

The estimation of the return on firms' investments – as to ISO 9001

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Abstract

The aim of this paper was to estimate the return on investment in QMS (quality management systems) certification undertaken in Portuguese firms, according to the ISO 9000 series. A total of 426 certified Portuguese firms were surveyed. The response rate was 61.03 percent. The different payback periods were validated through statistical analysis and the relationship between expected and perceived payback periods was discussed. This study suggests that a firm's sector of activity, size and degree of internationalization are related to the length of the investment in QMS certification recovery period. Furthermore, our findings suggest, that the time taken to obtain the certification is not directly related to the economic component of the certification. The majority of Portuguese firms (58.9%) took up to three years to recoup their investment and 35.5% of companies said they had not yet recovered the initial investment made. The recoup of investment was measured by the increase in the number of customers and consequent volume of deliveries, improved profitability and productivity of the company, improvement of competitive position and performance (cost savings), reduction in the number of external complaints and internal defects/scrap, achievement of some important clientele, among others. We compared our work to similar studies undertaken in other countries. This paper provides a contribution to the research related to the return on investment for costs related to the certification QMS according to ISO 9000. This paper provides a valuable contribution to the field and is one of the first studies to undertake this type of analysis in Portugal.

Keywords: Quality Awareness; ISO 9000 series; Return on Investment; Portugal

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1. Introduction

Currently, the need to measure, evaluate and, above all, secure and improve the quality of public and private enterprises in the manufacture of products and services, is widely accepted by society and governments. Within this context, the quality principles and management practices may be helpful to cover these needs and ensure the competitiveness of our economy (Costa, 2008). This is visible through the growing number of firms certified according to the family of norms ISO 9000 since 1987, the year in which it first emerged as a norm of reference. Despite this, there are still many firms that do not seem to be attracted by the advantages provided by certification. There are several reasons that justify such an attitude. This is mainly due to the fact that a firm's staff has to devote a great deal of their time to implement quality systems and ensure its certification, as well as the increased bureaucratization required to attain and maintain certification. However, the high cost is undoubtedly one of the main arguments mentioned by firms; this argument is also shared by many authors for which, costs of certification exceed its benefits (Escanciano, 2001). Terziovski (2003) argues that the literature review has revealed that the benefits attributable to ISO 9001 certification were mainly for procedural efficiency and error rates, and less likely for market share, staff motivation and costs. On other hand, many times, companies do not provide financial data. Hence, just it was asked them, in relation to quality system certification, how long time it was the investment recovered? It is likely they had considered several items, such as (Santos, 2011): an increase in the number of customers and consequent volume of deliveries, improved profitability and productivity of the

company, improvement of competitive position and performance (cost savings), reduction of the number of external complaints and internal defects/scrap, achievement of some important client. This is possible with the involvement of all employees in solving the problems of quality and surely, external customer satisfaction.

With this in mind, we conducted an empirical study to examine the impact of certification in Portugal from a financial point of view, along the lines of other studies in the field. Given the the lack of specific economic data provided by firms, it was used the time it took to recoup the investment made in certification as a reference, based on the estimate provided by the firms examined in our analysis.

2. Literature review

Several studies have been and continue to be made in various industries seeking the return on investment (Corbett , 2005; Almeida , 2009; Heras, 2011), or quality management practices and business performance (Terziowski, 2003; Samson,1999); however, we are mainly interested in the return on investment on certification of quality systems according to ISO 9000. According to Corbett (2005), firms' decision to seek their first ISO 9000 certification was indeed followed by significant abnormal improvements in financial performance, though the exact timing and magnitude of this effect depend on the specification of the control group. Thus, quality management can be defined as a holistic management philosophy that strives for continuous improvement in all functions of an organization (Kaynak, 2005). Alternatively, quality is just one parameter used to determine the competitive situation of a firm (Neergaard, 2002). On the other hand, many manufacturers understand that improved quality systems are extremely important in gaining greater global competitiveness. Customers also continue to be more discriminating in seeking only products that achieve high quality. One of the important means of achieve high product quality is through the attainment of ISO certification (Dowlatshahi, 2004). ISO 9000 certification is associated with improvements in a firm's financial performance (Sharma, 2005). Terlaak (2006) suggests that facilities that certify with ISO 9000 experience an increase in the production volume subsequent to certification compare to non-certified facilities. Thus, the return on investment is easier, if the financial performance is enhanced. This is in line with Corbett Corbett (2005), who argues that one firm may have the potential to be more successful than others, however this potential becomes a reality as a result of ISO 9000.

One could say that some firms may have a "gene for good management," but that this gene is not expressed until ISO 9000 switches it on. Yet according to Corbett (2005), this view could go a long way to reconciling the apparently conflicting views of those who believe that ISO 9000 is too minimal a standard to be able to drive real performance improvements, and those who are convinced that it does just that. If a firm lacks the "good management gene," ISO 9000 may not help them much either. Firms that do have the potential to be successful may need an external trigger to unlock that potential; ISO 9000 appears to be one such trigger. Samson (1999) suggests that efforts in improved leadership, human resources management and customer focus are more likely to be fruitful than efforts in improving information and analysis, strategic planning and process management. According to Bartkus (2006), mission statements that include phrases that refer to what many may view as the fundamental rules of business have a significant positive relationship with financial performance; such phrases include "be concerned with your employees", "be responsible to the society in which you do business," and "emphasize and communicate your value system". But Terziowski (2003) argues that the business value of certification has varied from unprecedented successes to an increasing workload and "cost of doing business". On other hand, according to Naveh (2005), obtaining ISO 9000 certification does not ensure competitive advantage.

Naveh (2005) argues that the implementation of a managerial practice, such as ISO 9000, yields an advantage is largely dependent on how the practice is implemented. Competitive advantage in the operations area can be achieved if the standard is installed—externally coordinated with suppliers and customers and integrated with practices the company already has in place—and used—both in daily practice and as a catalyst for change. However, Wayhan (2002) undertook a study on "the financial performance implications of ISO 9000 certification". The cited study explores the relationship between ISO 9000 certification and financial performance. Wayhan (2002) states that "*the most research in this area has been anecdotal in nature. The empirical studies that have addressed this relationship have not only been limited, but also have been largely contradictory. In an attempt to reconcile these conflicting results, a multivariate, repeated measures research design was utilized. Results indicate that ISO 9000 certification has a very limited impact on financial performance, as measured by return on assets, however this effect dissipates quickly over time*". Moreover, Dick (2008) concluded that although there is some evidence to indicate that quality management system certification has some causal influence on business performance, there is also evidence for the existence of a substantial mechanism whereby better performing firms self-select to adopt certification.

According to Elmuti (1996), implementing the ISO 9000 requires time, training, communication and hard work. Despite other reviewers, such as Crosby's, that defends that quality has no costs, one of the negative aspects of certification for firms is their high cost. According to some authors, the costs that the firm incurs to undertake a quality management system and certify it are greater than the potential benefits that might derive from it (Jones, 1997; Brown, 1998). In this line, Corbett (2005), argues that immediately after deciding to seek certification, firms experience a significant abnormal productivity improvement.

There are other studies that reached the opposite conclusion and show that the benefits they can derive from it far outweigh the costs of obtaining it (Rayner, 1991; Buttle, 1997; Malak, 1997; Schroeder, 1993). Considering that certification

represents an important asset to those who have it (Struebing, 1997) for the numerous benefits achieved (Buttle, 1997), or the short payback period associated with the investment (Escanciano, 2001; 2000).

Since certification costs time and money, which is one of the main criticisms it is subject to, especially by SMEs (Leung, 1999), these can be compensated and overcome, in most cases by the benefits they acquired (Rayner, 1991; Malak, 1997).

For this reason, some authors describe certification as an investment with a short payback period, depending on the case (Escanciano, 2000). In fact, according to Heras et al. (2002), certification is not a bad investment but its expectations should not be inflated, as, according to Vloeberghs (1999), a strong commitment from the company management can reduce the cost of certification. Most firms are certified even when they can not decrease the costs. A particular case is the exporting firms. Hence, for firms with a competitive orientation, the adoption of ISO 9000 certification will follow naturally and will be easy. It is inevitable that problems would be encountered in implementing ISO 9000 (Chow, 2002). According to this author, a successful ISO 9000 implementation cannot be carried out independently of supply chain partners and without conformance to set rules and regulations. On other hand, Naveh (2005) states that ISO 9000 can and should become a springboard for rethinking the way in which a firm does business and a point of departure for additional innovation. Being a catalyst for change means that ISO 9000 is used as a launching pad for new understanding about how a company does business. For Wilson et al. (2003), the evaluation of costs and benefits associated with ISO 9001 certification depends on a firm's volume of sales, given that a firm with higher sales can absorb the cost of certification. According to Anderson et al. (1999), the costs of certification can act as barriers of entry in regulated markets, since the company must have the capacity to cope not only with the set-up costs but also the maintenance and training costs (Martinez, 2000). On other hand Corbett (2005), argues that one way to look at good results is to conclude that the prescriptions contained in ISO 9000 themselves lead to superior performance.

Finally, according to Heras (2011), and related to ISO 14001 certification, for example, opportunities for reducing costs, through risk management and relations with external stakeholders, are more likely in industries that are highly regulated and scrutinized by the public, such as the following industries: chemical, energy, pulp and paper, metallurgy, etc.. Opportunities for reducing costs of materials, energy and services are more likely to occur when firms have a flexible production process or when firms are in highly competitive industries where optimization of resources is important.

3. Methodology

The investigation began with the drafting of a questionnaire with the term payback divided in seven periods: Less than 1 year; Between 1 year and 1.5 years; Between 1.5 years and 2 years; Between 2 year and 2.5 years; Between 2.5 year and 3 years; More than 3 years; Not yet recovered (Table 1).

In order to test its feasibility a pre-test was administered to a few firms and experts. Relevant changes were made, as some respondents had some difficulty in responding to some of the questions. The questionnaire was mailed to 426 firms from a database compiled with information provided by businesses accredited by the Portuguese Institute of Quality – IPQ, about Portuguese companies, from the north region, that until then had been certified according to ISO 9000.

265 responses were received, which corresponds to 62.20%. 5 of these were eliminated because they had incomplete responses or because did not answer the questionnaire. Thus, the number of questionnaires that make up the sample is 260, representing a response rate of 61.03%, which is higher than other studies using a comparable methodology (Buttle, 1997; Casadesús, 2001; Corbett, 2003; Leal, 1997).

The information for this empirical work was obtained through a questionnaire designed from major international studies on the research topic. We analyzed the segmentation variables used more frequently in the literature and articles on quality management, such as the type of activity, the first year of certification, number of employees and whether the firm is a multinational one or not, as well as the time of deployment and the time of recovery of the investments, which the implementation of quality systems according ISO 9000 implicated (Buttle, 1997; Escanciano, 2000; Casadesús, 2001; Corbett, 2003; Heras, 2000; Cameron, 1999; Leal, 2002; Leal, 1995; Powel, 1995; Conca, 2000; Leal, 2001).

The purpose of this study was to estimate the payback period for Portuguese firms to recover their investment in the implementation and certification of their quality systems as well as the characteristics of firms that have an impact on this measure. In our understanding, the length of the payback period associated with investing in certification will depend on various factors, such as, experience in quality, the length of time to achieve the certification, the type of activity, the firm's size and its internationalization. Thus, we formulate the following hypothesis: "There is a relationship between the firm's investment and experience in quality, the time elapsed from setting up the system till the time of obtaining certification, the type of activity, the firm's size and its internationalization". In turn, to answer this hypothesis, were formulated five main questions. The first question formulated is, a): what is the importance of experience in quality, in order to shorten payback period? The decision to certify is not an easy decision. Firms interesting in undertaking certification must make additional investments in time, effort and economic resources. The last items are usually a source of concern for corporations that usually associate the cost of certification with the costs incurred with an external consultant and reasonably, with those related to the certification company (Leung, 1999).

Based on this, we believe that as time elapses since the thought to introduce the quality system until certification, more time will be required for the firm to consider the investment worthwhile (Escanciano, 2000). Consequently we highlight the following question, b): "Do firms that take less time to achieve certification believe that they will incur in a shorter pay-back period?"

On the other hand, the quality concern, its principles, practices, methods and models used for its implementation have their origin in the large industrial enterprise and it is not an easy task to transfer them to specific and distinct fields of industry, such as the commercial area and the services (Costa, 2008). In fact, the norms related to the ISO 9000 departed from industry and applied themselves more particularly in the production of tangible products produced in serie (Peyrat, 2001) and industrial firms are the most indifferent to cost reduction as a prerequisite for the implementation of quality management system, since they implement these regardless of whether costs aren't reduced. This led us to develop the following question, c): "Industrial companies are those that believe that it took less time to recover their investment?"

The larger companies have less difficulty in accommodating the costs with certification, as well as proceed with additional investments that derive from the evolution of the system and can delay the recovery of investment (Escanciano, 2000; Wilson, 2003; Martinez, 2000). Some authors believe that the deployment and certification according family of norms ISO 9000 were expensive, especially for SME's (Anderson, 1999), that must deploy them more efficiently and have a better planning (Casadesús, 2001; Mo, 1997). On this basis, we formulated the following question, d): "There is a relationship between the recovery of investment and firm's size. Do larger firms consider they take more time to recover the investment? "

On the other hand, considering that Portuguese leaders are less prone to processes of formalization and their openness to new ideas or organizational systems (Brilman, 2000) shows that multinational companies are able to recoup their investment a lot quicker than the implementation of family of norms ISO 9000 represented. Thus, we developed the following question, e): "Do multinational companies feel they have more time to recover their investment?"

4. Results and Discussion

For firm, one of the negative aspects of certification is its high cost. In fact there are numerous papers and opinion articles on this topic that have tried to determine the time needed for recovery. In order to measure this variable in our study, respondents were asked to estimate the time needed to recoup the investment that certification implied. According to Table 1, to facilitate the response, we proposed seven temporary spaces, ranging from "less than 1 year" to "not yet recovered". The goal was to select the answer that fit according to their experience.

Table 1. Term recovery of investment in certification according ISO 9000.

Term payback	Valid percentage	Cumulative percentage
Less than 1 year	4.7	4.7
Between 1 year and 1.5 years	14.0	18.7
Between 1.5 years and 2 years	18.7	37.4
Between 2 year and 2.5 years	10.3	47.7
Between 2.5 year and 3 years	11.2	58.9
More than 3 years	5.6	64.5
Not yet recovered	35.5	100

Also according to Table 1, we can also see the frequency distribution of responses to term payback. Only 18.7% of firms consider that the payback period was less than, or equal to 18 months. In this case, it is worth noting that in the universe under consideration, 37.4% of companies have recovered the investment. There are a significant number of 35.5% of companies that did not recover the investment that certification represents, even after 3 years. Compared with other studies, a percentage of 58.9% of Portuguese companies recover the investment in three years, while according with Escanciano (2000), 76.6% of Spanish companies also recover it, in the same period of time.

In a survey conducted by The Quality Systems Update and Deloitte and Touche between North American and Canadian certified enterprises (Buttle,1997), it was proved that the cost and the time consumed in the certification is recovered by itself in 15 months. According to other studies, such as SGS Yarsley (Buttle, 1997), it takes about three years. Also a percentage of 35.5% of Portuguese companies say that they have not recovered the investment, while only 17.9% of Spanish companies have the same opinion (Escanciano, 2000). Moreover, 18.7% of Portuguese companies said to have recovered the investment after 18 months, while other international studies indicate that 40% of the companies recover in the same period (Escanciano, 2000).

Certification costs (time and money), which is one of the criticisms most common, especially by SMEs (Leung, 1999) can be offset by the benefits obtained (Rayner1991; Mallak,1997) . For this reason, some authors describe the certification as an investment with a payback period more or less rapidly, depending on the cases (Escanciano, 2001). As can be seen in Table 1, which summarizes the frequency distribution of the response to this question, 37.4% of firms consider that the payback period was equal or less than 2 years. In this sense it is clear that the Portuguese firms take longer to recover the cost with certification, compared to other countries.

4.1 - Investment Recovery Vs experience in quality

The first question to answer the formulated hypothesis was: what is the importance of experience in quality to shorten the payback period? Since the number of certified companies has increased over time, we explored a possible explanation of the high percentage of firms that still did not recover the investment that the certification implied.

Whereas at the end of year 2000 it was published a revision of the standard, appearing then ISO 9001:2000, we have grouped the firms that have obtained the certification until the year 2000, included, and the firms that made their first certification under the new framework, of which 73.0% of the companies obtained the first time certification, after the year 2001, ie, already in accordance with ISO 9001:2000.

Table 2 shows that, 36.06% of companies that have not recovered the investment of certification according to ISO 9000, more than half, ie, 20.67% (7.2% in 2003, 10.58% in 2004 and 2.88% in 2005), have been certified since 2003, which may explain, at least in part, the significant number of companies that still have not recovered the investment. On other hand, until 2 years after obtaining certification, 37.50% (18.75 less than 1 year, 13.94% between 1 and 1.5, and 18.75 between 1.5 and 2 years) of firms recovered the investment; this translates into a good experience or good learning in quality systems to improve production.

Table 2. Term recovery of investment in certification/ Year 1st certification (%)

Year 1st certification	Term payback period						Not yet recovered	Total
	Less than 1 year	Between 1 and 1.5 years	Between 1.5 and 2 years	Between 2 and 2.5 years	Between 2.5 and 3 years	More than 3 years		
Until 2000	0.96	4.81	8.17	2.40	2.88	1.44	3.85	24.52
2001	0.48	1.44	2.40	0.48	1.92	2.88	4.81	14.42
2002	1.44	2.88	2.40	0.96	4.33	0.00	6.73	18.75
2003	0.96	2.88	3.37	2.88	1.44	0.96	7.21	19.71
2004	0.96	1.44	2.40	2.88	0.96	0.00	10.58	19.23
2005	0.00	0.48	0.00	0.00	0.00	0.00	2.88	3.37
Total	4.81	13.94	18.75	9.62	11.54	5.29	36.06	100

3.2 - Investment Recovery Vs Implementation Time

Our second research question was: "Do firms that take less time to achieve certification believe that they will incur in a shorter pay-back period?"

The heads of the companies sampled were asked about how long time it took, since it was decided to implement the quality management system to its certification. In order to facilitate the response, it has been proposed a set of five time-periods to select the one that best suits the firm's experience. The results appear in Table 3.

As can be seen in Table 3, a higher percentage than 67% of the sample took between one and two years to obtain the certification since they took the decision to deploy the quality system. Moreover, 18.8% took less than a year.

Krasachol et al. (1998) in the study of Thai companies, concludes that the average time that companies spend to achieve certification is a year and a half, which is in line with Martinez et al. (2000), who indicates the same period. The study by Casadesús and Heras (2001) suggests 22 months as the average time of implantation and Escanciano (2000) indicates two years for 57% of companies. These times are in line with our study.

Table 3. Time from decision making to implement the quality system to certification.

Time of implementation of ISO 9001	Valid percentage	Cumulative percentage
Less than 1 year	18.8	18.8
Between 1 year and 2 years	67.2	85.9
Between 2 and 3 years	11.7	97.7
Between 3 and 4 years	1.6	99.2
More than 4 years	0.8	100

Thus, only 0.8% of companies took more than four years, which mirrors the existence of a process of reflection, or perhaps an accommodation problem of the firm's operations to the requirements of ISO 9000.

Table 4. Percentage on the period of investment recovery / deployment time

Time of implementation	Term payback period - %							Total
	Less than 1 year	Between 1 and 1.5 years	Between 1.5 and 2 years	Between 2 and 2.5 years	Between 2,5 and 3 years	More than 3 years	Not yet recovered	
Less than 1 year	0.47	2.35	4.23	1.88	1.41	0.47	7.51	18.31
Between 1 and 2 years	3.29	11.27	11.27	7.51	7.98	4.23	22.07	67.61
Between 2 and 3 years	0.47	0.47	2.82	0.47	1.88	0.00	5.16	11.27
Between 3 and 4 years	0.00	0.00	0.47	0.47	0.00	0.47	0.47	1.88
More than 4 years	0.00	0.00	0.00	0.00	0.00	0.47	0.47	0.94
Total	4.23	14.08	18.78	10.33	11.27	5.63	35.68	100

Crossing the two variables, deployment times and the investment recovery period, we have Table 4. In order to verify whether the firms that it took less time to achieve certification are those that believe that the benefits derived from it are greater than the costs of obtaining it, we using contingency tables. Thus, we try to compare the relationship between the firm's beliefs regarding costs – benefit recorded by the firm and the period of time to obtain certification. However, according to Table 5, the high value of the Chi Square statistic, doesn't give a significant relationship between both variables. We cannot conclude that a relationship exists between the recovery of an investment and the time elapsed since the decision in implementing the system, until to obtain the quality system certification.

Table 5. Chi – Square Tests

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21,046 ^a	24	,636
Likelihood Ratio	19,684	24	,715
Linear-by-Linear Association	,481	1	,488
N of Valid Cases	208		

a. 24 cells (68,6%) have expected count less than 5. The minimum expected count is ,09.

We must not forget that ISO 9001 is a standard that establishes basic requirements that the quality system of a firm must fulfill to ensure quality. Thus, when a firm exceeds the audit for its certification, the certifying entity is limited to declare that its quality system fulfils the requirements, without valuing if it only meets or if it exceeds them.

Such as Hareton et al. (1999), this study concludes that the time taken to obtain certification does not affect the relation cost - benefit. It is possible that the conclusion has been reached, due to the enterprises that have obtained the certification more

quickly, restricted to fulfil the minimum, forgetting that once the certification is achieved, there is the possibility of unanticipated investments, because the certification is only the beginning of a long journey to maintain the quality of its products or services.

3.3 - Investment Recovery Vs Type of Activity

The third question was: "Do industrial companies believe it takes less time to recover their investment?". The series of ISO 9000 standards are revised periodically and resulted in the publication of new versions that aim to reflect the progress in the field of quality and to ease the use in any organization regardless of size, sector of activity or product (Martinez, 2000).

Respondents were asked to identify the type of activity of their organization. 57.3% of firms are industrial, 36.9% work in the services field and 5.8% work, simultaneously, in industries and services. This distribution is similar to other studies, such as Buttle (1997) and Casadesús and Heras (2002).

Table 6. Ratio of percentage payback period by type of activity

Payback Period	Type of activity		
	Industry	Services	Both (industry and services)
Less than 1 year	5.9%	2.4%	9.1%
Between 1 year and 1.5 years	12.6%	11.9%	45.5%
Between 1.5 and 2 years	25.2%	10.7%	9.1%
Between 2 and 2.5 years	10.9%	9.5%	9.1%
Between 2.5 and 3 years	11.8%	11.9%	.0%
More than 3 years	5.0%	7.1%	.0%
Not yet recovered	28.6%	46.4%	27.3%
Total	100.0%	100.0%	100.0%

Combining the variables, type of activity and timing of investment recovery, we have Table 6. Looking at this table, the Payback Period is correlated with the type of activity. Industrial firms are able to recover their investment quicker than other firms. In fact, 66.39% of industrial firms recover their investment less than three years, 46.43% of service firms and 72.73% of the manufacturing and services firms.

On the other hand, 28.57% of industrial firms failed to recover their investment against 46.43% of services firms and 27.27% of firms of both types. This performance of industrial firms is in line with other studies as Powell (1995). Also, it is important to note that firms that are simultaneously industrial and geared towards services, and that have implemented quality system certification, recover their investment quicker than others. This finding may be due to the fact that there is a 'tertiarization' of the economy and a growing number of industrial firms that assert themselves as companies providing customer service.

3.4 - Investment Recovery Vs Number of Workers

The fourth question was: "Is there a relationship between the recovery of investment and the firm's size? Do larger firms believe they take more time to recover the investment?"

The implementation of the quality system and certification according to ISO 9001 has a high cost, especially for SME's (Anderson et.al. , 1999). The costs involved with implementation and certification can be a heavy burden for companies, so the smallest companies must implement the ISO 9001 more effectively and should plan it in the best way possible (Casadesús, 2001; Mo, 1997).

On the other hand, the large firms will be less pressed to recoup the investment required by quality system certification. Due to the difficulty in obtaining data directly from firms, we chose to measure firm size by the number of workers. Respondents were asked to indicate the approximate number of employees.

For the purposes of the analysis and comparison with other studies, the replies were aggregated according to the intervals contained in the 4th Directive on European Union Societies, as it appears in Table 7 below:

Table 7. Firm size by number of employees, according to the 4th Directive on European Union Societies.

Number of employees	Percentage valid	Cumulative percentage
Up to 50 employees (Small enterprises)	58.1	58.1
From 50 to 250 employees (Medium enterprises)	34.3	92.3
More than de 250 employees (Large enterprises)	7.7	100

In Table 7, it appears that the vast majority of firms (92.3%) are small or medium in terms of their size. Small firms represent 58.1%, and large firms represent only 7.7% of the total number of firms.

In other studies, we find a distribution of firms, with a predominance of companies up to 50 employees (Buttle, 1997). In the Casadesús and Heras (2001) study, there is a predominance of firms up to 100 employees, with a recent increase of certification of smaller companies. Combining the two variables, number of employees and timing of investment recovery, we have Table 8.

According to Table 8, we can observe that mid-size firms, that have between 51 to 250 employees, are the ones that recover their investment in certification the quickest. 53.73% of small firms, 68.06% of medium firms and 30.76% of large firms, recover their investment up to 3 years after certification, which confirms that the largest companies are the last ones to recover their investment.

Moreover, 41.32% of small firms, 26.39% of medium firms and 53.85% of large firms say they have not recovered their investment. It is the largest firms, in vast percentage, that say they still have not recovered the investment. It should be noted that the medium-sized firms are those that recover their investment the quickest given the implementation and the certification of the quality system.

Table 8. Term of payback period / firm size

Term payback period	Number of employees		
	Up to 50 employees	From 50 to 250 employees	More than 250 employees
Less than 1 year	3.31	5.56	0.00
Between 1 year and 1.5 years	9.92	20.83	15.38
Between 1.5 and 2 years	16.53	20.83	15.38
Between 2 and 2.5 years	12.40	6.94	0.00
Between 2.5 and 3 years	11.57	13.89	0.00
More than 3 years	4.96	5.56	15.38
Not yet recovered	41.32	26.39	53.85
Total	100	100	100

3.5 - Investment Recovery Vs Multinational

The fifth question was: "Do multinational companies feel they require more time to recover their investment?" In this analysis, only 9 firms, i.e. 3.5% of all firms, are multinational firms. Combining the variable "the multinational firm" with variable "Period of investment" we have Table 9.

Table 9. Deadline for return on investment / multinational enterprise

Term payback period	Is your firm a multinational?	
	Not	Yes
Less than 1 year	4.3%	16.7%
Between 1 year and 1.5 years	13.5%	33.3%
Between 1.5 and 2 years	18.8%	16.7%
Between 2 and 2.5 years	10.6%	0.0%
Between 2.5 and 3 years	11.1%	16.7%
More than 3 years	5.8%	0.0%
Not yet recovered	36.1%	16.7%
Total	100.0%	100.0%

We can see that 66.67% of multinational firms recovered their investment in less than two years and 83.33% in less than three years, versus 46.6% and 58.17% of the national firms, respectively. Only 16.7% of multinational companies had not recovered the investment against 36.1% of national companies. This data confirms that in the universe under study, multinational firms recover their investment in certification in less time than national companies do.

5. Conclusions

Firms are normally encouraged by the market to become certified, but above all, as a requirement by major clients. The quality system certification improves business relations and it has a positive effect on a financial perspective. The major benefits of quality systems certifications are, among others: increase in the number of customers and consequent volume of deliveries, improvement of profitability and productivity of the company, as well the competitive position and performance (cost savings), reduction of the number of external complaints and internal defects/scrap and achievement of some important client (Santos, 2011).

On other hand, the findings of our study are in line with other studies, namely a study done by Corbett (2005), who carried out a study about the financial performance from 1987 to 1997 of all publicly traded ISO 9000 certified manufacturing firms in the United States. According to this author, using event-study methods, they have found that after deciding to seek their first ISO 9000 certification, publicly traded manufacturing firms in the United States experience significant abnormal improvements in financial performance. It is also in line with Ittner (1999) because competitive requirements have forced nearly every firm to invest in quality improvement activities. However, many companies find it difficult to identify the quality improvement projects offering the highest returns, or to quantify the financial payback from these investments. According to this author, 52 per cent of the executives found it difficult to identify the quality projects with the highest expected economic returns, and none found this to be an easy task.

Our findings are also in line with Sharma (2005) who carried out a study based on 384 firm listed on the Singapore Stock Exchange over a 6-year period and revealed that the financial performance of firms achieving certification was significantly greater than non-certified firms. More importantly, yet according to Sharma (2005), the results indicated that ISO 9000 certification was associated with significant improvements in financial performance; the control-firm adjusted performance in the post-ISO 9000 certification period was significantly greater than that in the pre-ISO 9000 certification period. Hence the payback period of investments in certification, can be shorter.

The development of the concept of quality has led many firms to look for guidelines to implement it, which necessarily involves costs. This empirical study on certified firms in Portugal showed that there is a relationship between the investment

payback period associated with the implementation and certification of quality system according ISO 9001, the firm's type of activity, its size and its internationalization. However, it was observed that the fact that the firms take little time to obtain the certification does not have any influence on the reduced payback period. Although the implementation of the quality system according ISO 9001 is an expensive initiative, few firms believe that certification is not worthwhile. Thus, most firms feel that the benefits of certification outweigh the costs, are present in firms in the form of better organization, better representation and even when they have not recovered the investment made with the implementation of quality system. The majority of Portuguese firms (58.9%) take up to three years to recoup their investment and 35.5% of companies say they have not yet recovered the initial investment they made. Industrial firms, medium-sized firms and the most internationalized firms recovered their investments in certification quickly. However, it was observed that the fact that the firm took little time to obtain certification according to ISO 9001 has no influence on the reduced payback period.

These results indicate a greater difficulty for Portuguese firms to recover their investments in certification when compared with other studies in other countries.

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