CHAPTER 2

REVIEW OF LITERATURE

In Indian industries the main reason to go in for ISO 9000 certification is to achieve a competitive edge over the rivals in the business. If the objective of implementing ISO 9000 is indeed relatively uniform, the question is whether the impact of ISO certification on different firms is similar as well. It is more or less evident from the literature and the subjective reactions generated from the industrial personnel and academicians. The impact of ISO 9000 on different employees and organisations is different and is, in fact, mediated by a variety of individual and organisational factors. If this be the case, it is indeed necessary to assess the impact of ISO 9000 on productivity. To explore this more systematically, an extensive review of the literature published in journals, conference proceedings and relevant books published during the last two decades has been undertaken. The review of the related literature is aimed at obtaining an insight into the implementation process of ISO 9000 certification. The literature is critically analyzed and presented after categorization into the main areas. The literature review has been classified according to the following factors at the national and international levels.

- Implementation issues of ISO 9000
- Reasons for ISO 9000 implementation
- Executives’ perceptions
• Success stories of the industries
• Road map to ISO registration
• Organisational effects
• The benefits of ISO 9000 and
• Barriers to the implementation of ISO 9000

Literature related to the productivity model and the variables selected for analysis in the current study also have been reviewed.

2.1 IMPLEMENTATION ISSUES OF ISO 9000

The successful implementation of ISO 9000 depends on several factors. Many firms have gone in for registration with full spirit and enthusiasm, motivated by the benefits of ISO 9000 certification. It is observed that only modest benefits have been reported.

The time, effort and money involved in implementing ISO 9000 depend upon the level of the quality system followed by the organisation. An organisation needs to ensure that it has made the appropriate changes for successful implementation. The management commitment, the involvement of the employees, a proper knowledge of ISO 9000 and the quality system are the important critical success factors for effective ISO 9000 implementation.

2.1.1 Issues in developed countries

A few studies have explored certain aspects of the implementation process. For example, the Production Engineering Research Association (PERA) specially addressed the effective utilization of government financial
assistance (see the survey of Quality Consultancy Scheme Clients 1988-1990, PERA International and Salford University Business Services Ltd., 1991) for the implementation of ISO 9000 quality system standards.

In order to survive in the competitive business, the organisation has to meet the minimum requirements of ISO 9000 (Sakofsky, 1994). The senior executives of an organisation should be encouraged to understand the purpose and scope of ISO 9000 standards, which embraces the whole business. This willingness to move beyond initial registration may again be linked to the perceived benefits of the systems (Taylor, 1995).

Implementing Statistical Process Control (SPC) is a necessary condition in order to sustain the ISO implementation (Gongxu, 1998).

A study conducted by the Singapore Productivity and Standards Board (Leong, 1998) reveals that the most common reasons for the implementation of ISO 9000 are:

1. To achieve a systematic work procedure for carrying out work.
2. To enhance the reputation of the company and
3. To achieve consistency in operation procedures.

The external consultants are mainly used for carrying out training and starting off the documentation. There is no significant difference between the mean time and effort devoted to ISO 9000 implementation between internally and externally driven firms. However, the amount of time and effort devoted to ISO 9000 implementation varies with respect to type, size and the current quality system of the organisation. The three most commonly identified
difficulties faced during the implementation are increased documentation, interpretation of the ISO 9000 clauses and efforts to make the employees understand the newly adopted procedures (Leong, 1998).

One of the motivating factors for a successful ISO 9001 initiative is total employee involvement. For the ISO 9001 program to be effective, every operating part has to contribute equally to its success. Mohr, General Manager of United Airlines Engine Maintenance division has identified that the employee participation and self-satisfaction are driving forces behind the prosperity of each business unit and the ISO 9001 program's overall success (O'Neil, 1998).

2.1.2 Related issues in India

Today, the tremendous enthusiasm about quality in Indian industry has led to a fresh introspection of the erstwhile quality practice of Indian industry, work culture, business environment, etc. For the effective implementation of ISO 9000 in the Indian context, a clear understanding of the specified ISO 9000 requirements is imperative. Its utility is the first step in the journey to Total Quality Management (Agrawal, 1993).

The quality system implementation is not a difficult task, but it requires the willingness and commitment of each and every one in the organisation to create a harmonic environment at the work place and to improve the quality of the product. (Shrivastava, 1996).
2.2. REASONS FOR ISO 9000 IMPLEMENTATION

2.2.1 In developed countries

It is useful to review the reasons why the organisations go in for ISO certification and understand the driving forces behind them. Rayner and Porter (1991) have stated that the principal reasons for seeking ISO 9000 certification are actual and anticipated customer pressure and gaining market advantage. The main reasons for seeking certification have been associated with marketing. The greatest benefits have been internal ones such as management control, discipline and waste avoidance. This indicates that the obtaining of the ISO 9000 certification can pave the way for improvement in overall management.

Business with the European Community (EC), which is demanding quality, on the lines of ISO 9000 and beyond for safety related items, is a strong starting motivation for ISO 9000 registration (Sahu, 1993).

Mendham et al's (1994) survey of four thousand ninety one small businesses reported that their principal motivation for seeking certification, other than to improve quality was to win new customers.

The research conducted on behalf of SGG Yarsley, an internationally accredited ISO registrar examined the reasons for obtaining ISO registration and its impact on businesses. The driving force behind the majority of the decisions to pursue ISO registration has been external pressure. 78% of the respondents sought registration to the standards in anticipation of future customer requirement. The need to maintain market share, pressure from existing customers and marketability have also been identified as other reasons.
The internal factors are the improvement in consistency, cost reduction, efficiency and the quality of operations. (Manchester Business School, 1995).

The motivating factors for gaining registration are varied, as might be expected. According to the survey (Taylor, 1995), pro-active step, increasing efficiency or productivity, customer pressure, high-grade product and being a part of Total Quality Management plan are the factors, in the order of preference, for seeking ISO 9000 registration. Customer pressure is clearly a factor for ISO 9000 registration, but certainly not the predominant reason.

Hollise (1995) has given the reasons for ISO registration as retention of market share, customer pressure, trade in European country and the desire to establish functional quality management system. Companies pursue ISO 9000 certification in order to enjoy both operational and marketing benefits (Buttle, 1996).

The survey conducted in Turkey (Erel and Ghosh, 1997) shows that the outstanding reasons for registration are to:

- Export to the European Community
- Increase customer satisfaction
- Procure continuity in quality
- Increase market share
- Establish TQM culture
- Create competitive advantage and
- Establish an effective workflow.
The main reasons for implementing ISO in Turkey are very similar to the ones given for implementation in Malaysia (Idris, 1996) but different from those given in Brazil (Macedo-Soares, 1996).

A study conducted in Hong Kong (Lee et al. 1997) reports that the customer pressure has been the prime reason for the implementation of ISO 9000.

The objectives of acquiring ISO 9000 as given by Mallak (1997) are:

- To achieve and sustain the quality of products and services
- To give the management the confidence that quality standards are being met and
- To give the customer the confidence that consistency is being delivered in the product or service

The University Industrial Center (UIC) of the University of Hong Kong (Lee, 1998), considered the following reasons for the implementation of ISO 9001:

- To adopt a systematic approach
- To ensure product and service quality and
- To avoid rework

Lisiecka (1998) has identified the reasons for understanding work on the quality system as customer pressure, competition in the sector, need to obtain advantage over competitors, improvement of prestige and winning the customers' confidence. Wong (1998) and Leong (1998) have also supported these reasons.
Chan and Lee (1998), in a research study, identified the motivation for ISO 9000 implementation, as Government compliance and customer demand for quality improvement.

Vincent et al's (1998) study on "Quality of Laboratory Support Services in Tertiary Institutions" advocated customer requirement, improvement of quality and improvement of efficiency as the reasons for ISO certification in private enterprises. Their studies also reveal that, for public sector companies the reasons for ISO adaptation are:

- Promoting image
- Improving operation efficiency and
- Safety procedures.

Paul and Tritos (1998) have considered the three main reasons for adopting ISO 9000 certification as:

- Improving product quality
- Market needs/Competitive drive and
- Corporate strategy/Policy

In recent years, the number of ISO 9000 registered companies in Singapore has grown rapidly. The major driving force is the pressure from customers and competitors. Even government owned companies required their supplier to be ISO 9000 certified. An ISO 9000 quality system is fast becoming an "admission ticket" as well as a competitive advantage (Wan and Chow, 1999).
In a survey of Hong Kong companies which have implemented ISO series, Lau et al. (1999) asserted the external reasons such as customer demand and competitive advantage as more important than the internal reasons such as improving quality and efficiency. These findings suggest the possibility of the warnings from Juran and others being heeded in Hong Kong.

2.2.2 Indian scenario

The main driving factor to make a company to seek ISO certification is real or anticipated customer satisfaction. It is only the customer pressure for quality that has driven the Indian industries to consider implementation of ISO (Bagchi, 1994).

The major factors to attain ISO 9000 standards registration come from pressure applied by a large company on their supply chain. Vendors supplying to large companies are under pressure to get ISO 9000 certification. (Business Today, 1995).

Vaidya (1996) indicated that Bharath Heavy Electricals Ltd. (BHEL) has set the goal for achieving certification to ISO 9001 in order to maintain leading positions and to sustain high level of customer confidence.

According to Shrivastava (1996), the main motives behind achieving certification are

- To modify and improve the existing working system;
- To enhance the company's image in the market; and
To improve productivity, competition, customer satisfaction and working culture

In a deregulated economic framework (Rajeev Chadha, 1999), Indian organisations are opting for ISO 9000 as a tool to acquire Total Quality Management in a short timeframe in view of

- global competition;
- cost reduction of products/services;
- market demand; and
- quality upgradation.

2.3. MANAGERIAL/EXECUTIVE PERCEPTION

The views differ as to the suitability of ISO 9000 certification. It is argued that the quality management system is a necessary foundation for other quality initiatives such as Total Quality Management.

According to a survey (Taylor, 1995), the senior executives' perception reveals that the purpose of ISO 9000 is to find a disciplined means of providing goods/services for the customers. The survey of real levels of the senior executives' commitment to ISO 9000 implementation concludes that there are at least some grounds for believing that it could improve the organisation's performance considerably. A majority of the senior executives have expressed an intention to move from ISO 9000 to Total Quality Management, although other findings in the survey cast doubt about the likelihood of these aspirations translating into action.
Weston (1995) has stated the main reason for ISO registration is strategic. Registration has been perceived as a necessary ingredient for the successful future of the business and the meeting of the customers’ expectations.

2.4. SUCCESS STORIES OF THE INDUSTRIES

The road to ISO 9000 certification is long and complex, but the results will improve not only an organisation's processes and products, but also its relations with customers and suppliers (DeAngelis, 1991).

The British Standard Institution, a leading British Registrar has estimated that the registered firms reduce their operating costs by 10% on an average (Marquardt, 1991). Du Pont attributes the following results to the adoption of ISO 9000 standards in their plants:

- On-time delivery at one plant increased from 70% to 90%
- Cycle time in another plant came down from 15 days to 11/2 days
- First-pass yield at one plant went up from 72% to 92%
- Test procedures were reduced from 3000 to 1100.

The adequacy of the system and the procedure's adherence to it is measured by auditing against the standard. Therefore, ISO standards measure neither the efficiency of the system nor how good the product or service. (O'Neil, 1994).
Garver and Lucore (1994) have projected that in future, ISO 9000 would be imperative to remain in business. The survey on the impact of ISO 9000 on businesses in UK shows that the ISO certified companies are prepared to recommend the standard to other similar organisations (Buttle, 1996). Jones et al. (1997) have provided statistical evidence showing that the certified companies have eventually benefited from implementation of ISO 9000.

A study on tangible benefits of obtaining and maintaining ISO 9000 certification reveals that there has been no significant increase in prices of products and services from suppliers after certification. Only about 18% of the organisations have increased the prices of their products and services to their customers. Hence, the costs of implementation and certification are not passed on to the consumers (Leong, 1998).

ISO 9001 has proved to be the tool to maintain the customers' trust with regard to safety and to ensure the consistency of the competitiveness in the business. For example, United Airlines Engine Maintenance division realized the benefits of quality standards. After getting certified they realized 4 major benefits during the period of three years: increased efficiency, employee involvement, improved accountability and technical publication accuracy. As a result of this the overall efficiency increased and the division was able to decrease the engine overhaul cycle time from 120 days to 60 days (O'Neil, 1998).

ISO 9000 can have a number of positive implications with one of the most important benefits being, the impact on the firm's profitability (Hertzberger, 1999). It has provided significant advantages even if they are difficult to quantify.
The successful outcome obtained by two Indian industries after the implementation of quality system are reduction of defective items by 65% to 100%, improved productivity reduction in poor quality and halved process variability (Vaidya, 1996).

2.5 ROAD MAP TO ISO 9000 REGISTRATION

ISO 9000 registration is a virtual necessity for competing at the international level. Companies willing to share their proven methods for implementing effective quality system have paved the road to ISO 9000 registration. These companies have demonstrated that there are many right ways to satisfy the requirements of the ISO 9000 standards, and their experiences can be a valuable learning tool for organisations just beginning the journey.

Du Pont's Quality Management & Technology Center has developed a working guide to quality system registration called "A Road Map to ISO Registration" (Marquardt, 1991). It has the following nine milestones:

- Securing Management decision and commitment
- Establishing and training internal resources
- Conducting internal audits
- Documenting efforts
- Choosing a registrar
- Documenting and implementing practices
- Learning from pre-assessment
- Undergoing registration assessment and
- Achieving registration
This follows a stair-like progression from initial management decision to actual quality system registration.

Registration is really just the beginning of the ISO 9000 process: it serves as the foundation for organizing quality and business improvements. By following the Du Pont's road map to ISO registration, organisations are able to prioritize the needs and resources to implement an effective quality system that meets the ISO 9000 standards. Successful ISO 9000 registration involves considerable costs but this road map overcomes some of the drawbacks associated with ISO 9000 (Kymberly, 1994).

ISO 9000 process is only one of the foundation stones for TQM. It feeds the TQM process by formalizing a methodology to make decisions to determine whether products and services meet established quality levels (Sakofsky, 1994). ISO 9000 quality system registration is a critical milestone to a quality journey towards TQM (Aytimur, 1995).

Taylor's (1995) survey has revealed that there are differences in the registration activity associated with the size of organisation, penetration being greatest in the medium-sized organisation. The highest registration has been in manufacturing sector. The registration has reduced considerably in dropping service sector and public sector organisations.

According to Benson (1995), ISO 9000 registration seems to be a natural fit and an extension of existing activities. A road map to ISO 9000 registration based on Du Pont's stair-step approach has been followed with
standard procedures. This has helped the company to achieve registration three months ahead of schedule.

It is generally recognized that ISO certification is the cornerstone towards TQM (Godfrey, 1997). Most of the ISO certified companies have indicated their intention of pursuing TQM as their next step forward (Chan and Lee, 1998).

2.6. THE IMPACT OF ISO 9000 ON THE ORGANISATION

ISO 9000 is a tool that the management needs to implement in order to become a better organisation. The manufacturing functions are generally heavily affected by the implementation of ISO 9000 while at the same time, they are likely to be most prepared for the necessary changes. One of the effects of ISO 9000 on manufacturing functions is the need to document all of the existing work processes and activities prior to registration. The manufacturing role has often been forced to focus on quality improvement.

Every company, whether it manufactures a product or provides a service, should be concerned about meeting the ISO 9000 requirements because they provide a foundation for an effective quality system. ISO 9000 registration makes companies more competitive (Dzus, 1991).

A British Government survey (see Berry, 1997) revealed that 89% of ISO 9000 registered companies reported greater operational efficiency. 48% reported increased profitability, 76% reported improvement in marketing and 26% reported increased export sales. The survey conducted by London Chambers of Commerce and Industry (LCCI, 1994) on two hundred and thirty
seven companies has reported that 74% of service firms and 57% of manufacturers believed that BS 5750/ISO 9000 certification has increased their competitive advantages.

Though ISO 9000 is least effective in improving the processes, it is certainly more effective in improving the other four Operational Business Performance (OBP) factors, namely supplier relationship, people, policy deployment and customer relationship (Mann, 1994).

If the ISO 9000 approach does not involve a major change in the manufacturing process, it will not add a significant burden to the company (Bellon, 1995).

A survey conducted by Manchester Business School (1995) reveals that on the average 53% of the respondents have been satisfied with the impact of ISO 9000.

A study conducted by Bhadury and Mandal (1998) among the ISO certified companies reported that 49% of the companies improved the quality of their product, 23% lowered the cost of manufacturing, 39% reduced the customer complaints and 36% of the companies reported high motivation.

Many industries have aggressively pursued registration to ISO 9000 standard series to enhance their productivity and International marketability. The impact of ISO 9000 standard in the European Union Food Industry reveals that if ISO certification becomes a common business practice and a de facto condition to do business in Europe, it could represent an effective barrier to third-country trade. The volume of trade increases with the level of adoption of
a common standard. ISO standards are found to be an important tool to sustain and improve competitiveness in the food sector (Zailbet et al. 1997).

Leong (1998) has observed the following changes in the organisation as a result of ISO 9000 certification:

- Document and data control.
- Corrective and preventive actions
- Internal quality audits.

According to him, most companies did not have performance indicators in place prior to the ISO 9000 implementation and certification. Among the performance indicators, delivery performance measures and customer-related measures are the most commonly adopted. In addition, manufacturing firms are more likely to collect productivity and quality measures, whereas service firms collect delivery and customer-related measures.

O’Neil (1998) concluded that ISO 9001 proved to be a competitive advantage, a productivity tool, a customer assurance mechanism and a road map to operational efficiency. In short, ISO 9001 was a vehicle to go beyond industry norms. A survey conducted by Koo et al. (1998) also concluded that the ISO certification had improved the performance of the company.

Empirical evidence (see Chan and Lee, 1998) from 157 ISO certified companies and 244 non-ISO certified companies showed that the former have better implementation of TQM practices addressed by the Baldrige criteria and achieved significantly more competitive financial performance. Taylor (1995) also has the same view about the financial impact.
In another study, Lee et al. (1999) have presented the survey result of 383 companies on the benefits of certification. The benefits are clearer work procedures, improved quality of product/service, improved team spirit, better control over subcontractors, increased efficiency and fewer customer complaints.

Most companies implementing ISO 9000 have experienced improvement in the company’s quality profile, increased sales, convenience in dealing with product liability litigation, improved work environment and safety. A substantial decline in cost of product and wastage has also been reported (Rajeev Chadha, 1999).

According to Hertzberger (1999), ISO can have a significant impact on the marketing and selling of a firm's products, design and development functions and manufacturing. It can also have a significant impact on the organisation’s operations, culture and its employees. A telephonic interview has been conducted with the quality engineer in an automatic parts manufacturing company to gain an understanding of the impact of ISO 9000 on his organisation. It reveals that the most important aspect of ISO is to assess the organisations current position and to compare the progress based on various measures. This process allows them to benchmark and analyze cost trends associated with quality.

2.7 THE BENEFITS OF ISO 9000

This section discusses briefly the benefits acquired through implementation of ISO 9000 in various organisations. The introduction and implementation of the ISO 9000 standards has unquestionably benefited a
larger number of organisations. There are plenty of companies, which point out the tangible results such as increased profits, reduced wastage or rework, lower operational costs and many more actual measures of the rewards for a better quality operation. Also, companies have reported the valuable intangible benefits such as better relationships with customers, increased staff responsibilities and morale (Douglas Munro, 1996).

Lofgren (1991) has pointed out that many suppliers are committing their organisations to achieve registration because of the perceived benefits, which include the following:

- Reduction in the number and scope of rapidly increasing second-party audits by customers
- Operation as a tool for improving the supplier's operations.
- Use of registration as a marketing tool
- Access to markets that require quality system registration.

In U.K., ISO 9000 standard has reduced product cost significantly by consistently providing high quality products. Less rework, fewer customer returns and less time spent on solving the customer problems are the major benefits reported. Implementing ISO has helped the employees to understand their jobs better and it has also improved training (De Angelis, 1991).

A study conducted by Rayner and Porter (1991) reveals that the most valuable benefit achieved has been the retention of existing customers. This observation would imply that, in many cases, the decision to obtain certification has been a defensive action to retain existing customers in an environment where the need to demonstrate commitment to quality is increasing. The survey
also identifies the fact that the improvement of product quality is one of the important benefits through ISO 9000 certification. This is probably true because the firms are working to fixed specifications. Improved quality shows itself as reduced scrap, wastage and warranty cost, rather than as an absolute increase in product quality or an improvement in process capability.

Ho (1994) further divided Bellon's (1995) categorization of ISO benefits into advantages of having the system and additional advantages from having independently assessed quality system. Ho (1994) has cited that the benefits of British Standard Institution are in the form of a marketing tool, buyer acceptance as proof of quality and technical expertise, less likelihood of customers to arrange special assessment, quality performance morale improvement, reduction in cost of quality, improved customer satisfaction/sales/competitiveness and profitability, confidence, image and export markets.

Dale (1994) has outlined the following benefits of ISO: Error reduction, reduction of audit time by customers, improvement in control discipline procedure, documentation, communication, customer satisfaction, identification of ineffective and surplus procedures and better working environment.

The survey conducted by Confederation of Indian Industries (CII, 1995) reports that 54% of 330 respondents have stated an improvement in their product and process quality after obtaining certification. Parah and Larry (1995) have observed that more and more companies achieving ISO 9000 certification are realizing increased productivity, reduced customer audits and fewer returns.
A survey conducted by Manchester business school reveals that, overall, 99% of the respondents claimed that they have benefited from ISO registration. Better management control, improved awareness, elimination of procedural problems, improved efficiency and better induction of new staff are the benefits of ISO registration. It is also used as a useful marketing tool, a means of improving customer service and satisfaction and a vehicle to improve market share (Manchester Business School, 1995).

Erel and Ghosh (1997) have reported the following benefits of ISO:

- More motivated employees
- Better product quality
- Lower quality costs and
- Efficient operations

According to a survey conducted by Weston (1995), the most commonly listed benefits from ISO 9000 certification are:

- Establishment of a formal quality system
- Establishment of consistent documentation methods and
- Competitive advantage

The 23 benefits identified in UK businesses by Buttle (1996) due to ISO 9000 certification are classified into four categories: profitability, process improvement, marketing benefits and sundry benefits. The most important benefit sought from certification is profit improvement. Ranked second and third most important are process improvement and marketing benefits respectively. Marketing benefits include gaining new customers, retaining existing customers, using the standard as promotional tool, increasing market
share, increasing growth in sales and improving customer service and satisfaction. McLachlan (1996) has reported 35 benefits similar to this and he has related the benefits to the relevant clauses of ISO.

Motwani et al. (1996) have summarized the benefits of ISO indicated by Dzus (1991), Sateesh (1992) and Sprow (1992) under six heads. These benefits are trade with European countries, recognition by the international community, marketing edge, improvement in quality, productivity and costs, discarding of second party audits by prospective customers and being listed in international certified supplier directory. Benefits such as reduced complaints, conformity to specifications have been also reported (Kemezis, 1992).

Yung (1997) reported the benefits of ISO as marketing advantage, better documentation system, quality awareness among staff and efficiency improvement/cost reduction.

Benefits of ISO certification include (Quazi and Padibjo, 1997) increased customer preference, improved company quality image and competitiveness in the market, compliance to customer requirements, streamlined procedures and documentation, increased awareness of preventive and corrective actions and provision of foundation for TQM.

Mo and Chan (1997) have classified the ISO benefits into quantitative (expansion of market share, reduction of scrap and rework, increase in productivity and reduction of product defect) and non-quantitative (increase in employee morale, minimized role ambiguity, better control of suppliers, improvement of existing system and improved customer satisfaction) benefits.
Lee (1997) has summarized the findings of various surveys conducted in different countries including the U.K., ten European countries, New Zealand, Australia, U.S.A. and Hong Kong. Furthermore, the Industry Department of the Government of Hong Kong has conducted a comprehensive study on certified companies in Hong Kong. According to these studies, the small and medium enterprises are able to derive benefits in the following areas:

- Clear working procedures
- Better team spirit
- Reduced wastage
- Improved quality
- Better control of subcontractors
- Less customer compliance
- Better relations with customers

The most common benefits of ISO implementation identified by Leong (1998) are:

- Improved document control and documentation
- More systematic work procedures, and
- Improved traceability
- Decreased customer complaints
- Less defective work

Ufuk (1998) in a survey identifies the following improvements through ISO certification.

- Creation of documentation
- Construction of an effective paper flow
• Customer satisfaction
• Increase of quality level
• Clearer understanding of TQM
• Strengthening of prestige in the market

Upon acquisition of ISO certificate, the company has made significant improvement in the following areas:

• Management ability
• Quality System
• Servicing
• Training of employees
• Business reputation and
• Personnel management

Vincent et al. (1998), in a research study, identified the following benefits acquired through ISO implementation in private enterprises:

• Improved customer satisfaction
• Reduced rejects
• Increased market share and profit and
• Better control

whereas the benefits acquired by public sectors are:

• Confidence from the public and operatives
• Streamlined processes and
• Pride
In the same study, the benefits obtained by laboratory support services in Treasury Education Institutions (TEI) are

- Process re-engineering
- Systematic work attitude
- Job satisfaction and
- Work recognition

According to Hertsberger (1999) the four points that communicate the common message about the benefits of ISO 9000 are: commitment to quality, enhancement of the quality of the product, adoption of quality system and finally, the message that quality is not an empty promise.

Most of the companies certified under the ISO 9000 have reported significant improvements in their internal organisation and increased productivity (Rafidah, 1999).

A survey of four hundred and five Malaysian companies reveals better documentation, greater quality awareness and improved measurement system as the internal benefits and improved customer satisfaction, higher perceived quality and competitive edge as the external benefits (Yahya and Keat, 2000).

2.8 BARRIERS TO THE IMPLEMENTATION OF ISO 9000

Despite the growth and popularity of ISO certification, the scheme is not without flaw. The reasons for many companies failing to recognize the advantages have been reviewed in this section. The barriers have to be
identified and properly handled so that the quality system can successfully be introduced and sustained. Sometimes the cost involved for the time and effort may have outweighed the benefits of certification. Since certification does not itself translate into high quality, the quality of products or services may not actually improve (Manchester Business School, 1995). In addition, the implementation costs are sometimes felt to be disproportionate for small businesses because the ISO specifications required significant supplementation such as the employment consultant firms (Avery 1994). Thus companies that want to implement ISO must carry out cost-benefit analysis before proceeding with implementation.

ISO 9000 implementation does not provide the expected increase of sales to new customers (Leong, 1998). Hence, ISO 9000 implementation appears to benefit the company only internally, in their documentation and systematic procedures, but not externally in increased sales and profits.

There are other perceived disadvantages such as reduced innovation, creativity and free thinking to a certain extent (Avery, 1994). Another disadvantage has been the requirement of documentation of all activities at each operation level which leads to employee resistance (Weston, 1995).

A study of quality practices in Asia, Syrett and Pike (1995) remarked that it is possible for a company to be certified to ISO 9000 without having initiated any quality program. Many companies seek ISO 9000 because of pressure from customers.
Other points of criticism (McLachlan. 1996) about ISO include the following:

- Being too expensive
- Not addressing the needs of small businesses
- Being biased towards manufacturing
- Being irrelevant with rubbish still being made and sold

ISO 9000 could lead to loss of flexibility because it formalizes the process and documentation. Rigid documentation may tend to hamper the ability of a company to change quickly (Hunt. 1996). Since the ISO 9000 quality manual has 150 requirements in 20 categories, people commonly think that it is too theoretical, too elaborate and outdated. Moreover, it may lack flexibility and getting the ISO 9000 certificate may be of no use afterwards (Vloeberghs and Bellens 1996).

Motwani et al. (1996) have listed the major points of criticism against ISO 9000, namely lack of details with respect to the safety of the product, continuous improvement, preparation costs and maintenance of ISO certification.

While carrying out the procedures involved in the implementation of ISO 9000 Quality system at Central Cables limited in India, the company has faced various difficulties. Lack of funds, resistance from their employees for adopting a new system, lack of awareness of the new concept and irregular scrap disposal are some of the difficulties reported by Shrivastava (1996). Apart from these major problems, the other constraints are lack of facilities and technical manpower, lack of awareness of Statistical Process Control (SPC), etc.
There are actual and perceived disadvantages in launching ISO certification. One has to be aware of the possible drawbacks and take appropriate measures to avoid or minimize their adverse impact. It has been reported that ISO being costly and time consuming, it typically pays for itself within 15 months (Mallak et al. 1997). It is the first barrier to overcome in order to convince the top management to introduce ISO into the organisation. Seddon (1997) has pointed out that in addition to cost, ISO has made customers unhappy, demoralized staff, and has taken away opportunities to improve performance.

A study by Quazi et al. (1997) has identified the following reasons: lack of top management commitment, lack of financial and human resources, lack of time for implementation and perceived employee resistance.

Mo et al. (1997) suggest that the cost of certification, customers and the attitude of applying double standard and increased ISO maintenance over heads are the main factors inhibiting ISO certification. Small firms have experienced technical obstacles like implementation costs, inadequate resources and insufficient external assistance.

There are many barriers to an efficient and effective adoption of ISO in the service sector. The most common problem is how ISO 9002 concepts should be interpreted and applied in the banking sector in an effective way without creating unnecessary documentation burden. Yet another difficulty is to train the staff to competently adopt the standards and approach in assessing various functions of a bank (Liu and Loh, 1999).
The survey conducted in the Footwear Company reveals that it has not witnessed a major cost reduction or changes in defect rates after ISO implementation. Another drawback of ISO 9000 is the cost of implementation of ISO 9000 (Hertzberger, 1999).

2.9 PRODUCTIVITY AND QUALITY

The literature related to ISO 9000 implementation issues in general, and its impact on the organisations in particular, have been discussed in the previous sections. Since this study intends to analyze the effect of ISO 9000 on productivity in Indian industries after ISO 9000 certification the literature related to productivity models and variables selected have been reported in this section.

Quality is a specific dimension of productivity. High productivity is not the outcome of lowered specification of products manufactured or services rendered. Generally, a quality product is considered to be costly. It is presumed that quality and cost have a linear relationship. Adam et al. (1981) have suggested a formal definition of quality:

Quality is the degree to which a product or service conforms to a set of predetermined standards related to the characteristics that determine its value in the market place and its performance of the function for which it was designed.

Juran (1999) defines quality as fitness for use. Crosby (1979) sees it as conformity to requirements. Feigenbaum (1991) has defined quality as the outcome of the contribution of all departments. Thus, quality is the total
composite product and service characteristics of marketing, engineering, manufacturing and maintenance through which the product and service in use will meet the expectations of the customer. ISO 9000 quality system emphasizes on the customers’ needs and wants. Quality (ISO 9000, 1992) is the totality of features and characteristics of a product or service that have a bearing on its ability to satisfy stated or implied needs.

Shewhart’s broad quality concept has lead to the chain reaction described by Deming (1986) which links quality, productivity, market share and jobs. Feigenbaum (1991) stresses a system approach to quality through the definition of a quality system:

Taguchi (1986) emphasizes an engineering approach to quality. Hill (1989) sees quality as the single most important factor in determining market share. A fundamental understanding of quality is essential to compete effectively in today’s international markets.

According to Mohanty and Lakhe (1997), quality and productivity are considered to be the major strategic instruments in today’s competitive business world. Productivity improvement has always been the dominant strategy for improving the quality of life of any nation. Traditionally, every nation has endeavored towards improving the factors that positively affect productivity. However, the role of quality has relatively been underplayed. The primary reason for such low consideration of quality has been due to the misconception that improvement of quality tends to increase the costs and hence degrade the financial performance. Moreover, in most organisations, there has always been a bias either towards quality or towards productivity but not on both in their totality. There is a recent growing realization in many organisations, that quality and productivity are complementary to each other
and not mutually exclusive. Poor quality of goods and services will add to the costs through disrupted schedule, delayed deliveries, increased rework, more scrap, wasted manpower and material, lost machine time etc., and thus will reduce productivity and consequently lead to a decline in profit. Therefore, an attempt is made to understand the links between quality and productivity.

2.9.1 Linking productivity and quality

Thor (1992) has observed that the improvement of productivity requires balanced attention to the behavioral and managerial systems, in addition to the technical configuration. Output cannot be counted unless it is without defect. Thus, we find quite a convergence between organisational productivity improvement and organisational process quality improvement. Both are aimed at giving the customers better products and services and are achieved through balanced system improvement. Worker effort leads to process quality and productivity improvement which in turn allow the reliable creation of products and services to satisfy the customer.

Productivity and quality are interrelated (Sink, 1982). Efforts to improve quality, if effective and efficient, can have a significant impact on the growth of productivity. Day (1988) reveals that reduction in wastage through quality makes the organisation healthier and improves its productivity.

Mefford (1991) outlines three mechanisms which link quality and productivity. The first is the direct improvement in productivity that results from reducing the number of defective products. A second link is through the secondary improvements in quality or productivity that often occur from efforts to improve the other and the third way in which quality and productivity are linked is by building employee morale.
2.9.2 Factors affecting productivity

The major factors affecting the productivity performance of Indian industry are the degree of competition in the industry both domestic and international, infrastructure availability and overall growth prospects for the economy (Ahluwalia, 1990).

Rothary (1991) has stated that ISO 9000 is a ready-made system for providing the kind of integrated but flexible quality management, which can fit into an overall management information system and can also sit comfortably with production management system of varying degrees of complexity. Hence, it increases both quality and productivity.

Suzette et al. (1991) describe the need to establish strategic goals for integrating quality with productivity. Gunasekaran et al. (1994) present a framework for improving productivity and quality by considering various issues and recent manufacturing concepts like Just-in-time. Yossi (1993) describes how effectively a quality cost management system will help in improving productivity.

Richard (1994) mentions the benchmarking procedures for productivity and quality improvement. He stresses the necessity for developing a productivity system that should be in line with ISO 9000 standard. Many researchers have envisaged the use of Information Technology (IT) for improving productivity. Howard (1993) describes the issues, methodologies and techniques that can aid in improving and integrating quality with productivity.

Thomas et al. (1992) examine the competitive advantage gained by providing computer information systems towards the development of an enterprise-wide system as a means to improve productivity and quality.
Expert systems, knowledge based systems and DSS will aid in productivity improvement only if human factors are considered during their development stages. A series of articles deal with the use of software as a means to improve the productivity. This is generalized as the benefit of avoiding waste as a means to improve productivity. Since the industrial world has concentrated more on quality development during the last decade, it is insisted that productivity improvement efforts will succeed only if they are capable of integrating themselves with quality improvement programs.

Shrivastava and Lakhe (1996) have stated that one of the main reasons for ISO 9000 certification is to improve productivity by reducing scrap, ultimately leading to saving of cost, time and improving profits.

A model to enhance productivity, integrating quality, cost and time management will be useful to the manufacturing community (Murugesh, 1997). Sutermeister (1976) incorporates the dimensions of quality in productivity as "Productivity is defined as output per employee-hour, quality considered". He has listed a large number of technical factors that contribute to productivity. These include product design, quality of materials, process technology, plant and job layout, product mix, maintenance and repair, market research etc. Shaw (1978) also emphasizes the Quality-Productivity connection and stresses the fact that a successful organisation has a winning combination of both.

The traditional concept lays stress on the efficient use of labor, material and capital as input resources. Over and above these inputs, there is the "technology" dimension which has a significant effect on the output. Output per man, a conventional measure of productivity, will be altered by changes in machine tools, process technology, methods and techniques. quality of materials to be processed and the machining parameter.
In recent years, numerous researchers have categorized the primary effects of the strategy, focusing on quality and its continuous improvement (Chang, 1993; Seemer, 1993; Hunt, 1992; Kane, 1992; Kinlaw, 1992 and Raynor, 1992).

Daniel and Retsperger (1991) argue that quality-focused management improves productivity and product appeal in a market. From the perspective of global competition, Noori (1991) has suggested that the competitive market conditions demand that firms compete simultaneously, not only in terms of quality but also in terms of cost dependability, flexibility, time and service.

2.9.3 Productivity measures

Methodologies and models for productivity measurement are essentially the translation of the various definitions and concepts of productivity. The conventional concept has considered productivity as a ratio of physical output to input. Pennathur (1983) questions this concept, as it implies that productivity is concerned only with production and manufacturing activities. Sink (1983) recognizes that there is a need for synthesis, clarification, and definition of productivity and its measurement.

2.9.3.1 Partial Productivity Measure (PPM)

Partial productivity is the ratio of output to one class of input. For example, labor productivity (the ratio of output to labor input) is the partial productivity measure. Similarly, capital productivity (the ratio of output to
capital input) and material productivity (the ratio of output to material input) are examples of partial productivity (Sumanth, 1990).

2.9.3.2 Total Factor Productivity Measure (TFPM)

Total factor productivity is the ratio of net output to the sum of associated labor and capital (factor) inputs. Net output means total input minus intermediate goods and services purchased.

2.9.3.3 Total Productivity Measure (TPM)

Total productivity measure is the ratio of the total output to the sum of all input factors. A total productivity measure reflects the joint impact of all the inputs in productivity.

2.9.4 Productivity Models

Many models to measure productivity have been contributed by several authors. The concepts of productivity have been challenged by many researchers and a number of models are proposed, each projecting a new methodology. Each of the models has its merits and usefulness for a specific application. Various models available can be categorized on the basis of concepts on which these have been constructed. The following are some of the major categories:

- Production function models
- Financial ratios as measures of productivity
- Production based models
• Product oriented models
• Surrogate models
• Economic utility models
• Models based on systems approach

A review of the literature on productivity measurement models shows that there is no agreed definition of the term productivity. A large number of models on productivity (PremVrat, 1998) are based on the concepts of casual analysis. There is a need to challenge the conventional models and to develop a new methodology. The new approach has to consider an organisation with multiple objectives to work as a system with interacting sub-system and under the influence of an external environment acting as a supra-system.

Any model of productivity measurement should basically translate the objectives of productivity measurement into a measurable index. The objectives have a direct relevance to the concept of productivity.

Using the principles of Management By Objectives (MBO), system theory and drawing on the proven strengths of the techniques of multi-attribute decision analysis and Goal programming, a new methodology of productivity measurement termed as Performance Objectives-Productivity (PO-P) has been developed. It is a multi-criteria productivity measurement technique, which lays stress on performance against objectivated output.

One of the primary tasks of productivity measurement is to provide comparative information on the rise or decline in productivity along with identification of opportunities for improvement. PO-P model meets these requirements. MBO lays stress on performance, setting of performance
objectives and review and monitoring of the organisation. The growth of system theory in recent times has provided a new powerful tool to analyze organisation issues. The principles of system theory have been applied in order to evolve performance objectives of an organisation considered as a system as well as sub-system. Objectivated output is the optimum level of output in terms of performance objectives. Goal programming provides a powerful tool to determine objectivated output.

2.9.4.1 PO-P Model

Productivity under PO-P concept is the system productivity. The outputs are the performance of the system and its subsystem. In the PO-P approach, productivity index of the system is built up in stages, from the productivity indices of the subsystem constituting the system. PO-P approach considers an organisation as a system and measures productivity by taking into account all the factors of productivity from each of the sub-systems. Emphasis is on the achievement of goals related to the system within the constraints of the resources available. Hence this model has been selected as the basis for the study.

2.9.4.2 PO-P Methodology

Productivity measurement using the PO-P approach consists of the following steps.

- Identification of sub-systems
- Identification of Key Performance Areas (KPA) in each sub-system
• Setting performance objectives
• Ranking and weighing of subsystems, KPA and performance objectives and
• Determination of objectivated output

Identification of sub-systems is the first step and a major exercise. Burns and Stalker (1961) have suggested that a system (or a sub-system) should have the following five basic characteristics:

• A central objective and measure of performance
• Its environment
• Its resources
• Its components and
• Its management

A typical industrial organisation engaged in manufacturing and marketing of engineering goods can be considered as a system with the following sub-systems.

• Production Sub-system
• Marketing Sub-system
• Financial Sub-system
• Technology Sub-system
• HRD Sub-system
• Material Sub-system
• Goals and values Sub-system

Each of the above sub-systems is briefly described below.
♦ Production Sub-system

The production sub-system is meant to produce marketable goods in right quantity, right quality at minimum cost and at the right time. The sub-system uses several resources including men, materials and capital. The raw materials as inputs flow through a large number of facilities to get transformed into finished goods.

♦ Marketing Sub-system

The marketing sub-system is organized to achieve a basic objective of finished manufactured stock to cash through sale. There are other functional requirements such as the development of a product strategy, carrying out surveys to identify the demand for the company's product, as well as to determine the preference of customers.

♦ Financial Sub-system

The financial sub-system is required to provide information and data to the organisation and other sub-systems. The sub-system provides information on accounts receivable, inventories, accounts payable, product costing and expenses incurred under each of the expense heads.

♦ Technology Sub-system

The technology sub-system provides information on techniques required for the transformation of inputs to outputs in the production sub-systems. The knowledge or the techniques cover a wide spectrum ranging from
providing specifications to procurement of materials, process engineering, tooling required for conversion process and use of tools of industrial engineering.

♦ **HRD Sub-system**

The HRD sub-system has its own unique role to play by making use of professional expertise in retaining motivated and dedicated manpower.

♦ **Material Sub-system**

The material sub-system encompasses several areas such as inventory control, material planning, vendor development etc. Its effectiveness and performance are largely governed by the input flows from the Technology and Production sub-systems.

♦ **Goals and values Sub-system**

The goals and values sub-system fundamentally represents the responsibility of the corporate office. Two sets of goals can be visualized: the financial goals and the social goals.

2.9.5 **Identification of Key Performance Areas**

Key Performance Area (KPA) can be in one or more of the following four categories namely quantity, quality, punctuality and cost. While identifying KPAs, the association with the sub-system and the basis and relevance to the organisational objectives should be considered. KPA must be subordinate to the sub-system. The areas of performance for a typical
production sub-system includes manpower utilization, assets utilization, schedule completion, quality of production and production planning and control. A typical marketing sub-system comprises various performance areas such as sales, market research, product strategy and sales promotion and publicity.

The key performance areas of the financial sub-system include accounts receivable, accounts payable, costing and budgetary controls and taxation. The performance areas of the technology sub-system pertaining to design and development, production engineering, and R & D/innovation under the HRD sub-system, industrial relations, personnel administration, and training and development are considered. The key performance areas of the materials sub-system include purchase management, stores management, and inventory control. The KPA's relevance to goals and values of sub-systems include financial goals, investor satisfaction, employee satisfaction, customer satisfaction, supplier satisfaction and societal goals.

2.10 CONCLUSION

The literature on ISO 9000 quality system and its impact over various aspects have been reviewed. It is observed that there have been many studies undertaken in various countries with respect to the ISO 9000 quality system. The impact of ISO 9000 on productivity level has not been reported in any literature. An attempt has been made in this study to find out the reasons for going in for ISO 9000 certification and its impact on productivity levels in India.