

## “A STUDY ON IMPACT OF ISO 9001 ON THE CRITICAL SUCCESS FACTORS OF PRODUCTIVITY”

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### ABSTRACT

*It has been broadly pointed out that the emergence of ISO 9001 has been substantially changing the standardization of the functioning of various departments of the manufacturing organizations as a resultant of a significant impact on the quality of goods and services and productivity. Adopting ISO 9001 is crucial for the companies' growth and meeting the respective international competition. It is tried by many researchers to establish relationship between quality and productivity. The study of ISO 9001 is relevant to understand the relationship between ISO 9001 and productivity which leads for internal benefits. This research empirically studied the impact of ISO 9001 as whether it increases or decreases the productivity of the selected companies of steel and power sectors. Findings shows that there is a positive impact on the productivity which companies have implemented ISO 9001. This study will help the impact of ISO 9001 which provides insightful suggestions to companies to frame-up the strategy according to the open innovational world.*

**Keywords:** *ISO 9001, Globalization, Quality Management, Productivity*

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### INTRODUCTION

The highly demanding and ever-changing business environment, especially after the liberalization, privatization and globalization, has necessitated the organizations to be astute in the competitive market, offering products and services of superior quality. Such products and services enable them to attract new customers and strengthen their relationship with the existing ones. Timely adoptions of technological innovations have served to break the geographical boundaries, resulting in more informed and demanding customers than in yester years. Increased pressure from the customers, competitors and the environment is forcing the managements to implement strategies for lowering the operating costs and improving efficiency, without compromising quality.

Quality creates income and resultantly living of standard of the people prefer the quality instead of price while purchasing goods and services. Quality is the key strategy for maintaining competitive advantages and ISO 9001 integrated approach to improve the quality of goods and services.

ISO 9000 is a family of standards that provide a series of guidelines on how to establish a quality system to manage the processes that affect its product or services. This is in a way the

crystallization and international acceptance for the TQM concept. TQM concept, the basis for the ISO 9000 standard, and the productivity concept, both aim at profitability through organized efforts influencing each other can be seen as a complimentary business philosophies of ISO 9000 standard. The implementation of the standard and thus specify the action to be taken by the organization. The ISO is global standard. The world change faster than standard and hence standard need to be revised to keep them continuing suitable to user needs. The net effect of the implementation of ISO 9000 will be directly reflected in the organization sales volume, export and profitability.

## REVIEW OF LITERATURE

**Deming (1986)** argued that an improvement in quality creates corresponding improvement in productivity by reducing costs, errors, reworks and delays. The proponent of TQM claim that well implemented TQM can offer many benefits including improved products and services, reduced costs, more satisfied customers and employees and improved bottom line financial performance (**Powell,1996**). **Mehmet Demirbag (2005) and Christos et al. (2009)** explored that firm's focus on improving the quality of their product and processes lead to improve the revenue and reduction of costs. So, the financial performance of the firm as a result of quality initiatives can be measured by the increase in the level of sales, revenue produced, and level of cost performance, the return on investment and assets, and by increase in market share. Consequently, Profit increases. (**Gravin, 1984**). According to **Agus et al. (2009)**, QM has had a significant impact on the productivity and profitability of Malaysian electronics and electrical industry. Again, using the likert scale, QM variables, especially quality measurement, benchmarking and training are shown to have had a significant impact on productivity. (**Hendricks & Singhal, 1997**) Quality improvement program should be viewed not as a trivial solution for companies, but rather as a means with which to build and maintain a strong competitive foundation that will ensure the opportunities for financial success (**Winner & Eakins, 1994**).

**Handfeild et al. (1998)** found a positive linkage between TQM and financial performance occurs through two processes. Firstly, improve internal performance within the organization leads to less waste, improved efficiency, and ultimately higher return on assets, and then, improved customer satisfaction levels generate increased word of mouth, loyalty, brand value, and soon, leading to higher sales and market share.

In general, the  $R^2$  of the estimations with relatively parsimonious explanatory variables, are statistically significant (**Novales, 1996**) proponents of process management practices its expectations of improved quality and efficiency, leading to increased revenue, reduced costs, and ultimately higher profits (e.g. **Winter, 1994; Garvin, 1995; Hammer and Champy, 1993; Harry and Schroeder, 2000**).

**McCraken and Haynak** presented a simulation study to examine the impact on productivity in which they proved that as defects, scrap and rework decreased, productivity increased. **Kamlan et al.** investigated through regression analysis the impact of quality management tools on performance and reported a positive relationship between the two. These programs being with mapping or documenting an organization's operating processes (e.g. **Dean and Bowen, 1994; Hickman and Wageman, 1995, Hammer and Champy, 1993; ISO 2007**). Since receiving an ISO 9000 certification involves periodic audits by third party registrars to ensure that organizations are documenting and conforming to processes, there is little change for

an organization to be certified without undertaking the actual practices. After studying the literature on ISO 9000, it indicates that there are certain critical factors which are in addition to core value-added processes to deliver quality.

Growing adoption of ISO 9001 certification has led to the emergence of a distinct stream of quality research. In addition in majority of studies as per review of literature has been conducted in foreign countries very few studies has been conducted in Indian context to evaluate the performance before and after the ISO 9001 certification. Productivity and quality are an integral component of companies. Therefore, the primary purpose of the study is to identify the impact of ISO 9001 implementation on productivity in respect of the selected companies especially under power and steel sectors. Research in power area plays an important role in every sphere of the economic development of the country. India's per capita electrical energy consumption is targeted for 50% growth in the Eleventh five year plan from present level of 704 units per year. Therefore, it is considered as backbone of industrial & agricultural growth. Steel sector also having a critical role in economy.

## OBJECTIVES OF STUDY

- To study the difference in productivity during pre and post adoption period in selected sectors.
- To study the role of critical success factors of productivity due to ISO 9001.

## HYPOTHESES

Keeping in view the objectives of the study, the hypotheses have been formulated and tested:

H: There is no significant difference in productivity during pre and post adoption period in selected sectors.

H: There is no significant role of critical success factor of productivity.

## RESEARCH METHODOLOGY

The sector division of economy has been taken from the annual research report of CRISIL on the union budget of 2012- 2013. Out of all sectors I have selected two sectors which having a prospect of growth in the 12<sup>th</sup> five year plan. Accordingly the companies from each sector has been selected which is enlisted in [www.bse.com](http://www.bse.com). Six companies has been selected which having a higher market capitalization better to drawn an inference about the population. Judgmental sampling has been used. Secondary data was used to understand the impact of ISO 9001 in financial terms to measure the productivity of the companies selected under the certain sectors such as power and steel. The present study is based on the secondary as well as primary data. Analysis implies the computation of certain measures so that the relationship among various variables can be established. **Mann Whitney U test, Wilcoxon Sign Rank test, and Multiple regression analysis** has used.

## ANALYSIS AND INTERPRETATION

TABLE NO. 1

**The Trends of productivity of non adoption and adoption of ISO 9001 on the companies of Power Sector**

(Rs. in millions)

Non adoption trends	Productivity	ISO 9001 adoption trend	Productivity	Asymp. Sig. (2-tailed)
-1 year to -2 year	116.555	1 year to 2 year	121.65	<b>.021</b>
-1 year to -3 year	116.773	1 year to 3 year	125.05	
-1 year to -4 year	115.718	1 year to 4 year	122.42	
-1 year to -5 year	115.346	1 year to 5 year	121.49	

Note: 1. Mann Whitney u test at 5% level of significance.

2. Non adoption period taken base year 5<sup>th</sup> before adopting ISO 9001 certification that is (-1) and during the post adoption period year of adopting ISO 9001 certification taken as base year that is 1.

The table no. 1 exhibits the average productivity of selected companies of power sector during the pre and post adoption period of ISO 9001 certification. This table shows the highest growth during the three years of adoption of ISO 9001 certification. Productivity of the companies for the period of non adoption shows declining trend i.e. Rs.116.55 millions to Rs. 115.346 millions. The productivity has been declining during the five years period before ISO 9001 certification. The productivity is highest during the post adoption period from 1 year to 3 year that is Rs.125.06 millions. Lowest increment in productivity during the pre adoption period is Rs.115.346 millions. Implementation of ISO 9001 fixes the responsibility, accountability and authority of the employees in the organizations. ISO 9001 will also improve varies skills and competencies of employees. It also create healthy environment in the organization. It is clear that the productivity of the companies has increased during the period of ISO 9001. This result is also supported by the studies such as Haj Ali (1996), Shajrawi (1999) and Sadder (2000).They also found in their research that it improves the morale, loyalty as other related benefits of the employees. The study conducted by Casadesus et.al (2001) and Elmuti and Kathawala (1997) explained that the proper implementation by top management would improve the morale of the employees. So, adoption of ISO 9001 has positive impact on the productivity of the companies working in power sector. **Clause 8.3 of ISO 9001 the organization shall ensure that product which does not conform to product requirements is identified and controlled to prevent its unintended use of delivery. Resultantly it reduces the cost then improves productivity.** As exhibits from table at 5% level significance the value of p is equal to .021that is less than .05. ( $p < .05$ ) It can be concluded that results of test elicited that there is a statistically significant difference between respective trends during non adoption and adoption period. The change during post adoption period is positive as mean value is higher during post adoption period. In respect of the productivity during the pre and post adoption period the mean of pre period (Rs. 116.098 millions) is less than the mean of post period (Rs. 122.65 millions).

**TABLE NO. 2****The trends of productivity of non adoption and adoption of ISO 9001 on the companies of steel sector.**

(Rs. in millions)

Non adoption	Productivity	Post adoption of ISO 9001	Productivity	Asymp. Sig. (2-tailed)
-1 year to -2 year	316.381	1 year to 2 year	430.496	<b>0.021</b>
-1 year to -3 year	303.372	1 year to 3 year	439.282	
-1 year to -4 year	298.069	1 year to 4 year	428.445	
-1 year to -5 year	295.519	1 year to 5 year	412.771	

Note: 1. Mann Whitney u test at 5% level of significance.

2. In above table non adoption period taken base year 5<sup>th</sup> before receiving ISO 9001 certification that is (-1) and during the post adoption period year of receiving ISO 9001 certification taken as base year that is 1.

The table no. 2 exhibits the trends of productivity of selected companies of steel sector during the pre and post adoption period of ISO 9001 certification. As the base year is the 5 year before the certification has been taken to know the trends during the pre adoption period. On other side, trend of growth in productivity has been observed to know the average change in productivity from year of getting ISO 9001 certification. Total productivity had a declining trend from -2 year to -4 year in pre adoption period. Total productivity ranges from Rs. 316.381 millions to Rs. 298.069 millions for -2 year to -4 year respectively. The productivity is highest during the post adoption period from 1 year to 3 year that is Rs.439.282 millions. Lowest increase in productivity during the pre adoption period (-1 year to -5 year) is Rs.295.519 millions. It explains that ISO 9001 helps to avail the benefits of marketing through which sales are increasing and Inaki Heras (2000) supported the results that there is a significant difference between pre and post period of the ISO 9001 certification. ISO 9000 adoption will improve an organization's financial performance (e.g Corbett et al., 2005; Sharma, 2005; Simmons and White, 1999; Naveh and and Marcus, 2005; Heras et al., 2002). Through ISO 9001 clause 7.2.3 customer communication: The organization shall determine and implement effective arrangements for communicating with customers in relation to; product information, enquires, contracts or order handling, including amendments and feedback including customer complaints. The result of Mann Whitney u test such as the a highest raise in the productivity during post adoption period of the ISO 9001 certification namely mean value is highest during the post period of ISO 9001 certification. From the table no. 3 mean of post adoption period' productivity (Rs. 427.74 millions) is higher than the pre adoption period of ISO 9001 certification (Rs. 303.33 millions). As exhibits from table no. 2 at 5% level significance the value of p is equal to .021 that is less than .05. ( $p < .05$ ) It can be concluded that results of test elicited that there is a statistically significant difference between respective trends during non adoption and adoption period.

**TABLE NO. 3**

**The result of Wilcoxon sign rank test during pre and post period Total productivity of their ISO 9001 certification on the selected sectors**

Sectors	Name Of Companies	WILCOXON RANK TEST	Sig.(2 tailed)
Power sector	Adani Enterprises Ltd.	-.405 <sup>a</sup>	0.686
	Bharat Heavy Electricals Ltd.	-.405 <sup>b</sup>	0.686
	J S W Energy Ltd.	-2.023 <sup>a</sup>	0.043
	PGCL	-2.023 <sup>b</sup>	0.043
	N T P C Ltd.	-2.023 <sup>a</sup>	0.043
	Uniflex Cables Ltd.	-.405 <sup>b</sup>	0.686
Steel sector	Bhushan steel ltd	-.405 <sup>a</sup>	0.686
	Jindal steel ltd	-2.023 <sup>a</sup>	0.043
	Tata steel ltd	-2.023 <sup>a</sup>	0.043
	Sesa goa ltd	-2.023 <sup>a</sup>	0.043
	Jindal saw ltd.	-1.214 <sup>b</sup>	0.225
	SAIL	-1.214 <sup>a</sup>	0.225

From the table it was reported that under power sector, steel and textile sector certain companies were selected such as under power sector Adani power ltd, BHEL, JSW Energy ltd, PGCL and NTPC having no significant difference between pre and post period of the ISO 9001 certification.

As p value ( $p < .05$ ) but on other hand Adani, BHEL, Uniflex cable ltd had a significant difference between pre and post adoption period of ISO 9001 certification. Under the steel sector, Bhushan steel ltd, Jindal Saw ltd, SAIL, had a significant difference between pre and post period of the ISO 9001 certification ( $p > .05$ ). On other hand, Jindal Steel ltd, Tata steel ltd and Sesa Goa ltd, had no significant difference between pre and post period of the ISO 9001 certification ( $p < .05$ ). So, the hypothesis being accepted for the certain companies.

### **SELECTED CRITICAL VARIABLES OF PRODUCTIVITY AND QUALITY**

Multiple regression analysis technique that used to explore the nature of a relationship between two groups of continuous random variables. Regression model is used to quantify the relationship between the two groups. Multiple regression equation method involves a linear combination of explanatory variables (independent). The present study consist of eight variables such as leadership, motivational initiatives, information system of management, training, process management, product design, permanent quality improvement, cooperation and rewards.

A general equation of multiple regressions that involves all the 8 predictors (e.g. X1 to X12) and one dependent variable (Y) can be stated as under:

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + \dots + b_8 X_8$$

Where,  $X_1, X_2, \dots, X_8$  such as leadership, motivational initiatives, information system of management, training, process management, product design, permanent quality improvement, cooperation and rewards 'Y' refers to productivity and 'a' is Constant

By substituting the values of regression coefficients (table 3) of all predictors and constant, the complete regression equation can be read as:

$$\text{Prod} = \beta_0 + \beta_1 (\text{leadership}) + \beta_2 (\text{motivational initiatives}) + \beta_3 (\text{information system of management}) + \beta_4 (\text{training}) + \beta_5 (\text{process management}) + \beta_6 (\text{product design}) + \beta_7 (\text{permanent quality improvement}) + \beta_8 (\text{cooperation and rewards}) + \epsilon$$

**TABLE NO. 4**  
**Parameters/Coefficients in Regressions**

Predictors	Regression Coefficients (b)	Mean
Constant	50.15	
Leadership	.234	41.23
Motivational initiatives	.143	33.2
Information system of management	.712	9.12
Training	.765	43
Process management	.543	21
Product design	.432	11
Permanent quality improvement	.123	8.21
Cooperation and rewards	.542	4.63
R=12.32		

The regression equation, in score form, indicates that for every unit positive impact on leadership productivity increased by .234 (here leadership emerges as a positive predictor). In same way, individual contribution of each of the predictors can be calculated. Table shows that multiple correlation between predictors and dependent measure is .726. The obtained F value for the significance of multiple R is equals to 12.32. The degree of freedom being 12 and 387, the F is significant beyond .001 probability level. The findings clearly indicate that the variables leadership, motivational initiatives and other independent variables have a significant impact on productivity.

## FINDINGS

The change during post adoption period is positive as mean value is higher during post adoption period. In respect of the productivity during the pre and post adoption period the mean of pre period (Rs. 116.098 millions) is less than the mean of post period (Rs. 122.65 millions). ISO 9000 adoption will improve an organization's financial performance (e.g Corbett et al., 2005; Sharma, 2005; Simmons and White, 1999; Naveh and Marcus, 2005; Heras et al., 2002). Through ISO 9001 clause 7.2.3 customer communication: the organization shall determine and implement effective arrangements for communicating with customers in relation to; product information, enquires, contracts or order handling, including amendments and feedback including customer complaints.

The findings clearly indicate that the variables such as leadership, motivational initiatives and other independent variables have a significant impact on productivity.

## SCOPE FOR FUTURE RESEARCH

Future research may be conducted in order to make an improvement in the existing one such as:

- Collecting data from the other industries with larger samples in order to have more comprehensive study.
- Further studies can be conducted by the companies themselves to identify the implication of the ISO 9001 certification.
- Comparative study can be conducted among the various companies selected from different sectors.
- It can be persuaded to non adopter companies to implement ISO 9001 in their respective units.

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