

# On the Benefits of ISO9000 Certification

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## ABSTRACT

*This paper presents the results of a research project focusing on the advantages associated with ISO 9000 certification. In particular, this study compares the impact of ISO 9000 certification based on samples of companies from US, India and China. Sample surveys involving both ISO 9000 certified and non-certified companies from these countries are conducted and the results are presented. The impact of certification on the organizational effectiveness of companies with and without certification is compared based on a number of factors such as customer satisfaction, profitability and productivity.*

**Keywords:** International Standards; ISO9000, Quality Management

## 1. INTRODUCTION

ISO9000 is a series of international standards on quality management and quality assurance developed and published by the International Organization for Standardization (ISO). The standard provides guidelines as to how organizations should set up their quality assurance systems. Organizations use the standard to demonstrate the ability to consistently provide products and services that meet customer requirements. The standard has earned a global reputation as a basis for establishing effective and efficient quality management systems. Organizations with ISO9000 certifications have been formally recognized to follow a set of international quality guidelines. Certification to this quality standard is accepted worldwide and helps organizations to operate successfully in a global economy by selling or buying products and services from sources outside their domestic market.

There are multiple standards within the ISO9000 family including ISO9000 itself, which provides details on the fundamentals and vocabulary. The other standards cover specific points such as performance improvements, documentation and training. There is also ISO9001, which determines the requirements of a Quality Management System (QMS). ISO9001 is the only standard within the ISO 9000 family that an organization can become certified against. Certification to ISO9000 in this paper implies that the organization is certified against ISO9001.

ISO9000 certification can open up new markets since several industries have been making certification as a requirement to do business with them in recent years. The process of obtaining ISO certification can be long and expensive and depends on the quality improvement efforts that exist in an organization. It requires a significant investment of both human as well as financial resources of the organization. A majority of organizations make this decision because many customers require certification as a pre-condition to do business with them. After a significant initial investment of several thousand dollars for getting the certification, the organization still has to spend substantial amounts annually to maintain its certification status. There have been questions raised as to the worthiness of making such investments by organizations for obtaining certification in relation to the financial and other related organizational outcomes such as profitability, quality and customer satisfaction. Even though the nature and the scope of ISO9000 is well researched and understood, there has been considerable debate in the literature as to whether or not ISO 9000 has a positive impact on the organizational effectiveness. These studies typically compare financial outcomes before and after implementation of the ISO standard. However, there is a lack of sufficient research in the area of direct comparisons of companies with and without certification to study the impact of certification and the current study attempts to fill that gap.

The objective of the study is to empirically estimate the impact of certification on the performance of factors that measure organizational effectiveness such as customer satisfaction, profitability and productivity. The study consists of a survey of companies from the US, India and China. Samples of 500 companies each representing multiple sectors of business were selected. A questionnaire is used that consists of questions related to various aspects of quality management as well as quality outcomes. Comparisons between certified and noncertified firms are made within each country. In addition, some general insights on the differences in results between the three countries are also discussed.

## 2. LITERATURE REVIEW

A majority of the literature on ISO9000 discuss the general aspects of the standard. Generally research done in this area fall under three categories. The first category deals with the specific requirements mandated by the standard and what organizations need to do for compliance (Clements, 1993; Carter & Pasqual one, 1995; Hoyle, 1998; Haiyan & Alma, 2005).

The second category involves implementation issues. They provide specific steps for implementation including how to develop individual procedures to satisfy specific requirements mandated by the standard. A few of these papers also discuss the implementation of ISO9000 as a vehicle for implementing Total Quality Management Studies also show that the commercial aspects constitute a determining factor in the decision to implement the ISO9000 standard (Vloeberghs & Bellens, 1996); Quazi & Padibjo, 1998; Brown, Van der Wiele & Loughton, 1998; Douglas, Coleman & Oddy, 2003; Costa, Martinez-Lorente & Choic, 2008).

The third category focuses on the financial rewards of certification to ISO9000 standard. With a few exceptions, generally the literature supports increased financial rewards for organizations with certification as a result of implementing quality procedures required by the standard. Though the majority of papers in this category focus on the financial impact of ISO certification there are also studies that seek evidence that firms can achieve internal benefits such as quality, productivity, and market share improvements (Quazi, Hong & Meng, 2002; Corbett, Montes-Sancho & Kirsh, 2005; Terlaak & King, 2006; Koc, 2007; Sampaio, Saraiva & Rodrigues, 2010). Results in studies in the third category showed mixed results on significant improvements achieved due to certification. This study extends the comparison of internal benefits of certification (Karth, 2015) to include China.

### **3. METHODOLOGY**

Survey data was used for this study. A questionnaire that consisted of questions related to various aspects of quality management and quality outcomes was developed. Samples of 500 companies each from US and India were selected for the study. The companies were selected from publicly available data resources categorized by sectors. The surveys were sent by email with a link to the appropriate questionnaire depending on whether a company is certified or not. They were sent to the individual in charge of quality management programs in each organization. The questionnaire was designed to measure the differences between ISO certified and non-certified companies in specific areas related to various quality outcomes.

The questionnaire contains two sets of questions. Depending on the ISO certification status the respondent is directed to the appropriate set of questions. The first part of the questionnaire deals with the demographics. These questions refer to whether the company is in manufacturing or service, the age, the number of employees, annual sales, its multinational status as well as information regarding the major foreign markets the company is doing business with. For certified companies specific questions related to the various implementation issues. These questions seek details regarding the number of years since receiving ISO certification was achieved as well as information on quality results. Specific information is sought on the quality improvements achieved as a result of satisfying requirements by the ISO standard related to a number of quality outcomes. They include areas such as improvement in scrap/rework, customer satisfaction as well as overall profitability. For companies without certification the second part of the questionnaire deals with information on the current status of quality. The questions refer to areas of customer satisfaction, management of customer complaints and recent market performance. The questions on quality results are identical to that of the companies with certification. Measurable improvements achieved as a result of their quality management policies are rated in this section. Also all variables are measured by a five-point Likert scale with higher numbers representing better quality improvements. The responses were automatically entered into an SPSS file for analysis.

#### **3.1 Research Hypotheses**

The primary intent of the study is to assess the impact of certification on a number of quality-related factors such as customer satisfaction, profitability and productivity. Since the specific quality system requirements mandated by the standard are aimed at preventing non-conformities at all stages from design to servicing, certified companies do have an advantage by having an effective quality management system already in place. They have procedures for monitoring all major functions that affect quality. As an example, let us consider the "Purchasing" element from the standard. The standard specifies how an organization should control the purchasing function. The requirements dictate that the organization must establish and maintain documented procedures to ensure that the products purchased from suppliers must meet specified purchase requirements. The standard specifies that the organization shall evaluate and select suppliers on their ability to supply product in accordance with the organization's requirements. It requires that the criteria for selection, evaluation and re-evaluation of suppliers must be established and records of evaluations and any necessary actions resulted from evaluation must be maintained. Procedures should provide, for example, that all purchasing documents should include data which completely describe the product such as name, type, class, grade, specifications, drawings and other relevant data. The standard dictates that purchasing documents are required to be reviewed to make sure that they are acceptable and meet customer's specified requirements.

The Standard addresses in a similar way a set of important characteristics of good management practices in critical areas of operation including contract review, product identification and traceability, performing corrective and preventive actions as well as identifying training needs. The standard provides requirements to establish a more effective management system through a process approach and continuous improvement.

An organization that is certified to the standard is expected to have in place a structured and effective quality management system that is being improved continuously through routine internal audits and procedures for corrective and preventive actions and under a management leadership that is committed to customer satisfaction. Such an organization is more likely to produce better quality products which in turn increases customer satisfaction, increased sales and hence profitability.

Increased customer satisfaction also enhances improved market share. In addition, a certified organization is more likely to recognize the importance of meeting customer requirements and work towards understanding the customer needs to better customer satisfaction. Since in many ways certification to standard is a first step towards implementing TQM based policies, it is reasonable to expect more familiarity of TQM principles for certified organization compared to one that did not work towards achieving certification. Lastly, since certification is a requirement to do business with an increasing number of countries there is more pressure on manufacturing than service organizations to seek certified status in a global market. The following hypotheses were developed:

**Hypothesis 1** Organizations with certification are likely to achieve higher customer Satisfaction and improved productivity measures

**Hypothesis 2** Certification has a positive impact on profitability

**Hypothesis 3** Certification has a positive impact on market share.

These hypotheses were tested using survey data with appropriate statistical tools. The results are summarized in the following section.

### 3.2 Survey Results

Surveys were conducted based on random samples of 500 companies each from the US as well as from India. For the US survey, a total of 84 usable responses were obtained and 50 of these companies were ISO certified and the rest 34 were noncertified. For the survey from India, 86 responses were received in total and the numbers for ISO certified and the noncertified were 56 and 30 respectively. Analysis was carried out using both descriptive and inferential statistical methods. Table 1 below summarizes the demographic characteristics of the respondents.

**Table 1:** Summary of Selected Respondent Characteristics (%)

Respondent Characteristics	US		India		China	
	Certified	Noncertified	Certified	Noncertified	Certified	Noncertified
Manufacturing	46.0	14.7	60.7	53.3	65.6	27.8
More than 10 years of age	90.0	91.2	82.0	76.7	41.1	11.1
Certified more than 5 years	84.0	NA	53.6	NA	53.4	NA
Less than 500 employees	22.4	20.6	80.4	90.0	84.3	94.4
Multinational	73.5	66.0	17.9	6.7	12.2	13.0
% of Annual sales from foreign markets	75.5	63.5	72.0	60.0	54.4	63.0
% who responded an increase in market share	61.8	58.0	64.3	26.7	63.3	22.2

The profiles of certified and noncertified companies in both countries vary in certain characteristics while show similarity in others. In general the majority of the companies from India in the sample were in manufacturing. In contrast, the number of manufacturing companies in the sample from the US was relatively less especially from those without certification. A high percentage of firms in both samples were at least ten years old, had maintained their certification status for at least five years, and had their major portion of their sales from foreign markets. There was a significant difference with regard to the size of the firms. A vast majority of Indian companies in the sample were smaller and employed less than 500 employees. Also there was a substantially higher proportion of multinational firms

in the sample from the US. Responses for the question regarding possible increase in the market share were also substantially different for the two countries.

A typical company in the sample from US with certification was a multinational company in manufacturing, with at least 10 years of age, with over 1000 employees, with annual sales over 50 million dollars and was certified for at least five years. In contrast, the typical firm with certification from India was also in manufacturing and with at least ten years of age but was not a multinational firm and was smaller with less than 500 employees and with less than 20 million in annual revenues. In terms of their contributions from foreign markets in annual sales the firms were comparable. For the noncertified groups, the typical US firm in the sample was a matured large multinational firm in the service sector compared to the typical from India was a matured non-multinational manufacturing firm with less than 500 employees with almost half in annual sales compared to the US firms.

For respondents without certification there were a few questions on the organization's quality status. These questions related to respondents clearly identifying both the internal and external customers, understanding the consequences of unmet customer expectations as well as seeking input from customers for improvement. A majority from both countries responded that they identified their internal and external customers and that they understood what the management expectations were in terms of quality. More than 70% of the respondents from both countries also felt that their management clearly understood the consequences of unmet customer expectations. For the question regarding the frequency by which the company would ask the customers to identify areas for improvement, the responses from the US firms were more than double compared to the Indian firms. About 55% of the US companies reported that their initial response time for customer complaints were less than 24 hours compared to less than 30% for the Indian firms. The companies that reported substantial (more than 40%) improvement in specific quality areas by both ISO certified and non-certified groups for the two countries are summarized in Table 2. In general the Indian firms reported substantial improvements in all areas with higher percentages compared to that of the US firms. To a smaller extent, a similar trend was seen when Indian firms were compared with firms from China. The data also showed that a majority of the companies in the study adopted TQM based policies regardless of their certification status.

**Table 2: Summary of Respondents who reported Significant Improvements (%)**

Quality Characteristics	US		India		China	
	Certified	Noncertified	Certified	Noncertified	Certified	Noncertified
Scrap/Rework	54.0	36.3	63.3	49.0	40.1	18.5
Customer Complaints	48.0	53.0	69.6	50.0	35.4	25.1
On time Delivery	58.0	54.0	82.1	86.7	80.0	70.4
Customer Satisfaction	70.0	57.0	86.3	79.0	84.0	68.0
Employee Satisfaction	60.0	56.0	83.9	86.7	82.2	72.0
Profitability	64.0	51.0	82.1	68.0	80.0	68.5

Analysis using cross tabulation between each of the demographic variables and the performance variables discussed above provided more insights into whether or not certification had an effect on the organization's overall performance. In general, there was no noticeable trend between manufacturing and service organizations when percentages of companies that reported substantial improvements in performance characteristics were compared. .

Analysis of variance tests on individual performance characteristics showed that within groups variation was consistently largewhich is indicative of the fact there is considerable variability in the data.In addition, tests of independence using Chi-square tests were also conducted for each performance characteristic.

### 3.3 Tests of Hypotheses

Standard statistical tests were used to test each hypothesis. For hypothesis 1 independent t-tests were used to compare the average responses of companies with and without the certification for evaluating the improvements achieved in various performance categories. In each case the null hypothesis was that there is no difference in the average ratings in improvements between the certified and the noncertified companies.

Table 3 below summarizes the averages and the standard deviations for responses for respondents from each country. The areas tested were scrap, customer complaints, on-time delivery, customer satisfaction, employee satisfaction and

overall profitability. The questions in these specific areas were scored in such a way that the larger values were consistent with higher percentages of improvements achieved.

**Table 3:** Summary Statistics for Performance Characteristics

Performance Characteristics	US		India		China	
	Certified (n=50)	Noncertified (n=34)	Certified (n=50)	Noncertified (n=34)	Certified (n=50)	Noncertified (n=34)
	Mean SD	Mean SD	Mean SD	Mean SD	Mean SD	Mean SD
Scrap/Rework	2.66 1.446	2.03 1.029	2.82 1.377	2.07 1.432	2.41 1.413	1.93 1.412
Customer Complaints	2.68 1.349	2.66 1.249	3.25 1.405	2.72 0.816	1.89 1.410	1.87 1.289
On time Delivery	2.66 1.394	2.94 1.455	3.57 1.142	3.70 1.179	3.52 1.609	3.30 1.487
Customer Satisfaction	3.22 1.447	2.71 1.225	4.03 1.081	3.82 1.098	3.66 1.415	3.24 1.516
Employee Satisfaction	2.74 1.212	2.60 1.310	3.48 0.991	3.43 0.971	3.21 1.362	3.11 1.127
Profitability	2.56 1.098	2.01 1.329	3.38 0.849	2.94 1.167	3.46 1.353	3.02 1.124

The results of the t-tests are summarized in Tables 4,5 and 6 for US, India and China respectively. The mean differences between the certified and the noncertified groups with their corresponding standard errors of estimate, the t values and the probability values are presented in these tables. From Table 4, at a 5% level of significance, we see that, for US, the performance characteristics Scrap/Rework, Customer Satisfaction and Profitability are statistically significant. For India, based on the results in Table 5, we see that at a 5% level of significance, the performance characteristics Scrap/Rework, Customer Complaints and Profitability are statistically significant. For China, from Table 6 we find that at a 5% level of significance, Profitability is the only significant performance characteristic. Based on these results, Profitability was the only performance characteristic that significant for all the three countries. For US and India Scrap/Rework was also a significant characteristic. For the US, Customer Satisfaction was also a significant factor. This shows that certification had a positive influence with regard to the significant characteristics in respective countries but no statistical evidence was observed to establish significant differences between certified and the noncertified firms for performance characteristics Customer Complaints, Customer satisfaction, On-time Delivery and Employee Satisfaction in any countries.

**Table 4:** Tests of Hypotheses Results for US

Performance Characteristic	Mean Difference	Std Error of Difference	t-value	p.v. (2-sided)
Scrap/Rework	0.630	0.2880	2.1875	0.0316
Customer Complaints	0.016	0.2910	0.0570	0.9550
On time Delivery	-0.281	0.3150	-0.8910	0.3750
Customer Satisfaction	0.510	0.2430	2.0988	0.0390
Employee Satisfaction	0.135	0.2780	0.4860	0.6280
Profitability	0.550	0.2757	1.9942	0.0494

The summary of t-tests for India and China are presented in Table 5 and 6 below.

**Table 5:** Tests of Hypotheses Results for India

Quality Characteristic	Mean Difference	Std Error of Difference	t-value	p.v. (2-sided)
Scrap/Rework	0.750	0.3160	2.3734	0.0200
Customer Complaints	0.530	0.2395	2.2129	0.0296
On time Delivery	-0.129	0.2610	-0.4942	0.6240
Customer Satisfaction	0.212	0.2460	0.8617	0.3910
Employee Satisfaction	0.049	0.2230	0.2197	0.8266
Profitability	0.440	0.2093	2.1020	0.0386

**Table 6:** Tests of Hypotheses Results for China

Quality Characteristic	Mean Difference	Std Error of Difference	t-value	p.v. (2-sided)
Scrap/Rework	0.480	0.2430	1.975	0.0251
Customer Complaints	0.019	0.2350	0.079	0.9370
On time Delivery	0.226	0.2690	0.840	0.4030
Customer Satisfaction	0.415	0.2500	1.657	0.1000
Employee Satisfaction	0.100	0.2200	0.454	0.6500
Profitability	0.436	0.2190	1.991	0.0482

Hypothesis 1 states that the organizations with certification are likely to achieve higher Customer Satisfaction and improved productivity measures. The results support this hypothesis only partially. For the US firms, the difference in Customer Satisfaction levels of certified and noncertified firms showed significance at a 5% level while the same is not true for the Indian or the Chinese firms. For Indian companies the Customer Complaints showed statistically significant at 5% level but that was not the case for the US or the Chinese companies. For all the three countries, the performance characteristic Scrap/Rework was found to be statistically significant. Overall, the data only supports Hypothesis 1 partially.

Hypothesis 2 states that the certification has a positive impact on profitability. Based on the results, this hypothesis is supported at a 5% level of significance in all three cases attesting to the fact that the certification did have a positive impact on profitability for all the countries.

For testing the hypothesis 3 which states that the certification enhances increase in market share, proportions of firms that reported an increase in market share were compared for certified and noncertified firms for each country. A z-test was performed to test the equality of proportions. Results are summarized in Table 7. The proportions of firms surveyed who reported an increase are presented along with the z-values and the corresponding probability values for each country.

**Table 7:** Test of Hypothesis Results for Increase in Market share

Country	Certified	Noncertified	Z	p.v. (2-sided)
US	0.618	0.580	0.3499	0.7264
India	0.643	0.267	3.3200	0.0020
China	0.633	0.222	3.7586	0.0000

The results show that, for the US, the hypothesis of equality of proportions was not rejected implying that there was no significant difference between firms with and without certification with regard to increase in market share. However, for India and China, this hypothesis was strongly rejected implying that the certification really had an impact in improving market share for these countries.

#### 4. DISCUSSION AND CONCLUSIONS

A few studies in the past have shown mixed results on the benefits of certification. The current study perhaps belongs to this group. In general the results support the hypothesis that certification has a positive impact on factors that influence

organizational effectiveness. However, specific comparisons between US, India and China show that the impact of certification is not consistent when individual factors are considered. Results show that certification had a significant impact generally in reducing Scrap/Rework. For both US and India this factor was significant at 5% level. The factor Customer Complaints was significant for India but not for the US or China. Also Customer Satisfaction was significant for the US but not for either India or China. For all the three countries certification had a significant positive impact on profitability supporting potential financial rewards of ISO9000 certification.

Certification to ISO9000 guarantees adoption of a process approach to developing a quality management system that enhances customer satisfaction. A certified organization will systematically collect, analyze and evaluate data in order to improve the quality management system on a continual basis. Specific procedures are in place for monitoring and measuring and controlling nonconformities. As a result, certified organizations are more likely to implement good practices to monitor and eliminate waste. It appears reasonable then to expect certified companies to do a better job dealing with problems arising from Scrap/Rework function. All three countries had significant results with regard to this factor. For China, a much higher percentage of respondents from certified companies compared to noncertified ones (40.1% vs. 18.5%) reported significant improvements in Scrap/Rework area. It may be noted that improvements in this performance characteristic enhance increased profitability which was found to be again a significant factor for all the three countries.

Customer complaints was a significant factor for India. That was not the case for either US or China. The typical noncertified company from US in the sample was matured (a majority were 10-25 years of age) multinational, reporting significant improvements in dealing with customer complaints. These successful companies are likely to have good practices already implemented in this area and this could be the reason for the non-significance of this factor for the US. In contrast, noncertified companies in the sample from India were less matured and majority of them were not multinationals. Certification had a significant impact on addressing issues related to customer complaints in this case. A major aspect of implementation of procedures required by the international standard is to enhance customer satisfaction. For the US, it shows that certification did help to achieve improvements in this area. A majority of firms from India and China, regardless of their certification status, reported significant improvements in Customer Satisfaction which perhaps could account for the non-significance of this factor for India and China. As to be expected, for both countries, with effective quality improvement systems in place to eliminate waste and improve customer satisfaction, certified companies did significantly better in the area of profitability.

There was considerable heterogeneity in the data due to variability in the demographic characteristics especially for China. This could be a limiting factor for this study and partly the reason for our mixed results. Survey data showed that a good majority of companies who do not have certification also practiced TQM based strategies such as continuous improvement and improving customer satisfaction. These factors appear to have contributed to comparisons being more similar resulting in differences being not significant in statistical tests. There may be other country-specific factors also at play here that would have an impact on quality such as good work ethics and individual pride in work. Also the cost of obtaining and maintaining certification is much higher in the US compared to India and China. For both India and China, increase in market share was found to be a significant factor while this factor was not significant for US. Part of the reason for this could be the fact that both India and China are emerging economies that depend on exports for their economic growth and international recognition through ISO9000 quality standard certification could be a valuable asset for improving business. A comparison of individual firms before and after receiving certification would have been ideal to control variability but it is difficult if not impossible to obtain that kind of data in practice.

Currently over a million companies worldwide have certifications and it is reasonable to expect that the number will grow in the next several years as more companies require that their suppliers be certified as well. Also with increased global competition, more companies view certification to ISO9000 standard as a critical marketing tool. In addition, the decreasing cost of certification will also enhance the number of organizations that will join the rank in the foreseeable future.

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