of the factors “company size”, “time span since implementation”, and “different types of motivation for adherence” on the different types of positive effects that can be derived from the implementation of the ISO 9001 Standard. In particular, the coefficients of the dependent variables (size, time span and different types of motivation) are shown, with respect to the independent variables (each of the positive effects considered in the research).

Based on the results of the previous table, the model would be as follows:

$$BIOrg = 0.262 + 0.299 * Age + 0.449 * AvIMot + u_i$$

Table 5
Results obtained for the model: coefficients of the independent variables.

Model		Non standardized coefficients		Standardized coefficients	t	Sig.
Dependent variable	Independent variable	B	Standard error	Beta		
BIOrg	(Constant)	0.262	0.563		0.466	0.643
	Size	0.081	0.098	0.077	0.825	0.412
	Age	0.472	0.154	0.299	3.065	0.003
	AvIMot	0.472	0.101	0.449	4.653	0.000
	AvEMotoutC	0.104	0.090	0.115	1.153	0.253
	EComMot	0.134	0.108	0.113	1.241	0.218
BIImp	(Constant)	0.371	0.649		0.572	0.569
	Size	0.146	0.112	0.127	1.302	0.197
	Age	0.774	0.177	0.443	4.363	0.000
	AvIMot	0.420	0.117	0.361	3.590	0.001
	AvEMotoutC	0.094	0.104	0.094	0.906	0.368
	EComMot	-0.054	0.124	-0.041	-0.437	0.663
BIHR	(Constant)	0.130	0.609		0.214	0.831
	Size	0.368	0.106	0.312	3.488	0.001
	Age	0.656	0.167	0.368	3.937	0.000
	AvIMot	0.569	0.110	0.480	5.182	0.000
	AvEMotoutC	0.106	0.098	0.103	1.085	0.281
	EComMot	-0.303	0.116	-0.227	-2.602	0.011
BECom	(Constant)	0.804	0.736		1.092	0.278
	Size	0.163	0.128	0.141	1.275	0.206
	Age	0.506	0.201	0.291	1.515	0.114
	AvIMot	0.110	0.133	0.095	0.831	0.408
	AvEMotoutC	-0.138	0.118	-0.138	-1.172	0.245
	EComMot	0.505	0.141	0.389	3.589	0.001
BEFin	(Constant)	1.064	0.768		1.386	0.170
	Size	-0.011	0.133	-0.008	-0.080	0.936
	Age	0.249	0.210	0.121	2.187	0.039
	AvIMot	0.271	0.138	0.198	1.959	0.054
	AvEMotoutC	0.642	0.123	0.543	5.212	0.000
	EComMot	-0.313	0.147	-0.204	-2.132	0.036
BECus	(Constant)	1.185	0.576		2.056	0.043
	Size	0.025	0.100	0.025	0.246	0.806
	Age	0.223	0.158	0.142	2.082	0.037
	AvIMot	0.355	0.104	0.356	3.423	0.001
	AvEMotoutC	0.281	0.092	0.326	3.043	0.003
	EComMot	0.062	0.110	0.055	0.562	0.576

$$BIImp = 0.371 + 0.443 * Age + 0.361 * AvIMot + u_i$$

$$BIHR = 0.130 + 0.312 * Size + 0.368 * Age + 0.480 * AvIMot - 0.227 * EComMot + u_i$$

$$BECom = 0.804 + 0.389EComMot + u_i$$

$$BEFin = 1.064 + 0.121 * Age + 0.198 * AvIMot + 0.543 * AvEMotoutC - 0.204 * EComMot + u_i$$

$$BECus = 1.185 + 0.142 * Age + 0.356 * AvIMot + 0.326 * AvEMotoutC + u_i$$

On the other hand, Table 5 shows the following results relating to the independent variables of the model.

The “size of the enterprise” (*Size*) is a variable of the model developed, with $|t| < 2$ for all positive external and internal effects, except for internal effects relating to human resource management ($t = 3488$), so with the exception mentioned, we can state that it is a non-significant variable for obtaining benefits derived from ISO 9001.

The “age of implementation of ISO 9001” (*Age*) is a variable of the proposed model, with $|t| > 2$ for all positive internal effects, and for all positive external effects, except for external commercial effects ($t = 1515$), so with this exception, it can be considered a significant

variable to obtain the benefits derived from ISO 9001. In the case of positive values, an increase in the independent variable will produce an increase (in percentage terms) in the dependent variable, remaining the rest of the factors constant. In this sense, an increase of 1 unit in the “age of implementation of ISO 9001”, will produce a 29.9% increase in internal benefits “BIOrg”, 44.3% in internal benefits “BIImp”, 36.8% in internal benefits “BIHR”, 12.1% in external benefits “BEFin” and 14.2% in external benefits “BECus”. The greater the value of the variable, the greater the value of the internal and external benefits indicated.

The “average internal motivation” (*AvIMot*) is a variable of the model considered, with $|t| > 2$ for all positive internal and external financial effects and those related to customer management, so it is considered a significant variable in order to obtain these benefits (in the case of the positive external effects related to customer relationship management, this variable is accepted as significant since the value of t is close to 2). In the case of positive values, an increase in the independent variable will produce an increase (in percentage terms) in the dependent variable, with the rest of the factors remaining constant. In this sense, an increase of 1 unit in the “average internal motivation” will produce a 44.9% increase in internal benefits “BIOrg”, 36.1% in internal benefits “BIImp”, 48% in internal benefits “BIHR”, 19.8% in external benefits “BEFin” and 35.6% in external benefits “BECus”. The greater the value of the variable, the greater the value of the internal and external benefits indicated.

However, this variable (*MotIMed*) shows $|t| < 2$ ($t = 0.831$), for the positive external commercial effects, so it is considered a non-significant variable for these effects.

The “average external motivation without regarding commercial aspects” (*AvEMotoutC*) is a variable of the model, with $|t| > 2$ for

the positive external financial and customer relationship management effects, i.e. the same type of aspects which these motivations are focused on, so it can be considered that this variable is significant for the achievement of these type of benefits. In the case of positive values, an increase in the independent variable will produce an increase (in percentage terms) in the dependent variable, with the rest of the factors remaining constant. In this sense, an increase of 1 unit in the “average external motivation without considering commercial aspects” will produce a 54.3% increase in the external benefits “BEFin” and 32.6% in the external benefits “BECus”. The greater the value of the variable, the greater the value of the external benefits indicated.

However, this variable (AvEMotoutC) has $|t| < 2$ for all commercial positive internal and external effects, so it is considered a non-significant variable for such effects.

The “commercial external motivation” (EComMot), i.e. having the possibility to fulfill a requirement demanded to compete in the market, is a variable that presents $|t| > 2$ for external commercial and financial effects, as well as for the internal aspects related to human resource management, so it can be considered a significant variable to obtain these type of effects. However, in the case of external commercial effects, that is to say, the same type of aspects which these motivations are focused on, the relationship is positive, which means that a greater value of this variable will imply a greater appearance of these positive effects (in particular, an increase of 1 unit in the “commercial external motivation”, will result in a 38.9% increase in “BECom” external benefits). However, the relationship between the external financial benefits and the internal benefits related to human resources is negative, so a higher value of this variable will mean a lower occurrence of these positive effects (in particular, an increase of 1 unit in the

Table 6
Significance summary.

Variable dependent	Variable independent	Sig.
BIOrg	(Constant)	
	Size	×
	Age	✓
	AvIMot	✓
	AvEMotoutC	×
	EComMot	×
BIImp	(Constant)	
	Size	×
	Age	✓
	AvIMot	✓
	AvEMotoutC	×
	EComMot	×
BIHR	(Constant)	
	Size	✓
	Age	✓
	AvIMot	✓
	AvEMotoutC	×
	EComMot	✓
BECom	(Constant)	
	Size	×
	Age	×
	AvIMot	×
	AvEMotoutC	×
	EComMot	✓
BEFin	(Constant)	
	Size	×
	Age	✓
	AvIMot	✓
	AvEMotoutC	✓
	EComMot	✓
BECus	(Constant)	
	Size	×
	Age	✓
	AvIMot	✓
	AvEMotoutC	✓
	EComMot	×

Table 7
Determination coefficients.

Model	R ²
BIOrg	47.9%
BIImp	43.6%
BIHR	52.2%
BECom	26.5%
BEFin	42.8%
BECus	39.6%

“commercial external motivation” will result in a 20.4% decrease in the external benefits “BEFin” and 22.7% in the internal benefits “BIHR”).

On the other hand, this variable (EComMot) has $|t| < 2$ for the positive internal organizational and implementation of operations effects, as well as for the external ones related to customer management, so it is not a significant variable for the achievement of these type of effects.

Table 6 shows a summary of the significance of the variables considered in the proposed model, with respect to the appearance of different internal and external benefits that can be generated from the adherence to ISO 9001.

Finally, Table 7 contains the corresponding determination coefficients (R²). According to the results described in this table, these coefficients have a value that is between 26.5% and 52.2% (for the results that are significant), which means that the independent variables of the model considered in this research explain between 26.5% and 52.2% of the variation of the different dependent variables that have been taken into account in the study, and which represent both the different positive internal and external effects that can be derived from the implementation of the ISO 9001 Standard, which reinforces the validity of the results obtained in the research carried out.

5. Conclusions

This study aimed to analyze how certain factors may influence the positive internal and external effects that may result from adherence to ISO 9001. These factors were: (a) different types of internal and external motivations for implementation of this Standard; (b) the size of the companies and (c) the time elapsed since obtaining the corresponding certification. To develop this objective the research has focused on companies in the Spanish construction sector. The conclusions reached from the multiple linear regression model carried out are described below:

Regarding the variables related to different types of motivation (internal and/or external) for the implementation of ISO 9001, the model considered shows that the variable “average internal motivation” is a significant variable for all positive internal effects considered, as well as for all the external ones, except for external commercial aspects (to fulfill the requirement to be able to compete in the market), which seems logical since for the achievement of this benefit it is sufficient to have the motivation to obtain the corresponding certification. Therefore, for the rest of positive effects, the higher the level of these type of internal motivations, the greater the appearance of the benefits derived from adherence to the Standard.

However, the variables “average external motivation without commercial aspects” or “commercial external motivation”, are only significant variables for the appearance of the positive external effects to which these motivations refer to respectively, without having the same type of influence on any of the other benefits that can be achieved by adhering to ISO 9001.

In addition, in the case of the “commercial external motivation”, an inverse significance sense is detected, both for positive internal effects of human resource management and for financial external

ones, that is, the higher the value of this variable, the lower the achievement of these type of benefits, which could be related to internal work and procedures required by these standards, which generate initial maintenance costs and if they are not compensated by real quality improvements, they provoke rejection in company staff and economic losses (Boiral & Amara, 2009; Heras et al., 2002; Martínez-Costa & Martínez-Lorente, 2007).

Finally, for these variables related to the motivations for the implementation of ISO 9001, the results of the model considered seem to indicate that when the motivations for adherence are mostly internal, a higher level of positive effects is achieved. This result coincides with the conclusions of the studies of Gotzamani and Tsiotras (2002), Llopis and Tari (2003), Rodríguez-Escobar et al. (2006), Boiral and Roy (2007), Feng et al. (2008), Jang and Lin (2008), Martínez-Costa et al. (2008), Sampaio et al. (2009), Lee et al. (2009), Prajogo (2011) and Castillo et al. (2014a, 2014b), which indicate that the search for internal improvements are the motivations that can actually cause a real improvement in the quality of the company's functioning, which with time will result in both positive internal and external effects pursued with the implementation of ISO 9001.

On the other hand, the "company size" is not a significant variable for the different positive external effects considered (commercial, financial and customer relationship management), as well as the effects of internal organizational and implementation of operations, so the achievement of these benefits does not undergo significant variations depending on the size of the company.

These results are in line with the work of Terziovski et al. (2003), Wilson et al. (2003), Briscoe et al. (2005), Bayati and Taghavi (2007), Lee et al. (2009), Psomas et al. (2010), Prado et al. (2013) and Castillo et al. (2014a, 2014b), which is consistent with the specificities of the construction and civil engineering sector, where product safety and quality has always been a fundamental characteristic for all companies regardless of their size.

Such significance is only produced in the case of the internal effects related to human resource management, which may be due to the fact that larger companies need more organized procedures, such as those provided by these quality assurance standards in order to involve the whole staff in the objectives of quality and customer focus.

Finally, the "time span since the implementation of ISO 9001" is a significant variable for all the positive internal and external effects considered, with the exception of those related to external commercial aspects, which seems logical since this benefit, which is referred to fundamentally to comply with a requirement demanded in order to be able to compete in the market, is achieved from the moment the certification of this Standard is achieved. For the rest of the positive effects, the longer the time that has elapsed since the adherence to the Standard, the greater their achievement. This result follows studies of Wilson et al. (2003), Climent (2005), Corbett et al. (2005), Terziovski and Power (2007), Martínez-Costa et al. (2008), Lo et al. (2009) and Castillo et al. (2014a, 2014b), where the positive influence of this factor derives from the learning curve of the Standard, which is necessary for the appearance of its benefits, especially those related to internal aspects.

Based on all of the above, and as implications for the management of construction companies, whatever their size, it can be concluded that although in this sector, and especially in the civil engineering sub-sector, there is a high level of competitive recruitment, for which having ISO 9001 certification is a basic requirement to be able to compete, it is not enough to implement this regulation exclusively seeking such positive effect. The real improvements in quality and productivity in the work of the companies that can be derived from the implementation of these type of Standards, are obtained only if in addition to obtaining the certification itself, there

are other motivations related to achieving real improvements in quality, fundamentally internal ones, which are the ones that will finally allow companies to avoid the usual complaints and penalties of contracts in this sector, and not be excluded in future contracts with the same customers.

Moreover, these companies should be aware that quality improvement is a long-distance race, so that once the implementation of ISO 9001 is done, it is necessary to continue investing resources for the gradual settlement of the basic principles of this Standard in the company (continuous improvement, involvement of the whole company, focus on customers, etc.), so as to ensure a higher level of positive effects resulting from adherence to the Standard.

On the other hand, the results achieved in this study have limitations, which in turn suggest areas for future research. Firstly, the people surveyed were quality managers of participating companies, so their opinions could be biased due to a certain interest in stating that the implementation results were positive. In addition, the "sample error" reflected in the technical specifications of the study is 6.7% (Table 2), i.e. it exceeds 5%, which may imply some kind of limitation to the possibility of extrapolating the results to the whole sector.

Regarding future research, a first line of action could be aimed at avoiding the possible bias of the participants in favor of the standard indicated above, so it would be advisable to extend the scope of research to other groups such as employees in general, customers and suppliers of the company. Another line of future action would be to improve the size of the sample, which would require support from associations in the construction sector (SEOPAN, etc.), or related to quality management (AENOR, AEC, etc.), and thus carry out new empirical studies confirming the conclusions pointed out in this paper.

Moreover, another future line of research could be aimed at analyzing the influence of the factors considered in this work, in relation to the results of another standard, such as ISO 14000 on environmental matters, either individually or through its integration with ISO 9001, comparing the conclusions that would be obtained in this regard.

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