Study of Policy, Practice and Outcome on Implementation of Quality Management Program in Indian Engine Bearing Industry

THESIS

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By
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Under the Supervision of
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CERTIFICATE

This is to certify that the thesis entitled **"Study of Policy, Practice and Outcome on Implementation of Quality Management Program in Indian Engine Bearing Industry"**; submitted by Himanshu M. Trivedi ID NO 2000PHXF404 for the award of Ph.D. degree of the Institute embodies original work done by him under my supervision.

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This research work is dedicated to
my mother
Late Bharti M. Trivedi
and my father
Shri Mahendra R. Trivedi
who, by their own way of living,
have inspired me
in my life’s journey towards excellence.

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Himanshu M. Trivedi
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ABSTRACT

During the post-liberalization period in India, several business leaders and quality experts have identified quality improvement as one of the most critical factors for the survival and growth of Indian industries.

Many business organisations in India initiated various Quality Management Program (QMP)s to improve the quality of their products and services. Among several initiatives some of the popular initiatives are ISO9001, QS9000, ISO/TS16949, Total Quality Management (TQM), Total Productive Maintenance (TPM), Just in Time (JIT), Kaizen, Six Sigma etc. They are implemented in the organisation with an aim to improve input, processes or output of product or processes or combination of it with coordinated efforts within the entire organisation. They are referred as Quality Management Program (QMP). QMP was defined as "Any organisational activity aimed at improving the quality of inputs, process or outputs of an organisation" (Jha, 1997).

The results gained due to such initiatives are positively encouraging. For the first time the Indian companies have won prestigious quality awards at international level. While Indian organisations are recording their achievements at the global level, it is interesting to understand how the improvements are managed within the organisation. The Indian Auto Component sector was selected for study in this respect due to its high growth potential (ACMA-McKinsey Report, 2005) in India.

Literature review on QMP revealed that Quality Management (QM) the world over has evolved from practice, and has benefitted from the research that followed. Quality Management initially emerged with strong engineering orientation, is now widely covered in management journals due to its multiple functional involvement within the organisation. Available literature on QMP identifies that in spite of the knowledge of factors favouring and inhibiting QMPs, the success rate of QMP implementation has been very low. Although the formal practices of quality management are well established, in all major companies, very little attention on research focus has been given specifically on quality management practices

(Flynn, et. al., 1994). As a result, quality management theory is far from fully developed (Ahire et. al., 1996) and its theoretical conceptualization is, in many aspects, still lacking (Lagrosen, S., 2004). The little research available on Indian workers makes it clear that success of western model is limited when applied in India (Kumar, Garg & Mehta, 2002). Scholarly inquiry at the Doctoral level dissertation in this area is also scant.

This study is expected to develop understanding of the process of QMP implementation. Thus the objectives of this research are to identify:

1) How Quality Management Program (QMP) is implemented?
2) What are the policy related elements in QMPs?
3) What are the practices deployed in QMP implementation?
4) How is the outcome of QMP measured?

Literature review on QMP revealed that there are mainly three streams of articles published. They are 'Research based', authors' 'Experience sharing' and 'Guru's prescription'. In this research, various factors favouring and inhibiting QMP were studied from all three streams of articles. Using 'Programme' implementation structure, several factors were compiled under three broad elements of QMP. The first is related to policy, the second is related to deployment of various practices, and the third is related to outcome of QMP both quantitative and qualitative.

Through case study method of QMP implementation in the Indian Engine bearing and Ball bearing industry, it was attempted to put the identified elements into an integrative framework. This thesis has identified additional two elements which earlier researchers have ignored. In integrative frameworks of QMP implementation, additional 12 sub-elements were also identified which were not directly identified in available literature on QMP implementation. Thus, this integrative model consists of total of 12 main elements, 42 sub-elements and 159 attributes/characteristics related to Policy, Practice, and Outcome of Quality Management Program.

In this research, based on sequence of implementation of various elements and sub-elements, an integrative framework of QMP implementation is proposed. This framework provides sequence of various sub-elements in QMP implementation, thereby introducing linkage between these elements. Causal relationship however would now need to be established through further research.

Analysis of the data also revealed two contrasting patterns in the way the organisations approached and implemented QMP, indicating that the organisations may have a “Proactive” or “Reactive” stance underlying the QMP. The thesis has also reviewed various definitions of “quality” and proposed a schema that facilitates differential understanding of the term in the organizational context.

This study can be useful to the practicing managers in several ways. Management of organisation can understand various elements and sub-elements of QMP implementation, practicing managers can plan and schedule their QMP based on understanding generated from this, self-assessment can be conducted based on the integrative framework, management can understand requirements of ‘proactive’ organisation and align their efforts in this direction.

Since this case study research was conducted in three engine bearing and one ball-bearing organisations of auto-component industry in India, the result of this study can be generalised to engine bearing industry of India. This research has also identified areas for future research. There is a need to carry out similar studies in other industries to generalise the findings across industries. Similar study can be conducted in other industries to make elements of Policy, Practice, and Outcome more comprehensive. A quantitative model may be developed with various attributes related to Policy, Practice and Outcome for enabling better identification among ‘Proactive’ and ‘Reactive’ organisations.

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CHAPTER 1. INTRODUCTION

1.1 Overview

Quality Management (QM), in its present state, is believed to have been initiated in the middle of the twentieth century under the guidance of Dr. Deming and Dr. Juran in Japan. Since then, its understanding and practice have passed through various stages. There are several contributors worldwide who had led this movement from different fronts. Some of these leaders known as “Quality Guru” are: Walter A. Shewhart, W. Edwards Deming, Joseph M. Juran, Philip B. Crosby, Armand V. Feigenbaum, Kaoru Ishikawa, Genichi Taguchi, Shigeo Shingo, etc.

The quality movement, initiated in Japan after World War II, was mainly practitioner-led. When this movement found its echo in American industry, there too, it was practitioner-led, with the American academics playing only a minor role. This emerging quality movement was in contrast to other movements such as strategic planning, in which American academics played a seminal development role (Scott & Cole, 2000).

In the 80s and 90s, quality became a major issue for American managers across a broad range of industries. Quality improvement was on the top of management’s agenda of ‘things to do’ (Scott & Cole, 2000) and, product and service quality improvements were rated as the most important challenges faced by executives in USA. Much discussion and many diverse, sometimes sustained, organisational initiatives took place thereafter.

At the height of the Japanese competitive challenge in the 1980s, there was a strong concern in the US business community that universities did not provide essential skills and, the academic literature on quality had not been reviewed extensively (Garvin, 1984). Executives believed that an understanding of “total quality” was one of the essential skills required for contemporary managers (Scott & Cole, 2000). The business community, therefore, issued a public call through the Harvard Business Review (HBR) for academics to give more attention to developments in quality management. A

Leadership Steering Committee composed of Chief Executive Officers (CEO), Presidents of six sponsoring companies (American Express, IBM, Procter & Gamble, Ford Motor, Motorola, and Xerox), Deans of universities, and faculty leaders formulated three objectives: (1) identify the core knowledge generic to total quality (2) develop a total quality academic research agenda and (3) develop faculty understanding and commitment to Total Quality Management (TQM).(Robinson et. al., 1991) Subsequently, eight universities worked with industrial partners to identify and evaluate opportunities for quality improvement at the industrial partners' facilities.

Thus contribution from academics has further strengthened the field of Quality Management which was earlier mainly practitioner-led.

1.2 The Indian Context

In India, Quality movement in its present state started with the establishment of Indian Statistical Institute by Prof. Mahalanobis in early 1930s. Early work in Quality was mainly in the field of Statistical Quality. In 1947, Walter A. Shewhart, the world's first Quality Guru visited India to lecture on quality improvements under the aegis of a committee on Statistics, Standards and Quality Control, set by the Council of Scientific and Industrial Research. In spite of all initiatives, quality in Indian industries was not taken as a business goal.

Globalization and liberalization of the Indian economy which was initiated in early 1990s, have led the Indian industries to a highly competitive environment of the global market. The market-oriented growth model that is pursued since 1990s, has changed the economic environment under which the Indian industries operated earlier. (Chandra & Shukla, 1994). The ability to compete in today's economy depends mainly on the quality of product and services. Hence improving product quality has become an essential requirement for Indian industries in order to prosper at the global level. (Lulla, S. 2003) Quality Excellence has thus become a major business strategy (Raju & Balasubramanian, 2002).

To meet these requirements, several Indian organisations have started embarking upon various types of Quality Management Program (QMP)s to improve the quality of their goods and services. The Indian companies have been able to win prestigious quality awards at international level. For example, M/s Vikram Cement became the first company to win TPM Excellence award in 1995; M/s Sundram Clayton became the first company to win the Deming Prize in 1998; M/s Sundram Fasteners became the first Indian component manufacturing company to achieve TPM Excellence Award; it also won Supplier of the Year award for five consecutive years from 1996 onwards from the General Motors USA. About sixty five Indian firms have won TPM Excellence awards (CII Newsletter, 2004) and eleven Indian firms have won the Deming Prize (Narayana & Chopra, 2006), - the largest number outside Japan. With respect to operational capabilities, Indian manufacturers have made greater inroads in key areas such as quality management (Narayana & Chopra, 2006). These achievements have increased the confidence of Indian companies and inspired them to adopt quality improvement initiatives.

In India, the number of companies implementing QMP has shown an increasing trend (Nohria, 1993). These QMPs include: ISO9001, QS9000, Total Quality Management (TQM), Total Productive Maintenance (TPM), Just In Time (JIT), Kaizen, Six Sigma, etc.

Unlike productivity tracking at national level, Quality tracking in India is not available. Therefore, it would be interesting and appropriate to study how such Quality Management Program (QMP)s are implemented.

1.3 Organisation of Thesis

This thesis is classified into eleven chapters. The first chapter outlines the overview of Quality Management and explains it in the Indian context. The second chapter is a review of literature related to Quality Management Program (QMP), the gap revealed from it, and the need for research and research questions. The third chapter deals with the process

of selection of appropriate research methodology for addressing the research objectives while the fourth chapter deals with Case study methodology in detail. The fifth chapter gives an overview of the Auto component industry. Chapters six to nine deals with data collected from four organisations -OA, OB, OC and OD - respectively. Chapter ten presents an analysis of QMP implementation, its elements and sub-elements and various attributes exhibited by the four organisations. The summary of analysis and its findings are also given. The eleventh chapter comprises of conclusion and contribution of this research as also the implications for future research. Additionally, there are four Annexures at the end. Annexure A provides classifications of various definitions of Quality while Annexure B gives tables of comparison of various elements of organisations OA, OB, OC and OD. Annexure C gives named and addresses of organisations approached for request for data collection while Annexure D narrates researcher's own experience in QMP implementation.

CHAPTER 2. LITERATURE REVIEW

This chapter reviews the available literature in the field of Quality Management Program (QMP). Initially, different definitions of quality as given by various authors are discussed and the conceptual schema is proposed for classification of quality definitions. Thereafter, literature review on various Quality Management Program (QMP)s is attempted. In this review on QMP, contribution of formal research, authors' experience on implementation and Guru's prescriptions are reviewed and elements related to QMP are presented in integrative framework. The gap for further research is identified. Finally, the need for research is explained and the research questions are identified.

2.1 Definitions of Quality

The initial discussion about quality was started more than two thousand years ago by Socrates, Plato, Aristotle and other Greek philosophers. The word 'excellence' has emerged from the Greek 'arete' (Reeves and Bendar, 1994) which was used widely. The word 'quality' is very frequently used in industry and academia with non-uniform understanding. Literature search for its definition revealed a variety of definitions offered by several experts (addressing a wide range of phenomenon). These experts include practitioners who have led the quality movement as also the academicians who have developed intellectual interest in the field. They are from various fields, including: operations management, philosophy, economics, marketing service, etc. There is no consensus among these contributors. The word Quality has been used extensively with non-uniform understanding. No single definition of quality fits and satisfies all aspects and situations.

Two note-worthy attempts of reviewing and synthesizing various definitions of quality are recorded in the available literature. They are summarised below.

David A. Garvin has reviewed and synthesized definitions of product quality arising from four different disciplines namely: philosophy, economics, marketing, and operations

management (Garvin, 1984). He argued that the problem of definition is related to coverage as group of scholars in each of these four disciplines have considered the subject from a different views. He identified five major approaches to the definition of quality: (i) Transcendent approach where quality is synonymous with 'innate excellence'; (ii) Product-based approach which views quality as a precise and measurable variable; (iii) User-based approach which believes that quality lies in the eyes of the 'beholder' (iv) Manufacturer-based approach in which definitions focus on the supply side of the equation and are primarily concerned with engineering and manufacturing practice; and (v) Value-based approach which defines quality in terms of cost and price.

R.W. Hoyer and B. Y. Hoyer (Hoyer & Hoyer, 2001) have reviewed the contribution of eight well-known quality practitioners (popularly known as 'Guru'). Definitions of quality by these experts were categorized under two main headings:
(i) **Level One quality**: It is a simple matter of producing products or delivery services whose measurable characteristics satisfy a fixed set of specifications that are usually numerically defined.
(ii) **Level Two quality**: It is independent of their measurable characteristics, that satisfy customer expectations for their use or consumption.
(iii) **Other**, not falling in the above two categories.

To summarise, 'product based', 'manufacturer based' and 'Level One' quality are mainly measured in supplier's premises before dispatching product to the customer, whereas 'user based', 'value based' and 'Level Two' quality are mainly measured after starting usage of product at customer's premises. 'Transcendent' and 'other' category of quality are measured at either place.

Thus, in this thesis, an attempt is made to evolve a model to conceptualize quality using the 'supplier-customer' approach. It can be stated that the reviewed definitions can be further categorized as 'that can be measured at supplier premises based on suppliers process and procedures before dispatching to the customer'–labelled as 'Supplier based' and 'that can be measured mainly after usage has started at customer's premises'–labelled

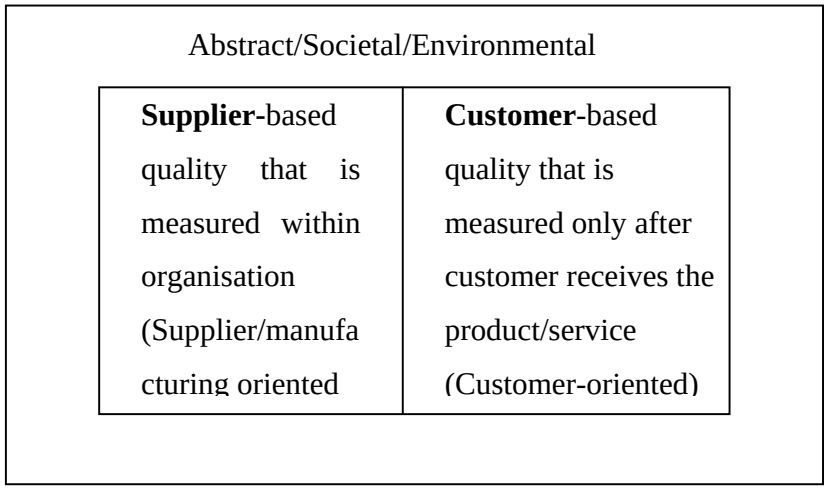
as ‘Customer based’ quality. In addition to these two, the third category which can not be categorized in either situation can be labelled as abstract, social and environmental definition.

The three categories of definitions of quality are as follows:

1) Supplier-based definitions of quality, which attempts to define and measure the quality in terms of the suppliers’ processes before a product is delivered to the customer.
2) Customer-based quality, which can be measured only when the product reaches the customer and/or its usage has started.
3) Abstract/societal/environmental quality, which cannot be measured or quantified directly.

The conceptual schema describing classification of quality definitions can be briefly presented in a model as shown in Figure 2.1

Figure 2.1: Conceptual Schema Describing Classification of Quality Definitions



Using this model, an attempt is made to categorize these definitions under the models of (i) Garvin, (ii) Hoyer & Hoyer, and the (iii) ‘Supplier-customer’ model presented above. See Annexure A for further details.

For conceptual understanding of QMP the evolved model of ‘supplier-customer’ is dealt with in subsequent chapters 6 to 10.

2.2 Quality Management Program (QMP)

After the second world-war, two of the American Quality Experts (popularly known as ‘Guru’) Dr Deming and Dr Juran, visited Japan and delivered series of sessions for top and middle management for improvement of Quality. The efforts put in by Japanese companies in such area became widespread during the oil crises of mid 1970s, when Japanese automobile car proved to have higher fuel efficiency than the US or European automobiles. This generated interest for understanding the Japanese manufacturing practices.

A detailed review of the genesis of Japanese manufacturing excellence undertaken by scholars in 1980s revealed that a holistic approach to Quality Management was instrumental in improving the efficiency and quality of the Japanese products and processes. (Ahire, Golhar & Waller, 1996) Quality circle (Ahire et. al, 1996; Gray, 1993) was one of the several initiatives undertaken during this period for achievement of higher productivity and quality through employee-involvement.

In India, an urgent need to improve quality of goods and services was felt in 1990s. This was mainly due to increased market competition which mainly emerged due to liberalization, privatization, and globalization initiatives by the Indian Government. To maintain their position in market, many organisations have focused efforts to improve their output (product quality) and input (material quality). Organisations have initiated efforts to implement one or more suitable techniques for improving output and input quality by involving various levels of employees. Quality improvement became an agenda for policy makers and top-management in India. These efforts were planned and executed as a program for the entire organisation. Such program in the area of Quality Management is known as the Quality Management Program (QMP).

QMP was defined as “Any organisational activity aimed at improving the quality of inputs, process or outputs of an organisation” (Jha, 1997).

Based on this definition of QMP, the following can be identified as its requirements:

- The program involves multiple functions in the organisation.
- The program aims at improving quality of inputs. This includes improvement of product from the supplier which requires joint efforts of customer and suppliers.
- The program aims at improving quality of process. This includes all processes within the organisation. Improvement of processes also includes reducing process variation and improving its capability.
- The program aims at improving quality of output. This includes improving outgoing product quality, reducing finished goods rejections and rework.

Some of the organisation-wide programs like ISO9001, QS9000, TS16949, Total Quality Management (TQM), Total Productive Maintenance (TPM), Kaizen, 5S, and Six Sigma satisfy the above criteria and hence included as QMP. They are further explained below.

2.2.1 ISO9001:2000

It is a Quality Management System standard. It has been developed to assist organisations of all types and sizes to implement and operate quality management systems. It emphasises on processes and their interrelation within an organisation. This standard was initially published in 1987 and subsequently revised in 1994 and 2000. Implementation of this standard in the organisation is generally planned as program as it involves various departments.

2.2.2 QS 9000

It is a Quality Assurance System standard developed by three automobile manufacturers – Ford, General Motors, and Chrylser. It is based on ISO9001:1994 to meet additional requirements of Automotive sector. This standard was published in 1998. Implementation of this standard in the organisation is generally planned as program as it involves various departments.

2.2.3 ISO/TS 16949:2002

It is a Quality Management System standard with particular requirements for the application of ISO9001:2000 for automobile production and relevant service part organisations. This standard was prepared by International Automotive Task Force (IATF) and Japan Automobile Manufacturers Association, Inc. (JAMA), with support from ISO/TC 176, Quality management and Quality assurance. This system standard lays emphasis on improving processes and their interrelation within automobile manufacturing organisation. Implementation of this standard in the organisation is generally planned as program as it involves various departments.

All these standards – ISO9001:2000, QS9000 and TS16949:2002- are related to Quality Systems. 'System' is defined as 'set of processes and their interrelations' and hence involve various processes related to input, and output of product quality involving employees of different levels in organisation. This process, if well managed, delivers planned output of the organisations.

When reviewing these standards from conceptual schema described in previous section i.e. chapter 2.1, figure 2.1, it addresses the 'abstract' definition of quality and also provides framework to define 'supplier' and 'customer' quality through development of Quality Policy and Quality Objectives. Implementation of such Quality Management Program involves various departments within the organisation.

2.2.4 Total Quality Management (TQM)

There is no universally recognized definition of TQM (Thiagarajan & Zairi, 1997). The US Department of Defence (Elshennawy & McCarthy, cited in Thiagarajan and Zairi, 1997) defined TQM as: "Total Quality Management (TQM) is both a philosophy and a set of guiding principles that represent the foundation of a continuously improving organisation. TQM is the application of quantitative methods and human resources to improve the material and service supplied to an organisation, all the processes within an organisation, and the degree to which the needs of the customer are met now and in the future. TQM integrates fundamental management techniques, existing improvement

efforts, and technical tools under a disciplined approach focused on continual improvement."

Customer focus, satisfaction and delight are important requirements of TQM. Thus, TQM addresses 'customer' type of quality schema, which is generally 'qualitative'. While it aims at improving customer satisfaction, it focuses on improving internal processes within the organisation. Implementation of this QMP within the organisations requires involvement of various functions company-wide. Through application of appropriate principles, tools, and techniques of TQM, their inputs, processes, and outcome can be improved.

2.2.5 Kaizen

Kaizen means improvement. Moreover, it means continuing improvement in personal life, home life, social life, and working life. When applied to the workplace, Kaizen means continuing improvement involving everyone -managers and workers alike (Imai, 1991). This technique is implemented in the entire organisation – both in manufacturing and non-manufacturing areas and thus requires involvement of all employees. Its implementation directly improves product, processes or systems of the organisation.

Kaizen addresses 'abstract' type of quality schema and is not restricted to 'supplier' or 'customer' alone. It is applicable to all functions within the organisation with an aim to improve inputs, processes, and output related to various functions. Implementation of this QMP involves all employees (irrespective of their level and function) within the organisation.

2.2.6 5 S

The 5 S is a practice used to establish and maintain the environment in an organisation that is conducive to achieve high quality of products and processes. The name stands for five Japanese words: Seiri (Structurise, Organisation), Seiton (Systemise, Neatness), Seiso (Sanitise, Cleaning), Seiketsu (Standardise, Standardisation), and Shitsuke (Self – discipline, Discipline). (Ho, 2002)

5 S addresses ‘supplier’ type of quality schema which can be ‘quantified’. Maintaining quality environment is important in all functions within the organisation. This QMP focuses on internal processes and involves all functions in the organisation.

2.2.7 Total Productive Maintenance (TPM)

It is a productive maintenance carried out by all employees through small - group activities. Like Total Quality Control (TQC), which is company-wide Total Quality Control, TPM is equipment maintenance performed on a company basis. The dual goal of TPM is Zero breakdown and Zero defect (Nakajima, 1997).

TPM addresses ‘supplier’ type of quality schema, which can be ‘quantified’. In order to achieve Zero defect and Zero breakdown, all employees of the organisations need to be involved in this QMP. The desired output is achieved by eliminating wastages within the processes through coordinated efforts within the entire organisation.

2.2.8 Just In Time (JIT)

JIT is a system to produce and deliver finished goods just in time to be sold, subassemblies just in time to be assembled into finished goods and purchased material Just in Time to be transformed into fabricated parts (Schonberger cited in Korgaonker, 1992). JIT is a philosophy that aims at simultaneous attainment of goals of perfect quality, quick delivery, low cost, and high degree of flexibility (Korgaonker, 1992).

JIT addresses ‘supplier’ type of quality schema which can be ‘quantified’. Inputs from suppliers, internal processes, and output – all these three elements are aimed to improve in this QMP. This QMP involves multiple functions to achieve its desired goals.

2.2.9 Six Sigma

It is a methodology that provides businesses with the tools to improve the capability of their business processes. This increase in performance and decrease in process-variation

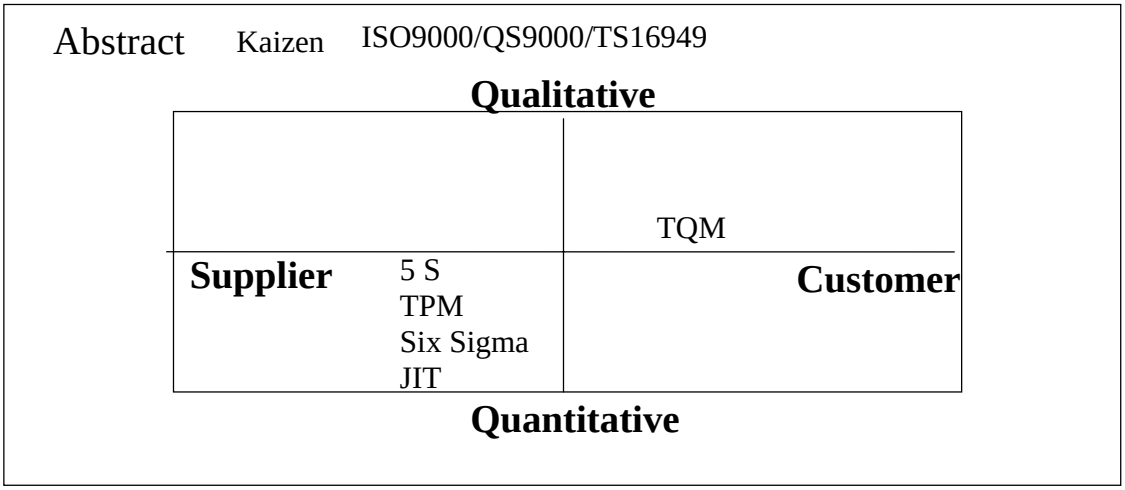
lead to defect reduction and improvement in profits, employee-morale and quality of product (ASQ glossary, 2005)

Six Sigma addresses ‘supplier’ and ‘customer’ type quality definition, which can be ‘quantified’. However its application has mainly covered area within the control of manufacturer’s premises. Implementation of this technique is mainly done through cross functional team by aiming to reduce process variation. The improvement areas are defined clearly based on the Cost of Poor Quality (COPQ) calculation. The improvements in inputs, process or output are possible in this QMP.

To sum up, various systems standards like ISO9001, QS9000, TS16949, other philosophy like TQM or techniques like TPM, JIT, Kaizen, and Six Sigma or combination of them are implemented with an aim to improve input, processes or output of product or processes or combination of it with coordinated efforts within the entire organisation. They are referred to as Quality Management Program (QMP).

The figure 2.2 summaries various QMPs in line with ‘Supplier-Customer’ schema and indicates whether mode of analysis adopted for understanding ‘quality’ addressed in a particular QMP is ‘qualitative’ or ‘quantitative’.

Figure 2.2: QMP Categorization Based on ‘Supplier-Customer’ Quality Schema.



Thus, in this section quality definitions and categorization are studied and new quality schema developed for this thesis. Understanding of various quality related techniques, philosophy and system standards is developed as part of Quality Management Program (QMP).

2.3 Literature Review on QMP

This subsection reviews the available literature in the area of Quality Management Program implementation.

Quality Management (QM) though emerged conventionally from Engineering is widely covered in management journals due to its multiple functional approach within the organisation. Initially, Quality was mainly referred as product quality and the focus was on controlling the product quality with the use of appropriate statistical tools. Subsequently, the meaning of quality has expanded to cover other fields of management. Flynn, et. al., (1994) defined QM as “an integrated approach to achieving and sustaining high quality output, focusing on the maintenance and continuous improvement of processes and defect prevention at all levels and in all functions of the organization, in order to meet or exceed customer expectations”. He expressed the need to articulate the distinction between quality management practice (input) and quality performance (output).

Literature review reveals that Quality Management theory is not fully developed. Some of the noteworthy attempts made by researchers include (Ahire et. al. 1996): identification of seven concepts of QM by Anderson et. al. (1989); eight constructs of QM by Saraph, et. al., 1989; and seven dimensions of QM developed by Flynn, et. al. (1994).

Some of the popular journals referred for this thesis include: ‘Quality Progress’, ‘The TQM Magazine’; ‘Harvard Business Review’, ‘Journal of Operations Management’, ‘Production and Operations Management’, ‘Productivity and Inventory Management’,

'SAM Advanced Management Journal', 'Academy of Management Review' etc. National Journals like 'Productivity', 'Indian Management', 'Industrial Engineering Journals' etc were also referred for reviewing articles related to Quality Management Program. Additionally various websites were referred for collecting data related to QMP implementation.

Literature on quality programs published in those journals can be classified under three streams:

1. Research- based articles: articles in this stream are those published as a result of formal research carried out in the field
2. Experience sharing: articles under this category include those which contain an account of author's own experience of having implemented such programs, with or without further analysis of the same, and
3. Gurus' prescriptions: articles written by Quality Gurus based on their own experience and insights.

This classification is used in the next two subsections to regroup the available literature on factors favouring and inhibiting QMP implementation.

2.3.1 Factors Favouring QMP

Under the first category – Research-based articles - several scholars have identified different factors which favor implementation of various QMPs. They are narrated below:

(i) Saraph, et.al. (1989, cited in Benson et.al. 1991) identified eight critical factors of QM at the business unit level and developed empirically validated instrument for QM: divisional top management leadership for quality, the role of the quality department, training, product or service design, supplier quality management, process management, quality data and reporting and employee relations.

(ii) Flynn et.al. (1994) identified seven dimensions and developed empirically validated instrument for QM: top management support, quality information,

process management, product design, workforce management, supplier involvement and customer involvement.

(iii) Twelve Quality Management Implementation constructs developed by Ahire (1996) based on empirical study using survey of motor vehicle parts and accessories in US. They are: top management commitment; customer focus; supplier quality management; design quality management; benchmarking; SPC usage; internal quality information usage; employee involvement; employee training; employee empowerment; product quality and supplier performance.

(iv) Ten critical success factors identified through survey of members of the European Foundation for Quality by Black & Porter (1996) (Cited in Dayton, 2003). They are: people and customer management; supplier partnership; communication of improvement information; customer satisfaction orientation; external interface management; strategic quality management; teamwork structure for quality; operational quality planning; quality improvement measurement system and corporate quality culture.

(v) Four key features which have characterized recent quality improvement efforts (Cole & Scott, 2000). They are: process oriented, stressing the centrality of product; focus on customer as final arbiter of quality; an emphasis on systematic application of tools to evaluate and improve work process, and the insistance that managers of all levels must take responsibility for quality improvement.

(vi) Eight major ingredients of customer-based quality management by Talley (1991) (cited in Raju & Balasubramanian, 2002). They are: management leadership and commitment; strategy; training; participative problem solving; measurement; statistical process control; continuous company-wide improvement and customer satisfaction.

(vii) Twenty-two criticality to quality factors in successful quality process identified by Ramirez & Lonely. It was the first reported attempt to empirically validate the criticality of numerous factors cited in literature (cited in Thiagarajan & Zairi, 1997). They are: management commitment; customer

satisfaction; clear vision statement; cultural change; education; participative management; strategic quality planning; goal clarity; error prevention; top management steering committee; problem solving; measurement; problem identification; goal setting; recognition scheme; QCCs/improvement teams; vendor partnership; project improvement process; publicized successes; SPC; cost of quality and zero defect attitude.

Some of the noteworthy study attempted in the Indian industries can be narrated as below:

(i) Thirteen critical successful factors were identified (Raju and Balasubramanian, 2002). They are: Human oriented metrics - top management leadership and commitment; employee relations; employee involvement; team work; employee training; customer satisfaction and Technology oriented metrics – quality policy and clear vision statement; adopt and communicate TQM; operational quality planning; process management; continuous quality improvement; quality assessment and quality results.

(ii) Eight critical success factors for implementing TQM (Wali, et. Al., 2000). They are: management behavior; quality strategy; communication for TQM; training for TQM; employee involvement; process system management; quality technologies and customer focus and satisfaction.

(iii) Thirteen factors affecting QMP implementation identified by Jha (1997). They are: Top management commitment, middle management commitment, workers' support, union's support, training, resources, communication, review and monitoring, rewards and recognition, egalitarian practices, aligning HR practices, supervisors' support and product-market situation.

While studying factors identified in the Indian context, it was observed that factors like commitment of middle management and supervisor, union's support, egalitarian practice, and aligning HR practices reported by Jha (1997) were not reflected in other researches. This gives additional elements of QMP in the Indian context.

The second category - Experience sharing - includes those articles which are based on several years of experience of the author in quality management. According to them the factors which favour QMP implementation are as given below.

(i) Seven important ingredients which every quality management program must have (Brocka & Brocka, 1992). They are: dedication, commitment, and participation from top leadership; zeal to build and sustain a culture committed to continuous improvement; focus on satisfying customer needs and expectations; involve every individual in improving his/her own work processes; create teamwork and constructive working relationships; re-organize people as the most important resource; and employ the best available management practice, techniques and tools.

(ii) Ten percepts of quality improvement (Motiska, 1990). They are: quality leadership must begin with top management; the most important aspect of the quality process is identifying the activities within the organization that affect quality; written procedures are necessary communications media by which the management functions of directing and controlling are exercised; one of the most critical activities in quality improvement is preparing a clear, concise description of the product or service to be acquired or produced; the cost, time and effort of evaluating and selecting suppliers must be commensurate with the importance of the goods or services to be produced; quality awards must determine the accuracy of and compliance with established policies, procedures, instructions, specifications , codes , standards and controlled requirements, it must also assess the effectiveness of their implementation; the simple objective of most quality audit is to collect enough reliable data through inspection, observation and inquiry to make a reasonable assessment of the quality of the activity being audited; the foundation of quality control is having timely and accurate information so that systems that are not capable of producing quality can be identified and improved; effective quality resources for improving quality and reducing costs and profit; and quality are the ultimate measures of the success of the product system.

(iii) Seven points that should be addressed while designing individual program (Fine, cited in Dale & Plunkett, 1990). They are: goals and objectives; philosophy and strategy; allocation of responsibilities; decision tools; measurement system; managerial style, and plan for transition management.

(iv) Different implementation strategy built on three success factors required for making significant gain in performance (Cohen, 1994). They are: generating real results and producing experience of success in the short term; creating the demand for higher performance and building infrastructure as needed to sustain the improvement process.

(v) Eleven factors deemed critical for successful TQM implementation (Shin & Kalinowski, 1998). They are: strong top management leadership and commitment; customer focus; employee involvement & empowerment; focus on continuous improvement; supplier partnership; recognition of quality as strategic issue in business planning; use of SPC & statistical tools; product & service quality in design; performance measurement focusing on quality; actions based on facts and new role of quality department and quality specialists.

(vi) Seven essential ingredients of TQM process (Coleman, 1994). They are: an obsession with customer satisfaction; leadership by example from top; the institution of continuous improvement mentality; employee involvement & empowerment; management by fact; understanding of process control and capability and appropriate recognition and rewards.

(vii) Six steps to effective change (Beer, et. al., 1990). They are: Mobilize commitment to change through joint diagnosis of business problems; develop a shared vision to organize and manage for competitiveness; foster consensus for the new vision, competence to enact it, and cohesion to move it along; spread revitalization to all departments without pushing from the top; institutionalize revitalization through formal policies, systems and structures; monitor and adjust strategies in response to problems in the revitalization process.

These articles are based on authors own experience on implementation of QMP.

The third category relates to Quality Gurus' prescriptions. These prescriptions deal with managing quality within organisations (Broka & Broka, 1992). They are narrated below:

(i) Demings' 14 points: create constancy of purpose for improvement of product and service; adopt new philosophy; cease dependence upon inspection to achieve quality; minimize total cost by working with a single supplier- end the practice of awarding business on the price tag alone; improve constantly and forever every process; institute training on the job; adopt and institute leadership; drive out fear; break down barriers between staff areas; eliminate slogans, exhortations, and targets for the work force; eliminate numerical for the work force and numerical goals for management; remove barriers that rob people of pride of workmanship, eliminate the annual rating system; institute a vigorous program of education and self-improvement for everyone; and put everybody in the company to work to accomplish the transformation.

(ii) Juran's nine steps approach to Quality improvement: create awareness of the need and opportunity for improvement; mandate quality improvement, make it a part of every job description; create the infrastructure, establish a quality council, select projects for improvement, appoint teams and provide facilitators ; provide training on how to improve quality; review progress regularly; give recognition to the winning teams; propagandize the results; revise the reward system to enforce the rate of improvement; and maintain momentum by enlarging the business plan to include goals for quality improvement.

(iii) Crosby's 14 steps to Quality improvement include: make it clear that management is committed to quality ; form quality improvement teams with representatives from each dept; determine how to measure where current and potential quality problems lie; evaluate the cost of quality and explain its use as a management tool ; raise quality awareness and personal concern of all employees; take formal actions to correct problems identified through previous steps; establish a committee for zero defects program; train all

employees to actively carry out their part of the Quality improvement program; hold a ‘zero defect day’ to let all employees realize that there has been a change; encourage individuals to establish improvement goals for themselves and their group; encourage employees to communicate to management the obstacles they face in their improvement goals; recognize and appreciate those who participate; establish quality councils to communicate on a regular basis; do it over again to emphasise that the quality improvement program never ends.

(iv) Ishikawa’s Quality philosophy is: quality begins with education and ends with education; the first step in quality is to know the requirements of customers; the ideal state of quality control is when inspection is no longer necessary; remove the root cause, and not the symptoms; quality control is the responsibility of all workers and all divisions ; do not confuse the means with the objectives; put quality first and set your sights on long-term profits; marketing is the entrance and exit of quality; top management must not show anger when facts are presented by subordinates; ninety-five percent of the problems in a company can be solved by the seven tools of quality control; and data without dispersion information is false data - for example, stating an average without supplying the standard deviation.

Quality movement was mainly practitioner-led and Guru’s prescriptions were mainly based on their experience in various countries.

2.3.2 Factors Inhibiting QMP

Besides the success factors, several authors have also identified the factors inhibiting QMP implementation.

Under the first category of classification –Research-based articles - several scholars have identified different factors which inhibit implementation of various QMPs. They are narrated below:

(i) Twelve obstacles in TQM implementation (Salegna & Fazel, 2000). They are: lack of company-wide definition of quality; lack of a formalized strategic plan for change; lack of customer focus; poor inter- organizational communication; lack of real employee empowerment; lack of employee trust in senior management; view of quality program as a quit fix; drive for short-term financial results; politics and turf issues; lack of strong motivation; lack of time for quality initiatives; and lack of leadership.

(ii) Ten reasons why TQM programs do not work in many companies (Harari, 1993 cited in Bounds, et. al., 1994). They are: focus on intended processes rather than on external results; focus on minimum standards; dependence on cumbersome bureaucracy; delegation of quality to quality czar and "experts" rather than to "real" people; no radical organizational reform; no changes in management compensation; no new relationship with outside partners; faddism, egotism and quick-fixism; drain of entrepreneurship and innovation from corporate culture and no place for love.

(iii) Ten reasons for failure of TQM efforts and twelve telltale signs of TQM efforts in trouble (Mahoney & Thor, 1994 cited in Tatikonda & Tatikonda, 1996). According to these scholars, the ten reasons for failure of TQM efforts are: lack of vision; lack of customer focus; lack of management commitment; training with no purpose; lack of cost and benefit analysis; organizational structure; creation of its own bureaucracy; lack of measurements or erroneous measurement; rewards and recognition; and accounting systems. The twelve telltale signs include: wandering quality teams and confused superiors; rampaging champions; no statistical logic and decisions; "Not discovered here" or " We are different " syndromes; too many classes- training that interferes with productivity; punishment for those who "Do the right thing"; fear of demands to pad the "members"; strained working relationship; perceived inappropriate use of standard or criteria; lack of appreciation and recognition; and the argument that 'this too shall pass'.

In the second category of articles - Experience sharing - three scholars have identified factors which inhibit implementation of QMPs. They are narrated below:

(i) Macdonald (1994) gives ten principle reasons for TQM disappointment. They are: lack of management commitment; lack of vision and planning; satisfaction with quick fix; tool bound processes; quality too constraining; satisfaction with customer satisfaction; culture change versus project approach; quality management became institutionalized; the people not really involved and; lack of real business measurable.

(ii) Cohen (1994) draws attention to three fundamental flows that undermine typical quality programs. They are: excessive focus on changing culture; excessive preoccupation with building infrastructure and shifting gears to achieve results.

(iii) Schaffer & Thompson (1992) give six reasons why activity-centered improvement programs fail. They are: programs not keyed to specific results; too large scale and diffused; delusional measurement; staff and consultant driven; bias to orthodoxy and not empiricism.

In the third category, several Gurus have pin pointed inhibiting factors of various QMPs (Brocka & Brocka, 1992):

(i) Deming has diagnosed seven deadly diseases: lack of constancy of purpose; emphasis on short-term profits; short-term thinking ; annual performance reviews; mobility of management, job hopping; use of visible figures only for management; excessive medical costs; and excessive costs of liability.

(ii) Deming's twelve obstacles: neglect of long-range planning and transformation ; the idea that problems are solved with automation, gadgets, and other "things"; approach to implementing quality improvements without basic principles; the attitude that "Our problems are different" leading to ignoring basic principles; the obsolescence in schools (grade school through graduate school) must be overcome; reliance on quality control department to "take care of all our problems of quality."; blaming the work force for problems ; quality by inspection; mass teaching with little guidance in implementation;

the unstaffed computer; inadequate testing and the illusive insistence that 'Anyone that comes to try to help us must understand all about our business'.

(iii) Feigenbaum has listed four deadly factors: hothouse quality; wishful thinking; producing overseas and confining quality to the factory.

Variables identified through three types of literature (research based, experience based and Guru's prescriptions) on factors favouring and inhibiting QMP can be segregated under these elements and sub-elements and can be further summarized in below tables.

Table 2.1: Summary of Variables Identified from Research Based Articles Related to Policy for Long Term Planning

ELEMENT	TYPE OF ARTICLE	FACTOR FAVOURING QMP	FACTOR INHIBITING QMP
Policy for long term and short term planning	Research based article	Top management commitment(Ahire, Jha); Management leadership and commitment (Talley) (Raju & Balasubramanian) ; Management commitment (Ramirez & Lonely) Divisional top management leadership for Quality (Saraph, et.al); Top management support (Flynn et.al.) Customer focus (Ahire); benchmarking (Ahire); Customer satisfaction orientation (Black & Porter); Customer focus (Wali et.al.)(Cole & Scott) Quality policy and clear vision statement (Raju & Balasubramanian); Clear vision statement (Ramirez & Lonely); Goal clarity (Ramirez & Lonely); Goal setting (Ramirez & Lonely) Strategy (Talley); Strategic quality management (Black & Porter); Strategic quality planning (Ramirez & Lonely); Operational quality planning (Black & Porter) (Raju & Balasubramanian); Quality strategy (Wali et.al.); Resources (Jha)	Lack of leadership (Salegna & Fazel) Lack of management commitment (Mahoney & Thor) Lack of vision (Mahoney & Thor); Lack of companywide definition on Quality (Salegna & Fazel) Lack of customer focus (Salegna & Fazel); Lack of customer focus (Mahoney & Thor) Lack of employee trust in senior management (Salegna & Fazel) Drive for short term financial result (Salegna & Fazel); View of quality program as quick fix (Salegna & Fazel)

Table 2.2: Summary of Variables Identified from Experience Based Articles Related to Policy for Long Term Planning

ELEMENT	TYPE OF ARTICLE	FACTOR FAVOURING QMP	FACTOR INHIBITING QMP
Policy for long term and short term planning	Self analysis / experience based articles	Leadership by example from top (Coleman); Management leadership and commitment (Shin & Kalinowski); Dedication, Commitment and participation from top leadership (Broka & Broka); Quality leadership must begin with top management (Motiska) Customer focus (Shin & Kalinowski); Focus on satisfying customer needs and expectations (Broka & Broka) Quality as strategic issue in business planning (Shin & Kalinowski) Shared vision (Beer Et.Al.); Goals and objectives (Fine); Creating demand for higher performance (Cohen); Identify activities that affect Quality (Motiska); Foster consensus for new vision (Beer et.al.)	Lack of management commitment (Macdonald); Lack of vision and planning (Macdonald); Lack of real business measurable (Macdonald) Program not keyed to specific results (Schaffer & Thompson); Shifting gears to achieve results (Cohen) Satisfaction with quick fix (Macdonald) Quality too constraining (Macdonald) Satisfaction with customer satisfaction (Macdonald)

Table 2.3: Summary of Variables Identified from Guru's Prescriptions Related to Policy for Long Term Planning

ELEMENT	TYPE OF ARTICLE	FACTOR FAVOURING QMP	FACTOR INHIBITING QMP
Policy for long term and short term planning	Guru's prescription	Adopt and institute leadership (Deming); make it clear that management is committed to quality (Crosby) Create constancy of purpose for improvement of product and service (Deming); put quality first and set your sight on long term profit (Ishikawa) Know customer requirements (Ishikawa) Determine how to measure where current and potential quality problem lie (Crosby); Mandate quality improvement (Juran); emphasise that quality improvement program never ends (Crosby) Create awareness for the need and opportunity for higher performance (Juran); eliminate numerical for the workforce and numerical goals for management (Deming)	Neglect of long range planning and transformation (Deming) Lack of constancy of purpose (Deming) Hothouse Quality (Feigenbaum) Wishful Thinking (Feigenbaum) Producing overseas and confining Quality to factory (Feigenbaum)

Table 2.4: Summary of Variables Identified from Research Based Articles Related to Policy for QMP

ELEMENT	TYPE OF ARTICLE	FACTOR FAVOURING QMP	FACTOR INHIBITING QMP
Policy for QMP	Research based article	Top management steering committee (Ramirez & Lonely) Role of Quality department (Saraph , et.al.)	Organisation structure (Mahoney & Thor); No redical organizational reform(Harari) Delegation of quality to CZAR and 'experts' rather than to real people (Harari) Dependence on cumbersome bureaucracy (Harari); Creation of own bureaucracy (Mahoney & Thor) Focus on intended process rather than on external results (Harari) Focus on minimum standards (Harari)

Table 2.5: Summary of Variables Identified from Experience Based Articles Related to Policy for QMP

ELEMENT	TYPE OF ARTICLE	FACTOR FAVOURING QMP	FACTOR INHIBITING QMP
Policy for QMP	Self analysis / experience based articles	Create infrastructure as need to sustain improvement process (Cohen); Reorganise people as the most important resource (Broka & Broka)	Excessive focus with building infrastructure (Cohen) Program too large scale and diffused (Schaffer & Thompson) Program staff and consultant driven (Schaffer & Thompson)

Table 2.6: Summary of Variables Identified from Guru's Prescriptions Related to Policy for QMP

ELEMENT	TYPE OF ARTICLE	FACTOR FAVOURING QMP	FACTOR INHIBITING QMP
Policy for QMP	Guru's prescription	Create infrastructure (Juran); Select projects for improvement appoint teams and provide facility (Juran); form quality improvement teams with representatives from each department (Crosby) Establish quality council (Juran); Establish a committee for zero defect program (Crosby) Eliminate slogans exhortation and targets for workforce (Deming) Hold a zero defect day (Crosby); establish quality council to communicate on regular basis (Crosby) Do not confuse means with objective (Ishikawa)	Approach to implement quality improvement without basic principles (Deming)

Table 2.7: Summary of Variables Identified from Research Based Articles for Linking HR Practices with QMP

ELEMENT	TYPE OF ARTICLE	FACTOR FAVOURING QMP	FACTOR INHIBITING QMP
Policy for linking HR practice with QMP	Research based article	Employee empowerment (Ahire) Middle management commitment (Jha), Supervisor's support (Jha), Middle management commitment (Jha) People and customer management (Black & Porter) Corporate quality culture (Black & Porter); Cultural change (Ramirez & Lonely); Zero defect attitude (Ramirez & Lonely) Measurement (Talley)(Ramirez & Lonely); Quality improvement measurement system (Black & Porter) Insistence that managers of all levels must take responsibility for quality improvement (Cole & Scott) Management behavior (Wali et.al.); Managerial style (Fine) Employee relations (Raju & Balasubramanian); Unon's support (Jha) Aligning HR practices (Jha)	Lack of formalized strategic plan for change (Salegna & Fazel) Politics and turf issues (Salegna & Fazel) no change in management compensation (Harari); Faddism egotism and quick fixism (Harari) Drain of entrepreneurship and innovation from corporate culture (Harari) Attitude that our problems are different (Deming); Not discover here and we are different syndrome (Mahoney & Thor) Lack of measurement or erroneous measurement (Mahoney & Thor) Reward and recognition system and accounting system (Mahoney & Thor) Punishment for those who do right things (Mahoney & Thor); Fear of demand to pad the members (Mahoney & Thor)

Table 2.8: Summary of Variables Identified from Experience Based Articles for Linking HR Practices with QMP

ELEMENT	TYPE OF ARTICLE	FACTOR FAVOURING QMP	FACTOR INHIBITING QMP
Policy for linking hr practice with QMP	Self analysis / experience based articles	Employee involvement and empowerment (Shin & Kalinowski) (Coleman) Philosophy (Fine) Measurement systems (Fine); institution of quality improvement mentality (Coleman); performance measurement focusing on quality (Shin & Kalinowski) Zeal to build and sustain culture committed to continuous improvement (Broka & Broka) Plan for transition management (Fine) Allocation of responsibilities (Fine) Mobilize commitment to change through diagnosis of business problems (Beer et.al.) Institutionalize revitalization through formal policies, systems and structures (Beer et.al.)	Cultural change versus project approach (Macdonald); excessive focus on changing culture (Cohen) Delusional measurement (Schaffer & Thompson) Program bias to orthodoxy and not empiricism (Schaffer & Thompson)

Table 2.9: Summary of Variables Identified from Guru's Prescriptions for Linking HR Practices with QMP

ELEMENT	TYPE OF ARTICLE	FACTOR FAVOURING QMP	FACTOR INHIBITING QMP
Policy for linking hr practice with QMP	Guru's prescription	Adopt new philosophy (Deming); Drive out fear (Deming) Encourage individuals to establish improvement goals (Crosby); Eliminate annual rating system (Deming); make quality improvement as part of everyone's job description (Juran) Breakdown barrier between staff areas (Deming); remove barrier that rob people of pride of workmanship (Deming) Quality control is responsibility of all workers and individuals (Ishikawa); Put everyone in the company to work to accomplish transformation (Deming) Revise reward system to enforce rate of improvement (Juran)	Annual performance review (Deming); Mobility of management (Deming); job hopping (Deming) Obsolescence in school must be overcome (Deming) Unstaffed computer (Deming) Illusion that anyone comes to try to help must understand all about our business (Deming)

Table 2.10: Summary of Variables Related to Practice of Verification and Assurance Systems

ELEMENT	TYPE OF ARTICLE	FACTOR FAVOURING QMP	FACTOR INHIBITING QMP
Verification and assurance system	Research based article	Process orientation (Cole & Scott); Process management (Saraph. et.al)(Flynn et.al.), Stressing the centrality of product (Cole & Scott); Statistical Process Control (Talley) (Ramirez & Lonely); Quality technologies (Wali et.al.) Error prevention (Ramirez & Lonely)	

	Self analysis / experience based articles	Quality audit (Motiska); Written procedure for directing and controlling (Motiska); Prepare clear and concise description of product or service to be acquired or produced (Motiska)	
	Guru's prescription	Cease dependence upon inspection to achieve quality(Deming); Ideal state – inspection is no longer necessary (Ishikawa)	Reliance on qc department to take care of problems (Deming); Quality by inspection (Deming)

Table 2.11: Summary of Variables Related to Practice of QMP Coordination

ELEMENT	TYPE OF ARTICLE	FACTOR FAVOURING QMP	FACTOR INHIBITING QMP
QMP coordination	Research based article	Process management (Raju & Balasubramanian); Process system management (Wali et.al.) Project improvement process (Ramirez & Lonely); Review and monitoring (Jha)	Perceived inappropriate use of standard or criteria (Mahoney & Thor)
	Self analysis / experience based articles	Employee best available management practice, techniques and tools (Broka & Broka) Decision tools (Fine); New role of quality department and quality specialist (Shin & Kalinowski); Monitor and adjust strategies in response to problems in revitalization process (Beer et.al.)	Tool bound process (Macdonald)
	Guru's prescription	Review progress regularly (Juran) Top management must not show anger when facts are presented by subordinate (Ishikawa)	

Table 2.12: Summary of Variables Related to Practice of Data Analysis and Presentation

ELEMENT	TYPE OF ARTICLE	FACTOR FAVOURING QMP	FACTOR INHIBITING QMP
Data analysis ad presentation	Research based article	Emphasis on systematic application of tools to evaluate and improve work process (Cole & Scott); SPC usage (Ahire), Quality data reporting and analysis (Saraph et.al.)	No statistical logic and decision (Mahoney & Thor);
	Self analysis / experienc	SPC usage (Shin & Kalinowski); Actions based on facts (Shin & Kalinowski) Management by facts (Coleman)	
	Guru's prescription	95% of problems in a company can be solved by the seven qc tools (Ishikawa) Data without dispersion information is false data (Ishikawa) Evaluate cost of quality and explain its use as management tool (Crosby)	Use of visible figures only for management (Deming)

Table 2.13: Summary of Variables Related to Practice of Communication

ELEMENT	TYPE OF ARTICLE	FACTOR FAVOURING QMP	FACTOR INHIBITING QMP
Communication	Research based article	Internal quality information usage (Ahire); Communication of improvement information (Black & Porter); Communication (Jha) Publicize success (Ramirez & Lonely); Propagandize the results (Juran) Quality information (Flynn et.al.) Communication for QMP (Wali et.al.); Adopt and communicate QMP (Raju & Balasubramanian)	Poor inter-organizational communication (Salegna & Fazel)

Table 2.14: Summary of Variables Related to Practice of Involving Customer and Suppliers

ELEMENT	TYPE OF ARTICLE	FACTOR FAVOURING QMP	FACTOR INHIBITING QMP
Involving suppliers	Research based article	External interface management (Black & Porter), Customer involvement (Flynn, et.al.) Supplier quality management (Ahire)(Seraph, et.al.); Supplier partnership (Black & Porter); Supplier involvement (Flynn, et.al.), Vendor partnership (Ramirez & Lonely)	No new relationship with outside partners (Harari)
	Self analysis / experienc	Supplier partnership (Shin & Kalinowski); Evaluation and selection of supplier based on importance of product or service (Motiska)	
	Guru's prescription	Work with single supplier to reduce total cost (Deming)	

Table 2.15: Summary of Variables Identified from Research Based Articles Related to Practice of Employee Involvement

ELEMENT	TYPE OF ARTICLE	FACTOR FAVOURING QMP	FACTOR INHIBITING QMP
Employee involvement	Research based article	Employee involvement (Ahire) (Raju & Balasubramanian) (Coleman); Improve constantly and forever every process (Deming); (Wali et.al.); Education and training (Ahire); Training (Talley) (Raju & Balasubramanian) (Saraph.et.al); Education (Ramirez & Lonely); Training for QMP (Wali et.al.); Training (Jha) Team work (Raju & Balasubramanian); Teamwork structure for quality (Black & Porter); Create teamwork and constructive working relationships (Broka & Broka);employee relation (Saraph.et.al), Problem identification (Ramirez & Lonely); Problem solving (Ramirez & Lonely); Participative problem solving (Talley); Participative management (Ramirez & Lonely); QCC/improvement teams (Ramirez & Lonely); Recognition scheme(Ramirez & Lonely); reward scheme (Coleman); Quality award must determine accuracy of the compliance to be produced with policy procedure specifications etc and effectiveness of implementation. (Motiska); Rewards and recognition(Jha), Egalitarian practices (Jha) Workforce management (Flynn et.al.)	Lack of real employee empowerment (Salegna & Fazel); lack of strong motivation (Salegna & Fazel); Lack of time for quality initiatives (Salegna & Fazel); Training with no purpose (Mahoney & Thor); Too many classis (Mahoney & Thor); Wandering quality team and confused supervisor (Mahoney & Thor); Rampaging champions (Mahoney & Thor); Strained working relationships (Mahoney & Thor); Lack of appreciation and recognition (Mahoney & Thor); Argument that this too shall pass (Mahoney & Thor);

Table 2.16: Summary of Variables Identified from Experience Based Articles Related to Practice of Employee-Involvement

ELEMENT	TYPE OF ARTICLE	FACTOR FAVOURING QMP	FACTOR INHIBITING QMP
Employee involvement	Self analysis / experience based articles	Involve every individual in improving his/her own work processes (Broka & Broka); Effective quality resource (Motiska); Develop competence to enact shared vision (Beer et.al.); Spread revitalization to all department (Beer et.al.);	Quality management became institutionalized (Macdonald); People not really involved (Macdonald);

Table 2.17: Summary of Variables Identified from Guru's Prescriptions Related to Practice of Employee-Involvement

ELEMENT	TYPE OF ARTICLE	FACTOR FAVOURING QMP	FACTOR INHIBITING QMP
Employee involvement	Guru's prescription	Quality begins and ends with education (Ishikawa); Provide training on how to improve quality (Juran); Institute training On The Job (Deming); Raise quality awareness (Crosby); Institute a vigorous program of education and self-improvement for everyone (Deming); Remove root cause and not symptoms (Ishikawa); Take formal actions to correct problems identified through previous steps (Crosby); Give recognition to the winning team (Juran); Recognise and appreciate those who participate (Crosby); Encourage individuals to communicate management obstacles they face in improvement goals (Crosby)	Mass teaching with little guidance in implementation(Deming); Blaming workforce for the problems (Deming); Idea that problems are solved with automation (Deming)

Table 2.18: Summary of variables related to Outcome of QMP

ELEMENT	TYPE OF ARTICLE	FACTOR FAVOURING QMP	FACTOR INHIBITING QMP
Outcome	Research based article	Product quality and supplier performance (Ahire); Continuous companywide improvement (Talley); Continuous quality improvement (Raju & Balasubramanian); Quality assessment and quality results (Raju & Balasubramanian); Customer satisfaction (Talley) (Ramirez & Lonely) (Raju & Balasubramanian) (Wali et.al.) Cost of Quality (Ramirez & Lonely)	Lack of cost and benefit analysis (Mahoney & Thor)
	Self analysis / experience based articles	Continuous improvement (Shin & Kalinowski); Obsession with customer satisfaction (Coleman); Generating real result and produce experience of success in short term (Cohen)	
	Guru's prescription		Excessive cost of liability (Deming); Excessive medical cost (Deming)

2.3.3 Choosing the Structure

Quality Management Program (QMP), as defined by Jha (1997) is, an organisational activity aimed at improving the quality of inputs, process or outputs of an organisation. This management program requires coordinated efforts within the entire organisation for considerably large duration of time. Program, as defined by Branson (1996), comprises of five functions: analysis, plan, staff, direct and control.

The literature revealed that rate of success of QMP implementation has been very low (Schaffer & Thompson, 1992; Tatikonda & Tatikonda, 1996) and the literature also identifies problems in implementation (Sousa & Voss, 2001). In India, it is quite often observed that objectives pertaining to Quality are widely and frequently talked about in the organisations, however, the practice does not necessarily follow. In other words, the

gap between what is planned and what is practiced is perceptible. The final outcome of the QMP is not fully assessed, unless mandated in order to obtain the certificate. Therefore in Indian context, it becomes interesting to study QMP implementation process by focusing on planning and implementation aspects of QMP.

Such situation offers an opportunity to study QMP implementation in the framework of programme implementation. For this purpose, the programme implementation framework was adopted. It was adapted to include outcome of QMP.

Another readily available alternative is to use the widely accepted framework based on functional management processes namely planning, organising, leading and controlling. However, it would require a set of skills to understand human processes (e.g. leading, motivating, etc.) that were not part of the researcher's educational skill set. The available literature provides framework of QM contributed by Flynn et.al. (1994), however, it does not support directly for studying QMP from planning and implementation aspects. Hence, it was decided to choose the program implementation framework for developing QMP structure.

For this research study, elements required for QMP implementation are grouped into planning which is labelled as 'Policy', implementation which is labelled as 'Practice' and 'Outcome.'

The `Policy´ expresses statement of aims, purpose and intentions and serves as continuing guidelines for management in accomplishing objectives (Johannsen & Page, 1975). This comprised of elements expressing intentions of organisations for future; its long-term and short-term plans and objectives; as well as various rules and regulations pertaining to quality management.

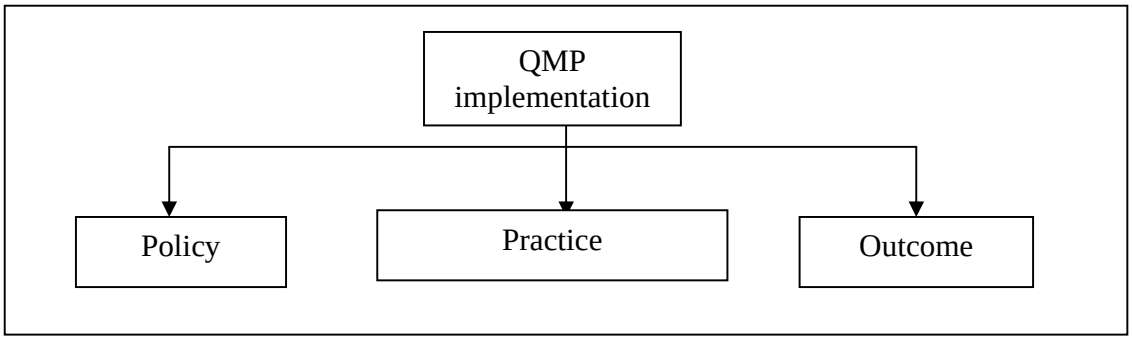
The 'Practice' is a habitual action or performance (The Oxford Dictionary for the Business World, 1993). This comprised of elements related to activities or practice related to QMP implementation.

The ‘Outcome’ is what gets generated as output of QMP implementation program. It is generally expressed quantitatively.

The available literature in QMP has given various variables and elements related to QMP implementation, however, it does not provide clear direction on Policy, Practice and Outcome elements. It was also revealed through literature review that there is no such framework reported in India for QMP implementation. Additionally, there is a need felt that academia should focus more on real practical problems. Thus, an attempt is made in this research to develop framework of QMP implementation by compiling available QMP implementation elements into Policy, Practice and Outcome.

The previous section enumerated various factors favouring and inhibiting QMP. These were identified from three streams of articles, namely research based articles, experience based articles and Guru’s prescriptions. All these variables were grouped together under the framework of Policy, Practice and Outcome as presented in Figure 2.3

Figure 2.3: Framework of QMP

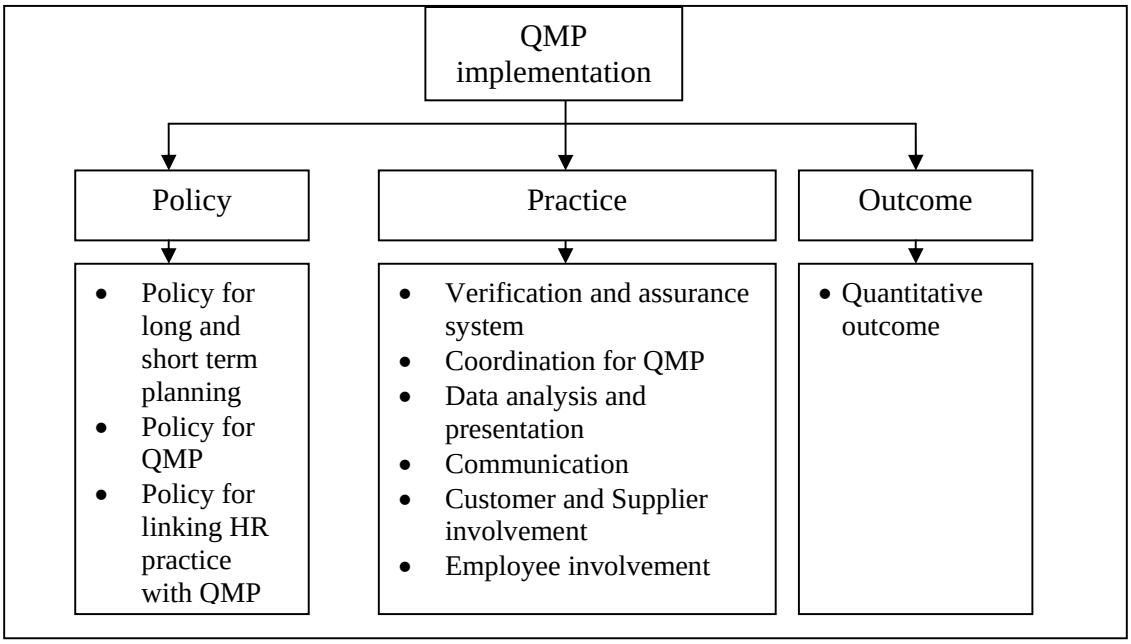


All variables related to Policy, Practice and Outcome were further grouped and ten elements emerged. Variables under Policy were grouped into three main elements namely: `Policy for long and short term planning´; `Policy for QMP´ and `Policy for linking HR practice with QMP´. Variables under `Practice´ were grouped into six main elements namely; `Verification and assurance system´, `coordination for QMP´, `data analysis and presentation´, `communication´, `customer and supplier involvement’ and

`employee involvement´. All `Outcome´ related variables were grouped under element- `Quantitative outcome´.

The structure of QMP implementation emerged from literature review includes three broad elements and tem elements which are presented in Figure 2.4.

Figure 2.4: Elements Related to QMP



2.3.4 Importance of Human Resource Function in QMP

There are several articles that highlight the importance of Human Resource function in the organisation. They point out the similarity found in Human Resource function and QMP by stressing that the key element in QMP is the employee; and consequently employee-commitment to a QMP program is essential. Human Resource is a function directly oriented towards employees, who should seek the responsibility for implementing QMP (Clinton et. al, 1994). The other areas covered in the articles include: importance of people (Ambroz, 2004; Cohen, 1994; Vouzas, 2004; Singh, 1991), 'soft factor' development (Samson & Terziovski, 1999), quality of champions/experts (Ishikawa 1987; Phillip, 2001) and importance of culture (Benjamin et.al., 1994; Salegna & Fazal, 2000; Jabnoun & Anwar, 2002).

2.3.5 QMP as Context Dependent

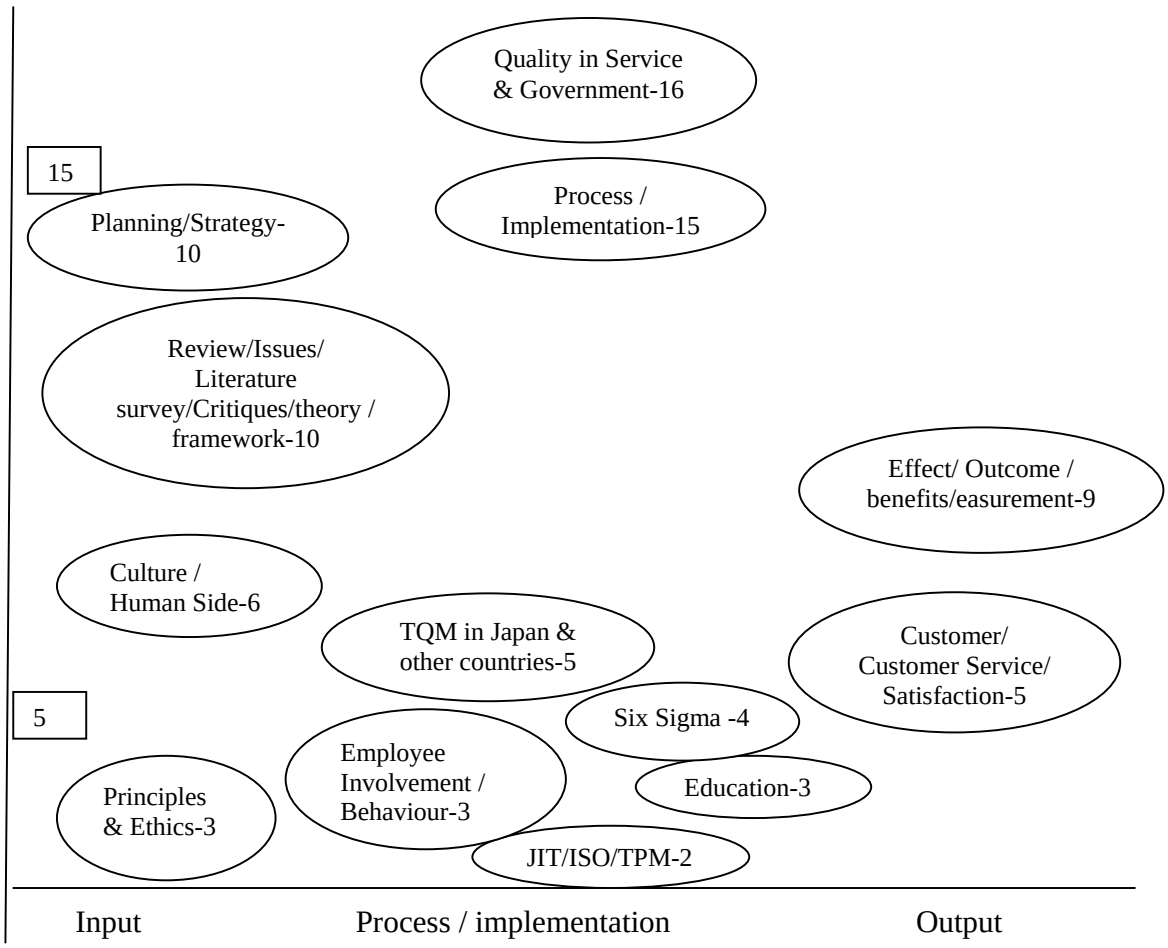
Quality Management has been advocated as being universally applicable to organisation. However, Sousa and Voss (2001) indicate that studies conducted by several scholars (Benson et.al., 1991; Sitkin et.al., 1994; Reed et.al. 1996 and Sousa & Voss, 2001) have concluded that the Quality Management is context-dependent and the process QM practices are contingent on plant's manufacturing strategy.

2.3.6 QMP as referred in Other Fields

The subject of Quality Management is also discussed widely in other areas. Total Quality appears to have covered a great deal of the same ground as management theory, and generated tremendous amount of interest in many sectors of the economy (Dean & Bowen, 1994).

In order to study the approach of journals belonging to other fields towards the Quality Management, a search was carried out in 'Wilson Social Science Abstracts' which covered 600 journals published between 1984 and 2001. It revealed that there were 91 articles in this area, which can be categorized under 'input' side, or 'process/implementation' side and 'output' side of Quality Management as explained below in Figure 2.5. It also revealed that the authors and researchers have devoted more attention on the input side of the Total Quality Management- i.e. how principles, planning, strategy, culture and human side are important for TQM implementation - and Implementation/process side of Total Quality Management. In the output side of TQM, a good number of articles were studied in the area of analysing outcome of the programme and customer satisfaction (Trivedi, 2002).

Figure 2.5: 'Quality Management' covered in Other Management Journals



2.3.7 Low Success of QMP

It has to be conceded that in spite of the knowledge of factors favouring and inhibiting QMPs, the success rate of QMP implementation has been very low. QM literature identifies the problems in implementation and raises the questions whether the low success factors are the result of conceptual flaws in QM approach or of its deficiency in implementation (Sousa & Voss, 2001). In a survey of McKinsey's study (Schaffer & Thompson, 1992) of the 30 quality programs, nearly 2/3 were either stalled or fell short of delivering real improvement. According to another survey (Tatikonda & Tatikonda, 1996) of 100 British firms, only 20 percent believed that their quality programs had a significant impact. Many authors recognize the virtue of the broad QM model and attribute failure to implementation problems (Sousa & Voss, 2001).

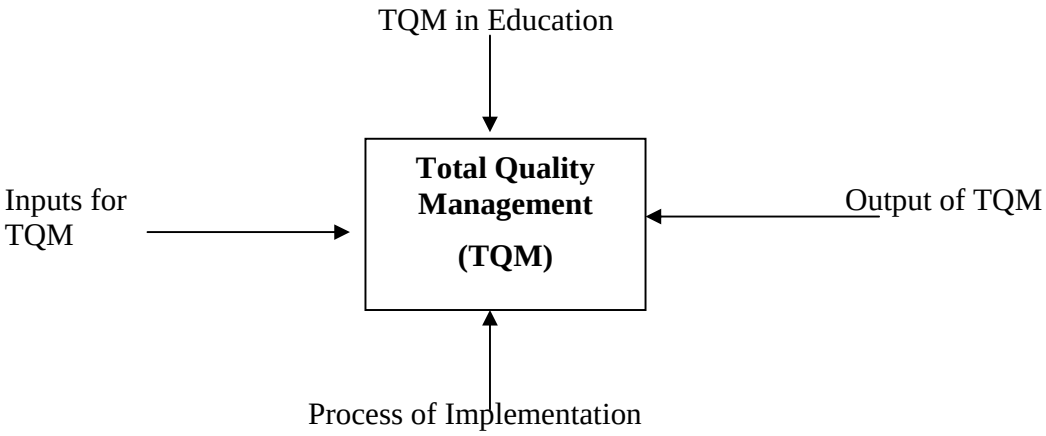
2.4 Dissertation Review on Quality Management

Since the past two decades, the increasing interest of practitioners in the field of Quality Management (QM) has resulted in academic researchers embracing QM as legitimate discipline of study. Examination of doctoral dissertation in the field gives opportunity to evaluate intellectual health of QM (Jack, et. al., 2001). An attempt is made to review in brief such dissertations in and outside India.

2.4.1 Dissertation Review Outside India

A search was conducted to identify Ph.D. level research carried out at universities in and outside USA. UMI research collection website was visited (http://wwwlib.umi.com), which contained around 232 linkages to universities in US and outside. Each of these universities was browsed and a query was generated to search any Ph.D. thesis registered in the area of "Quality Management". About 45 universities and schools are found to be involved in the area of research in Quality Management field at Ph.D. level. A conceptual model was developed explaining elements of Quality Management as - Input, Process and Output. All the dissertations searched from Internet were categorised under these headings as summarized in the figure below (Trivedi, 2002).

Figure 2.6: Summary of Dissertations in Quality Management in USA



As shown in the figure, the section on 'Inputs required for implementation' explores the possibility of designing TQM programme in a better manner by understanding the strategy required to build, frame required to develop, leadership required to lead and

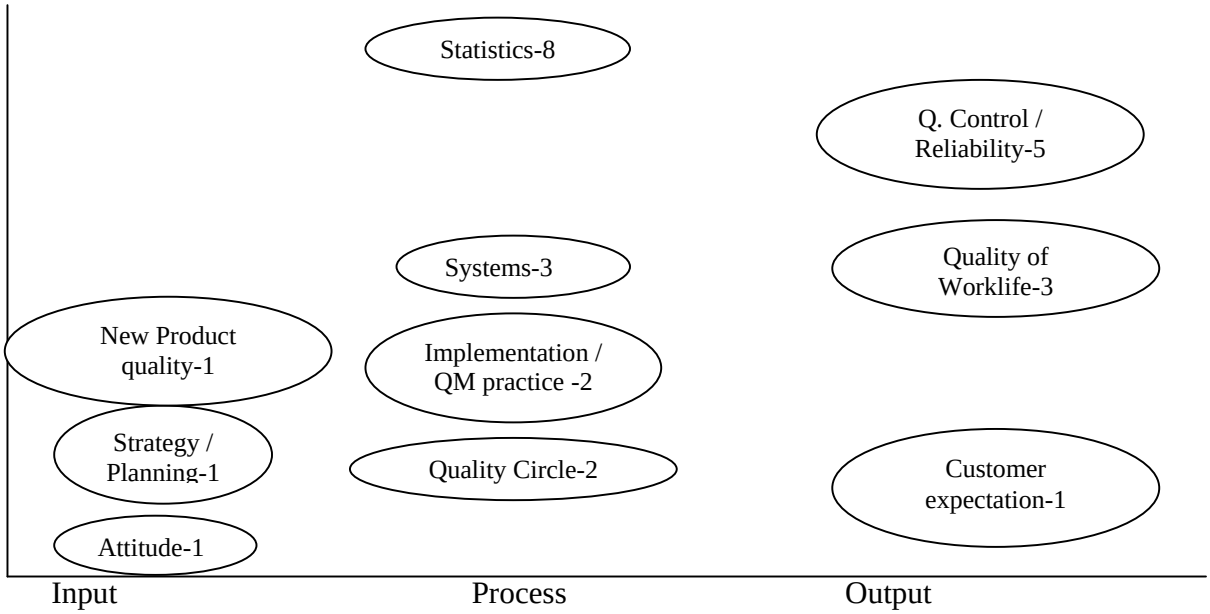
commitment required to achieve the desired target. In the 'input' side of TQM, work has been carried out in various areas like leadership, strategy, framework/infrastructure; effect of different factors on programme, and culture. The section on 'Process of Implementation' explores the implementation process/deployment, linkage with outcome, integration, training and comparative studies. The third section relating to 'Effects/outcome of implementation' explores the impact on organisational performance, efficiency and product quality. The fourth section explores other areas of research wherein 'TQM in Education' has been dominating because of its spread in educational institutes (Trivedi, 2002).

A study of doctoral dissertation (Jack et. al. 2001) in the field of Quality Management (QM) using Dissertation Abstracts International database from the year 1981 to 1998 revealed that the overall interest in the subject grew modestly during the 1980s. By the late 1980s and early 1990s, the research began to focus on developing theoretical foundations for quality management practice. The subject attracted increased interest during 1990s, which was indicative of the recognition of QM as a business discipline and an avenue of research. During the 1990s several researchers also identified QM as a key element of world-class manufacturing.

2.4.2 Dissertation Review - Indian universities

In order to identify Ph.D. level thesis submitted in the Indian universities, additional search was carried out at different levels. Several available bibliographies, doctoral dissertations and websites were browsed including the website of Association of Indian Universities, Information and Library network centre INFLIBNET (http//www.inflibnet.ac.in), etc. From the data collected from 112 Indian universities and institutes along with bibliography of Ph.D. thesis registered in Indian universities several areas were identified which are related to Quality. The same is plotted as process model – input, process and output of Quality Management and explained in the figure below (Trivedi, 2002)

Figure 2.7: Quality Management in Doctoral Dissertation in Indian Universities



Out of these twenty seven registered Ph.D. thesis in the area of quality, one of the oldest recorded in bibliography was on reliability approaches followed by a thesis on statistics in early 80s. During 1980s the main focus on Ph.D. level research as recorded in the bibliography was in the area of statistics, reliability and quality control model. In late 80s and early 90s two thesis were recorded in the area of Quality circle – the movement started by Japanese for team building and systematic problem solving – one thesis focused on Quality circle movement in India with case study of Rourkela Steel Plant, while the other focused on understanding the movement and its effectiveness. In 1990s the areas researched were quality of work life, system approach, quality of share price, quality control methods, new product failure, customer expectations, Kaizen, quality management program and its implementation, attitude of employees in Total Quality Management, etc.

Additionally, a survey questionnaire was prepared to find out whether any Ph.D. level research in the area of Quality Management Program has been documented in Business Schools. The question asked was related to research in the Quality Management Program: `Whether any study (at Project level or Ph.D. level) has been conducted in or through your institute.´ This was requested through email to 26 email addresses of India´s 16

leading Business Schools collected through website. The response received indicated that there is no research conducted on the subject in these schools.

It can be stated that QM has evolved from practice and has benefited from the research that followed. In India, we have barely scratched the surface of the phenomena that has potential to put India on the global map of operational excellence in management (Trivedi, 2002).

2.5 The Need

Although quality management is well established in practice, and used by all major companies, very little research focus has been given specifically on quality management practices (Flynn, et. al., 1994). As a result, quality management theory is far from fully developed (Ahire et. al., 1996) and its theoretical conceptualization is, in many aspects, still lacking (Lagrosen, S 2004). Inadequate attention has been paid to the adaptation and development of theory through research in this area. There have been only few systematic attempts in the literature to organize and synthesize the various sets of critical success indicators identified by different authors (Wali, et. al., 2000).

The rate of success of QMP implementation has been very low. In spite of that, there is little empirical evidence available regarding quality improvement practice at an operational level (Kannan, et.al., 2000). The theory of quality management needs to address the multiple and complex set of relationship between various dimensions of quality practices and various dimensions of quality performance (Fynes & Voss, 2001). Due to the paucity of insight into interaction among various quality management strategies, organisations employ them in isolation which results into failure of quality management program (Ahire et. al., 1996).

The understanding and practice of QMP in its current form had started in Indian companies in 1990s. In order to increase awareness on QMP in Indian industries, some of

the popular business magazines (e.g. Business Today, 1995) have also given exclusive coverage to the need for improving quality by selecting various QMPs.

There is a paucity of literature on Total Quality from the standpoint of an empirical analysis in India (Rogerson & Yadav, 1994). The little research available on Indian workers makes it clear that success of western model is limited when applied in India (Kumar, Garg & Mehta, 2002). Scholarly inquiry at the Doctoral level dissertation in this area is also scant.

The national culture has been recognized as an independent variable influencing the organisation culture and practice. Blind implementation of QMP without understanding work culture results in negative results for the organisation (Kumar, et. Al, 2002). Hence, even though researchers have developed new concepts in eastern and western countries, there is a huge potential of studying those concepts from the Indian perspective (Trivedi, 2002).

It was also felt that research in academia should be based more on real practical problems. As quality practice evolves over a considerable period of time during which it passes through different challenges, a longitudinal research could provide valuable contribution to theory development and refinement in the field of quality management (Fynes & Voss, 2001). This generates interest to conduct longitudinal case study to understand how such QMPs are implemented in Indian organisations with focus on various policies, practices and outcome.

2.6 Objectives of this Research

This study is expected to develop understanding of the process of QMP implementation. Thus the objectives of this research are to identify:

1) How Quality Management Program (QMP) is implemented?
2) What are the policy related elements in QMPs?
3) What are the practices deployed in QMP implementation?
4) How is the outcome of QMP measured?

CHAPTER 3. RESEARCH METHODOLOGY

This chapter deals with the process of selection of appropriate research methodology for addressing research objectives.

3.1 Understanding the Research Objectives

Generally, in any organisation, QMP implementation happens alongwith all other activities –routine and non routine. Hence study on implementation of QMP, involves complex real life phenomenon. Additionally, the implementation takes place in the organisational context and cannot, therefore, be separated from it. For example, many of the policy related decisions may take place in business review meetings and many of practices are demonstrated alongwith other routine practices. Such study of QMP implementation therefore needs to focus on complex phenomenon which involves many variables.

In this situation, when research question is posed to explore understanding of process of QMP implementation, it requires actual data from the field. This includes, collecting data from organisations where QMP is/being implemented. Hence instead of theoretical or analytical research, it becomes essential to conduct field research.

Moreover, many of QMPs, when implemented in organisations, take considerable time as the implementation does not only involve technical decisions, but, also involves human element for making QMP work. As a result, such process normally takes few months to five –six years depending upon the context in which it is implemented. Thus, this research also required field research where data are collected from organisations that had implemented QMPs in past five to six years.

While arriving at the decision to conduct exploratory study of QMP through the field research; data from the field comprises of first hand data collected through - structured and /or unstructured interview of those who have been directly involved in actual

implementation; understanding the process by collecting data from various field documents as well as collecting direct observations on the actual shopfloor practices. It is, therefore, necessary to spend time in such organisations and collect data through various sources. It thus meets understanding of Empirical research as defined by Simon (1969). Empirical research is the knowledge obtained from data resulting from first-hand observations. It excludes knowledge obtained by consulting authorities, in books or in person.

Objectives of this research do not require testing the developed theory, but require conviction that what is important to look for will emerge from this exploratory research. Hence, rather than developing research instrument for testing defined theory, this research needs to develop knowledge on QMP implementation process by rigorously following suitable research procedure. The rigour in this study is not expected in disciplined application of statistical tools, but in developing qualitative research strategy which suits scenario being studied as it is revealed.

Holliday (2002) while comparing Qualitative and Quantitative research methods explains their distinct characteristics. The following table explains their elements.

Table 3.1: Comparison of Quantitative and Qualitative Research. (Holliday, 2002)

QUANTITATIVE RESEARCH	QUALITATIVE RESEARCH
<u>Activities</u> i) Counts occurrences across a large population ii) Uses statistics and replicability to validate generalization from survey samples and experiments iii) Attempts to reduce contaminating social variables	a) Looks deep into the quality of social life b) Locates the study within particular settings which provide opportunities for exploring all possible social variables; and set manageable boundaries c) Initial foray into the social setting leads to future, more informed exploration as themes and focuses emerge

Beliefs	
iv) Conviction about what it is important to look for	d) Conviction that what is important to look for will emerge
v) Confidence in established research instruments	e) Confidence in an ability to device research procedures to fit the situation and the nature of the people in it, as they are revealed
vi) Reality is not so problematic if the research instruments are adequate; conclusive results are feasible.	f) Reality contains mysteries to which the researcher must submit, and can do no more than interpret
Steps	
vii) First decide the research focus (e.g. testing a specific hypothesis)	g) First decide that the subject is interesting (e.g. in its own right, or because it represents an area of interest)
viii) Then devise research instruments (e.g. survey questionnaire or experiment)	h) Explore the subject i) Let focus and themes emerge
ix) Then approach the subject	j) Device research instrument during process (e.g. observation or interview)
Rigour	
x) Disciplined application of established rules for statistics, experiment and survey design	k) Principle development of research strategy to suit the scenario being studied as it is revealed

Qualitative research is increasingly used in a wide range of academic and professional areas. It develops from aspects of anthropology and sociology and represents a broad view that to understand human affairs, quantitative survey and statistics are necessary but not sufficient by themselves to understand reality. It emphasizes the necessity to develop deep into the subjective qualities that govern behavior (Holliday, 2002).

Trochim (2003) explains that one of the major reasons for doing qualitative research is to become more experienced with the phenomenon in which researcher is interested. This is

where most of the more interesting and valuable new theories and hypothesis originate, and good qualitative research can play a major role in this theory development. Qualitative research has special value for investigating complex and sensitive issues.

Due to researcher's own experience in the field of practice in implementing various QMPs, interest was generated to study the same as research problem with focus on how QMP is implemented. The nature of research question thus makes clear to adopt qualitative research.

While selecting a particular research strategy at least three conditions need to be considered (Yin, 1984, 2003). They are: the type of research question posed; the extent of control an investigator has over actual behavioral events and the degree of focus on contemporary as opposed to historical events.

Table 3.2: Relevant Situation for Different Research Strategies (Yin, 1984, 2003)

RESEARCH STRATEGY	FORM OF RESEARCH QUESTION	REQUIRES CONTROL OF BEHAVIORAL EVENTS?	FOCUSES ON CONTEMPORARY EVENTS?
Experiment	How, why?	Yes	Yes
Survey	Who, what, where How many, How much	No	Yes
Archival analysis	Who, what, where, How many, How much	No	Yes/No
History	How, why?	No	No
Case study	How, why?	No	Yes

3.2 Selection of Research Method

As indicated in the literature survey, QMP in its current form was initiated in India during the early 1990s. Several factors have been identified favouring and inhibiting implementation of QMP, however its overall success-rate has remained very low. This study is expected to develop understanding of the process of QMP implementation.

The objective of this research is to understand: how Quality Management Program (QMP) is implemented? what are the policy related elements in QMPs? what are the practices deployed in QMP implementation? and how is the outcome of QMP measured?

Based on these requirements, a search was carried out for selection of an appropriate research methodology which includes experiment, archival analysis, history, survey and case study methods. To satisfy the research objectives, there are mainly three ways as explained below.

The researcher can participate in actual implementation in an organisation. This 'Action Research' will give first-hand data related to Policy, Practice, and Outcome related to QMP being implemented. In such action research, sample size also can be one. However, to get permission from one sample organisation which is initiating QMP exactly at the time of this research is difficult. Additionally, there is a high uncertainty in this type of research with respect to successful completion of the research agenda, if this QMP implementation remains incomplete or fails.

Secondly, a detailed 'historical research' of organisation can be conducted wherein all relevant documents of Policy, Practice, and Outcome can be studied from archives. In such methodology, data need to be at least 20 years old and in India, implementation of QMP was initiated mainly in 1990s.

Thirdly, there is a case study method, in which, real life phenomenon can be studied through multiple evidences like documents and interviews. This methodology helps in collecting data from multiple sources but requires spending time in organisations.

Out of these three methods, the case study was found more appropriate for this research as the first two did not suit due to the time constraint and inability to capture real life contest respectively.

3.3 Conclusion

This research study is expected to develop understanding of the process of QMP implementation. The objectives of this research as stated earlier are: to study How, Quality Management Program is implemented; what are the policy related elements; what are the practices deployed and how is the outcome of QMP measured.

In order to study these objectives, qualitative research with exploratory study of QMP implementation process by using the case study methodology is suitable.

CHAPTER 4. CASE STUDY RESEARCH METHODOLOGY

This chapter deals with the case study methodology and explains the components of research design; tests for quality of research; selection of the sample organisations; and process of data collection.

Case study is a method of choice when the researcher wants to obtain a wealth of information about the subject. This method is appropriate when one is trying to find clues and ideas for further research (Simon, 1969). The case study addresses a series of phenomena of great importance, which cannot possibly be recorded by questioning or computing documents, but have to be observed in their full actuality (Malinowski, 1961 cited in Simon, 1969). The Need as defined in chapter 2.5 is satisfied by case study strategy.

Yin (1984) asserts that the case study method allows an investigator to retain the holistic and meaningful characteristics of real-life events. He states: “A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used.”

In the case study method of research, primary distinction can be made between ‘single’ and ‘multiple’ case design. In a ‘single’ case design the sample size is only one where as in ‘multiple’ case more than one sample are selected for study. The single-case design is justifiable under certain conditions (Yin, 2003) such as: a critical case of an existing theory; a rare or unique circumstance; a representative or typical case or when the case serves revelatory or longitudinal purpose. In multiple case design, the evidence is often considered more compelling and the overall study is, therefore, regarded as being more robust (Herriott & Firestone, cited in Yin, 2003). For this thesis, the multiple case design is selected.

Each case in this design is carefully selected (Yin, 2003) so that it either (a) predicts similar results (a literal replication) or (b) predicts contrasting results but for predictable reasons (a theoretical replication). An important step in all replication procedures is the development of rich theoretical framework. This replication logic, whether applied to experiments or to the case study method, is distinguished from the sampling logic commonly used in surveys.

4.1 Components of Research Design

Based on the existing literature, open-ended research questions were framed for analysis. The unit of measurement was QMP implementation process. The selection of industry and the organisations within that industry was subsequently done.

4.2 Selection of Sample Organisations

4.2.1 Selection of Industry

Indian Automobile sector is a vital sector for the Indian Economy (Khanna, et.al, 2002) and it accounts for nearly 4% of the GNP (Auto Policy, 2002). The growth of Auto component industry in India has been very rapid during the past few years. It is believed that India-based automotive component manufacturing has potential to grow 500 per cent from its current level by the year 2015 (ACMA-McKinsey Report, 2005). Therefore, it was decided to select sample organisations from the Auto component industry.

Quality management practices as discussed earlier, have been identified as context-dependent (Sousa & Voss, 2001). The literature on the study of the subject has pointed out some contextual factors which are: external quality demand, past quality performance, type (manufacturing or service), extent of entry barriers, management knowledge, corporate support for quality, (Benson et. al., 1991); country (Madu et. al cited in Sousa & Voss, 2001), years since its adoption of QM program (Powel 1995, Ahire 1996 cited in Sousa & Voss, 2001).

Hence, it was decided to select Indian Auto component organisations with similar degree of external quality demand, with quality systems complying with minimum ISO9001 international standard, and has adopted minimum one QMP in the past. As Fynes and Voss (2001) mention, any quality practice evolves over a considerable period of time during which it passes through different challenges. It was, therefore, decided to study QMP implemented during past six years.

Major segments in the Auto component industry are Engine parts, Suspension and breaking parts, Drive Transmission & steering parts, Electrical parts, and Equipments. Out of these, Engine parts contribute the highest in terms of production share in Million Rupees. In Engine parts segment (which comprises of about 30 parts), Bimetal Bearing is among the first three (in the year 2002-03) according to quantity produced. (ACMA, Facts & Figures 2002-2003).

4.2.2 Selection of Organisations

A search for Engine bearing and Ball bearing manufacturers in India was carried out through several databases, namely CMIE (Center for Monitoring Indian Economy); ACMA (Automotive Component Manufacturers Association of India); 'Industry Market size and shares' (by Economic Intelligent Service CMIE); and through website search.
Forty-two organisations were identified from the publicly available data base. The list of these organisations is given in Annexure C. Each of these 42 organisations was requested for a permission to visit the plant and collect data. Postal address and email ids were collected from websites also. Separate letters were addressed to the heads of these organisations explaining the purpose of research and nature of data required.

Out of these 42 organisations, 36 were from Ball Bearing Industry and 6 were from Engine Bearing Industry. Initial response was received from 15 organisations. After responding to their initial queries, sample size came down to five. Reasons are mainly: organisations unwilling to share data after understanding nature of requirements for this study, organisations had different products or processes, and organisations preoccupation with other business related activities which do not allow time provision for such type of research. Out of five organisations visited, it was further revealed that nature of process

and product pertaining to one organisation was not similar to Ball Bearing or Engine Bearing Industry. This was discovered during the data collection visit. Finally, 4 organisations were qualified for data collection out of which three were from Engine Bearing and one from Ball Bearing industry. Substantial resource was invested to collect required data from these four organisations

For this research study, Quality Management Programs of four organisations were studied. Three of these four were Engine bearing manufacturers and one was Ball bearing manufacturer. In order to protect the confidentiality of various data of these organisations, the Ball bearing unit is referred as OA, and the three Engine bearing organisations are referred as OB, OC and OD. As there was only one response received from Ball bearing industry, the same was treated as pilot project. Hence, OA was considered as pilot project.

In Engine bearing industry there are main six organisations out of which three were visited for data collection. These three organisations (i.e. OB, OC and OD) contribute about 60% of the market of total Engine bearing business.

4.3 Case Study Method Employed

After a detailed literature review on the subject, elements related to Policy, Practice and Outcome of QMP were identified as mentioned in Chapter 2.3.3. Subsequently the organisation for pilot study was selected as explained in previous section.

4.3.1 Pilot Case Study

The main objective for selecting pilot case study was to refine data collection plan with respect to the content and procedure to be followed. As this pilot test is not pre-test (Yin, 2003), its main aim was to establish and fine tune data collection protocol in the field.

The first organisation OA was planned as pilot project. Before visiting OA, its relevant data were collected from Internet. The visit was planned for four days in consultation with the organisation.

The data collection for pilot case was based on questions derived from literature review and the author´s eight years of practical experience in implementing various QMPs. The literature review identified two types of factors – favouring and inhibiting – QMP. These elements reflected variables and attributes related to QMP implementation as well as its environment. For collecting field data, a study was conducted to identify variables and attributes which are not directly part of policy and practice and related to environment for QMP implementation. Some of the variables are primarily related to human processes within organisation which is mainly a functional domain of Human Resources management. Study of such elements is not included as it makes task of this research work more complex. Further, the author has very little educational background of dealing with Human Resource management. Additionally, for two variables which were specific to Design were not considered as data with respect to these variables are generally considered confidential as activities of design departments have a strategic dimension. This also got confirmed during the pilot study.

Summary of such excluded variables and attributes is tabulated as below.

Table 4.1 List of attribute and variables not included in this thesis.

SR	NAME OF ATTRIBUTE /VARIABLE NOT INCLUDED	AUTHOR	REASON
1	Design Quality Management	Ahire, 1996	Confidential data of organisation, not willing to share.
2	Product and service quality in design	Shin & Kalinowski, 1998	
3	Dependence on cumbursome bureaucracy	Harari, 1993 cited in Bounds, et. al., 1994	Element mainly a functional domain of Human Resources management
4	No change in management compensation		
5	Faddisim egotism and quick fixism		
6	Drain of entrepreneurship and innovation from corporate culture		
7	Creation of own bureaucracy	Mahoney & Thor 1994, cited in Tatikonda & Tatikonda, 1996	
8	Wandering quality team and confused supervisor		
9	Strained working relationship		
10	Argument that this too shall pass		
11	"Not discovered here and we are different" syndrome		
12	Lack of employee trust in senior management	Salegna and Fazal, 2000	
13	Politics and Turf Issues		
14	Lack of real employee empowerment		
15	Lack of strong motivation		
16	Management behaviour	Wali et. al., 2000	
17	Managerial style	Fine, cited in Dale & Plunkett, 1990	
18	Employee relation	Raju & Balasubramanian, 2002	
19	Union support	Jha, 1997	
20	Attitude that our problems are different	Deming cited in Broka & Brokka, 1992	
21	Drive out fear		
22	Blaming workforce for problems		
23	Dilusional measurement	Shaffer & Thompson, 1992	
24	Program bias to orthodoxy and not empiricism		
25	Excessive cost of liability	Deming, cited in Broka & Brokka, 1992	Not significant in the Indian context
26	Excessive medical cost		

During data collection, methods like semi structured interviews, direct observations and compilation of secondary data were used. Detailed notes with data sources were recorded and insight generated from the same was audio-recorded every day.

After completing data collection for four days from OA, detailed review was conducted with the supervisor to establish the data collection protocol. Additionally, the questions were segregated for various roles and functions. The questionnaire was also discussed and reviewed with one QMP implementation consultant.

At the completion of the case study, more clarity was generated about the operational aspects ofcase study protocol, construct validity, reliability, data sources, and principles of data collection as described by Yin (2003).

4.3.2 Process followed

After obtaining experience of pre-pilot and pilot study, data were collected from other three organisations namely OB, OC and OD through various sources. Several data collection methods were used including semi-structured interviews, direct observations (e.g. plant tour) and secondary data. Detailed notes on the data collected from various sources were maintained. Additionally, the insight generated from the field visit was audio-recorded at the end of each day.

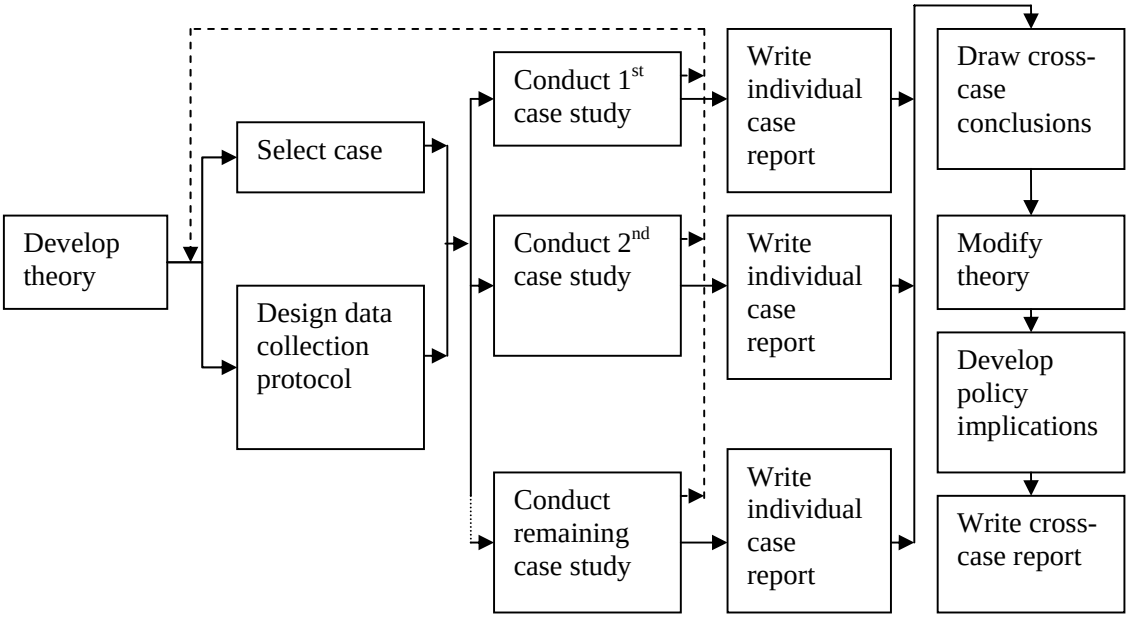
On return from every site, notes were transcribed, and the data were segregated and grouped. As the literature review identifies elements related to Policy, Practice and Outcome, they were compared with data collected from OA. Also attributes/characteristics exhibited on each element were identified and documented. The case study was documented, based on the structure developed on various elements under Policy, Practice and Outcome. It was sent to respective organisations for their reviews and suggestions offered were incorporated.

Case details of each of the four organisations – OA, OB, OC and OD can be referred in chapter six to nine. After documenting every individual case, variables emerging from all

cases were studied, comparative statements of variables for four organisations were prepared and Matrix analysis was conducted. Additionally all data collected were also presented for their comparison which can be referred in Annexure B. Finally, analysis and findings were recorded and analytical generalization was attempted based on which conclusion was drawn.

The framework presented in chapter 2.3.3 was used for collecting data from all organisations. The approach to multiple case studies is presented in the following figure.

Figure 4.1 Case Study Method (Yin, 2003)



Some of the questions asked during data collection can be represented in Table 4.1

Table 4.2 Questions Asked during the Case Study

This table gives a list of some of the questions asked during the case- study visit.

General points

Company details

QMPs implemented in organisations

Coordinators and their position in the organisation

Specific questions on QMP

Will you please explain how QMP was initiated in your organisation?

What were the reasons for selecting QMP?

Whether any targets were decided for QMP? What were they?

How was QMP coordinated in your organisation?

How was QMP reviewed? Who participated? How frequently was it reviewed?

How was the progress measured? By whom? At what frequency?

Whether any organisation was created for QMP? Whether any special rules and regulations were made for QMP implementation?

How did you measure the success of QMP?

How do you select quality related targets? What are the targets for the current year?

Will you please show achievements on these targets for the past five years?

Common questions for department heads

Will you please explain about vision or mission of your company?

Will you please explain about your Quality Policy?

How are vision, mission, and policy requirements ensured?

Was there any role played by your department in QMP? Will you please elaborate on this?

4.4 Criteria for Quality of Research Design

According to Yin (2003), four different tests have been commonly used for ensuring quality of any empirical research. They are: (i) Construct validity, (ii) Internal validity, (3) External validity, and (iv) Reliability.

4.4.1 Construct Validity

It involves establishing correct operational measures for the concept under study. As mentioned in the previous section, the questionnaire was more comprehensive after pilot study based on literature, review with consultants and colleagues in the same field. Additionally, tactics for these tests were also used at several phases of this research starting from research design to data collection, analysis and composition. The same is also explained in Table 4.2. As suggested by Yin (2003) important tactics for construct validity in case study research are: use of multiple sources of evidence, establishing a chain of evidence, and getting the draft reviewed by key informants.

Accordingly in this research, a multiple source of evidence was attempted namely: interviews, direct observation, study of company-records and published material, and company website. Chain of evidences was established during analysis so that one can establish evidentiary process backward. Citations were also mentioned while documenting the case. Additionally, the drafted material of cases was subsequently sent to the concerned organisations for their reviews and the suggestions offered were incorporated.

4.4.2 Internal Validity

It involves establishing a causal relationship. The tactics suggested by Yin (2003) are pattern matching, explanation building, and time series analysis. As this study is exploratory in nature and did not attempt to define causal relationship, the same was not attempted in this research.

4.4.3 External Validity

While the survey method relies mainly on statistical generalization, case study method relies mainly on analytical generalization. External validity involves establishing the domain to which the findings can be generalized (Yin 2003). All the four organisations studied were of Auto Component manufacturers. Out of these, the pilot project was from Ball bearing industry and the rest three organisations were from the Engine bearing industry. These three organisations are from a total six organisations from the organized sector and represent about 60% of total business of Engine bearing. Thus, findings from this research can be generalized to Indian Engine bearing industry.

4.4.4 Reliability

It involves demonstrating that the operations of a study can be repeated with the same results (Yin 2003). This was ensured by creating data-base which included field-notes, details of interviews, notes extracted from past records, documents, and published material. This research being a multiple-case, protocol of information about research, field procedures, and case study questions was ensured.

Yin (2003) illustrates various case study tactics for four design tests as narrated in Table 4.2.

Table 4.2: Case study Tactics for Four Design Tests (Yin, 2003)

TESTS	CASE STUDY TACTICS	PHASE OF RESEARCH IN WHICH TACTIC OCCURS
Construct validity	• Use multiple sources of evidence • Establish chain of evidence • Have key informants review draft case study report	• Data collection • Data collection • Composition
Internal validity	• Do pattern-matching • Do explanation-building • Address rival explanations • Use logic models	• Data analysis • Data analysis • Data analysis • Data analysis
External validity	• Use theory in single-case study • Use replication logic in multiple-case studies	• Research design • Research design
Reliability	• Use case study protocol • Develop case study database	• Data collection • Data collection

4.5 Data Collection

For this research, data were collected first for the Pilot study and subsequently from other three organisations.

Three principles of data collections recommended by Yin (2003) were used for collecting information from these organisations.

4.5.1 Data Sources

4.5.1.1 Personal Interviews

Semi-structured interviews were conducted during the data collection. Across cases informants included a top management member, a plant head, quality head, coordinator of QMP and representatives from QMP team, Production heads and representatives of shop floor supervisor, Purchase, Marketing, Finance, HR etc. Tentative plan of interview was circulated to all concerned by organisation representative on the first day; however flexibility of time was maintained as per their convenience. A checklist was developed

based on the available literature. Open-ended questions were asked to get information regarding various elements related to Policy, Practices, and Outcomes. Interview protocol was maintained. The purpose of research and the affiliation of the researcher with BITS-Pilani was explained.

4.5.1.2 Documents and Records

Document study was conducted during the field-visit. Various types of documents were referred in all the four organisations. These were: quality manuals, business plans, company manual (only in OB), minutes of meetings of quality management reviews, agenda and reports related to review meetings, progress reports, organisation charts, documents available on machines, process flow charts, rules and procedures related to QMPs, notice boards, display boards, company vision and mission statements, etc. Organisational website was also studied before the field visit in order to get preliminary information about the organisation.

4.5.1.3 Personal Observations

Multiple observations were made during the plant visits, through personal observations relating to workplace management, safety consciousness, housekeeping, general discipline, discipline related to record keeping and updating, machine maintenance, facility management, product handling, internal communication mechanism, etc.

4.5.1.4 Publications

Publications by the company like annual reports, in-house magazines, company brochures and booklets etc. were also referred during the field visit. Additionally, other publications concerning Auto component Industry published by ACMA were studied. The relevant websites were also searched.

4.5.2 Principles of Data Collection

4.5.2.1 Use of Multiple Source of Evidence

Use of multiple source of evidence was made while collecting data. Data triangulation was also practiced to ensure convergence of evidence.

4.5.2.2 Creation of Case Study Database

It is related to the way of organizing and documenting the data collected for case study. This was ensured by maintaining notes, documents, tabular materials, and narratives. Direct observations made in the field were audio-recorded every day.

4.5.2.3 Maintaining Chain of Evidence

In order to increase the reliability of this research, actual evidences were cited during the case writing. Please refer chapters six to nine for details.

4.5.3 Problems Faced in Data Collection

Based on the time constraint expressed by the organisations, a stay of four days at the site was mutually agreed for collecting the necessary data. This proved to be sufficient due to proper scheduling of interviews and study of other sources of data. Some of the problems faced in this research are mentioned below.

The coordinator of QMP in OD was absent during the field visit. This problem was overcome by arranging interview with the past coordinator who was the first coordinator for QMP (i.e. QS9000) and was in charge of a new plant located 10 kilometers away. Relevant quality data were obtained from various section heads and collected from documents and available records. To fill the missing links, requests were made to the coordinator subsequently through email after the visit. However, they were not responded to. The other common problem faced was of retrieving old data on quality and availability of their yearly consolidation.

In OC, no past documentation relating to quality and QMP was available for study. A top management member of OC was unable to spare time. Therefore, after completion of data collection work, an appointment of the group's Managing Director who was posted at Delhi was sought twice, but it could not be obtained due to his busy schedule. As per QA head and other heads, past data related to Outcome were not available, mainly due to frequent changes in responsibilities of coordinators.

One more organisation was visited based on the initial information provided. However, during the data collection at site, it was observed that the nature of operations in sintered metal industry was different from that of Ball bearing and Engine bearing industries. Hence, the collected data were not used for analysis.

To sum up, research objectives which were defined based on the literature review indicated the need of case study for studying empirically Policy, Practice and Outcome of QMP implementation. Components of research design were defined and criteria for judging quality of research design were ensured. Sample organisations were selected for multiple case designs. Data were collected through multiple sources and detailed data base was created for the same and protocol was ensured while repeating the data collection at other three organisations.

CHAPTER 5. OVERVIEW OF AUTO COMPONENT INDUSTRY IN INDIA

This chapter gives an overview of the auto component industry, including various initiatives taken by a number of organisations and their achievements in Quality improvement. It also indicates the future trend of this industry.

5.1 Background

Indian automobile sector is a vital sector of the Indian economy (Khanna et. al, 2002). Until 1980s, in India there were mainly three manufacturers namely M/s Hindustan Motors, M/s Premier Automobiles, and M/s Standard Motors which dominated its motorcar sector. Owing to low volumes, it perpetuated obsolete technologies and was out of sync with the world industry. In 1982, Maruti Udyog Ltd. (MUL) came up as a government initiative in collaboration with Suzuki of Japan to establish production of contemporary models. After the removal of licensing requirement in 1993, as many as 17 new ventures have come up, of which 16 are car manufacturers. The auto industry accounts for nearly 4% of the GNP (Auto Policy, 2002).

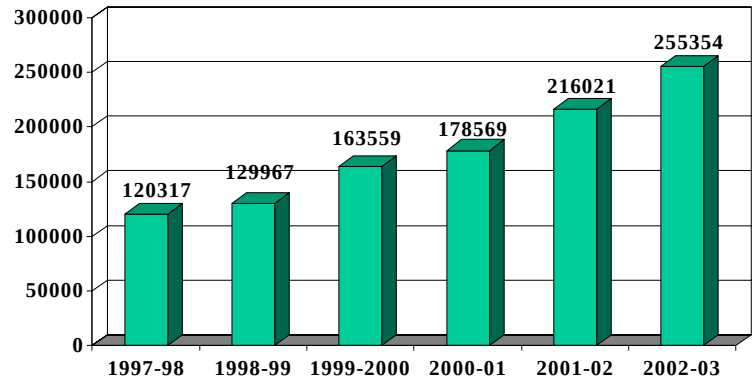
5.2 Auto Component Industry

The Auto Component Industry in India has come of age and is poised to become a major revenue earner for the country. This sector is being written up as the next industry after software that has a potential of becoming globally competitive. (www.indiabusiness.nic.in). It is estimated that India based component manufacturing has the potential to grow 500% from its current level to revenues of US$ 33-40 billion by 2015 (ACMA-Mckinsey, 2005).

Auto component manufacturers supply to two kinds of buyers: (i) original equipment manufacturers (OEM) and (ii) the replacement market. As per the ACMA report there are about 421 key players in this Industry.

The trend of production of auto component is shown in Figure 5.1.

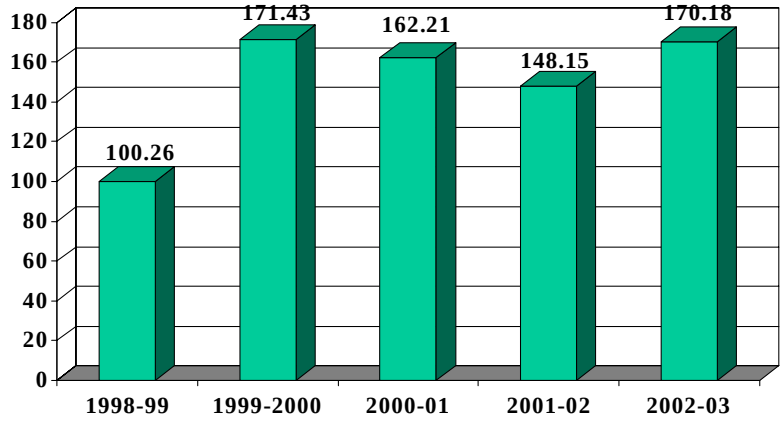
Figure 5. 1: Trend of Auto Component Industry by Production (Rs. in million)



Source: ACMA Facts & Figures:2002-2003 pp 25

Among auto components, engine parts have the maximum production share (23%) (ACMA Facts & Figures, 2002-03). An engine consists of more than 30 parts. One of the important parts in engine is Bimetal Bearings (Engine Bearings). Its trend of production is shown in Figure 5.2.

Figure 5.2: Trend of Bimetal Bearings Industry by Production (Rs. in million)



Source: ACMA Facts & Figures:2002-2003 pp 34

5.3 Initiatives in Quality

After liberalization, the Automobile sector has realized the competition ahead and felt the necessity of improving quality for its survival and growth (Khanna et. al., 2002). Upgradation of the present level of quality has become a major challenge for Indian component suppliers. Auto-component industries have initiated various shop floor practices like Kaizen, 5 S, Total Productive Maintenance (TPM), Total Quality Management (TQM), Six Sigma, Lean Manufacturing etc. (www.acma.com).

Additionally, several initiatives are taken up at various fronts to improve the quality standards. Some of these include: exclusive coverage on quality by some of the popular business magazines, inviting quality gurus from Japan for consultancy, development of forums to share achievements on quality and thereby learn from sharing, etc.

The Confederation of Indian Industry (CII) has been organizing annual Quality summits since 1993. It has established CII TPM Club of India jointly with the Japan Institute of Plant Maintenance (JIPM) to promote TPM in India. Four different awards (CII-Exim Award, Rajiv Gandhi National Quality Award, IMC Ramkrishna Bajaj Award, and Golden Peacock Award) are initiated to encourage Indian manufacturers to strive for business excellence.

5.4 Achievements in Quality

The nation-wide thrust on quality has resulted in encouraging results from many of the companies in India.

A report of ACMA-McKinsey (2005) indicates that in a sample of over 400 Indian Auto suppliers, 80% have ISO9000 certification; 50% have QS9000 certification 25 % of which have already graduated to TS16949; and 15% have ISO14001 of which 2% have the ISO-18001 OHSAS certification. Six companies have won the prestigious Deming award and happen to be the only Deming companies in Asia outside Japan. Additionally one company has won the prestigious award of Japan Quality Medal (www.acma.com).

A good number of auto component manufacturers have initiated TPM in order to achieve manufacturing excellence in their organisations. The first prestigious award of TPM Excellence in India in manufacturing was awarded to a leading auto component manufacturer – M/s Sundram Fastners in 1998.

5.5 Future Tends of Auto Component Industry

In the global automotive industry, sourcing of automotive components from low- cost countries (LCC) is likely to accelerate because of the increasing cost pressure on OEMs in developed countries, such as North America and Western Europe, and the emergence of skilled, cost-competitive suppliers in LCCs such as Brazil, China, India, and Thailand. In order to capture this opportunity, India-based suppliers should adopt a four-pronged approach. One of them is 'create a strong foundation through operational excellence.' Suppliers need to improve their operational performance to meet global benchmarks on cost, delivery, efficiency, and quality. In addition to this, suppliers need to continuously build improvement capabilities that will sustain their competitiveness. (ACMA-McKinsey Report, 2005)

Due to high potential in domestic and international business, many new organisations made their entry into India during past fifteen years. This has resulted in market competition wherein quality became a very important element. In order to improve competitiveness, many organisations have initiated various quality management programs.

CHAPTER 6. PILOT STUDY IN ORGANISATION A (OA)

This chapter deals with the data collected from the first organisation OA which was considered as pilot project for this research. Firstly, organisation OA is introduced in brief, subsequently QMPs implemented/undertaken in this organisation are outlined, and thereafter various elements of Policy, Practice and Outcome related to QMP are described.

6.1 Data Collection at OA

After receiving approval to the four-day visit for collecting data on QMP implementation at OA, attempts were made to understand the organisation. Website search was carried out and data related to organisation and its corporate quality policy was collected. Thereafter, mutual convenient dates of visit were finalised.

On the first day the concerned departments were given time schedule of interviews. Subsequently, data were collected through semi structured interview, company records and documents and direct observation (e.g. shop floor visit). Departments interacted were MD's office, Quality, Production, Marketing, Materials, HRM, IT, Design and Finance; informants were chief of the department, executive and supervisors. In OA, out of the total time spent for data collection, about 23 % was spent in document reading; 14 % in personal observation and about 63 % in interview and discussion. The range of time spent in interview and discussion at each department varied from 30 minutes to 430 minutes. Several reference documents were referred as suggested or offered during interview. Multiple sources of evidence and chain of evidences were ensured while collecting data (e.g. Quality Policy, Vision statement, and rejection data etc). The insight generated from the field-visit was audio-recorded at the end of each day.

On return from the site, notes were transcribed on to the computer. After the data collection the same were segregated and grouped. As the literature review identifies elements related to Policy, Practice and Outcome, they were compared with data

collected from OA. Also attributes/characteristics exhibited on each element were identified and documented. The case was documented based on the structure developed on various elements under Policy, Practice and Outcome. While doing so, literature was revisited to strengthen various elements related to Policy, Practice and Outcome. Finally, the draft of the case was sent to the organisation with a request for comments if any; however no comment was received. Thus the criteria suggested by Yin (2003) for case study were ensured in OA.

6.2 The Context

Organization A (hereafter referred to as OA) is the only public sector undertaking manufacturing Ball and Roller Bearings, Taper Roller Bearings (TRB), and Cylindrical Roller Bearings (CRB) for Automobile Industry in India. It was established in 1970 with headquarters and manufacturing unit in southern India. It has marketing offices at seven major cities in India including four metros.

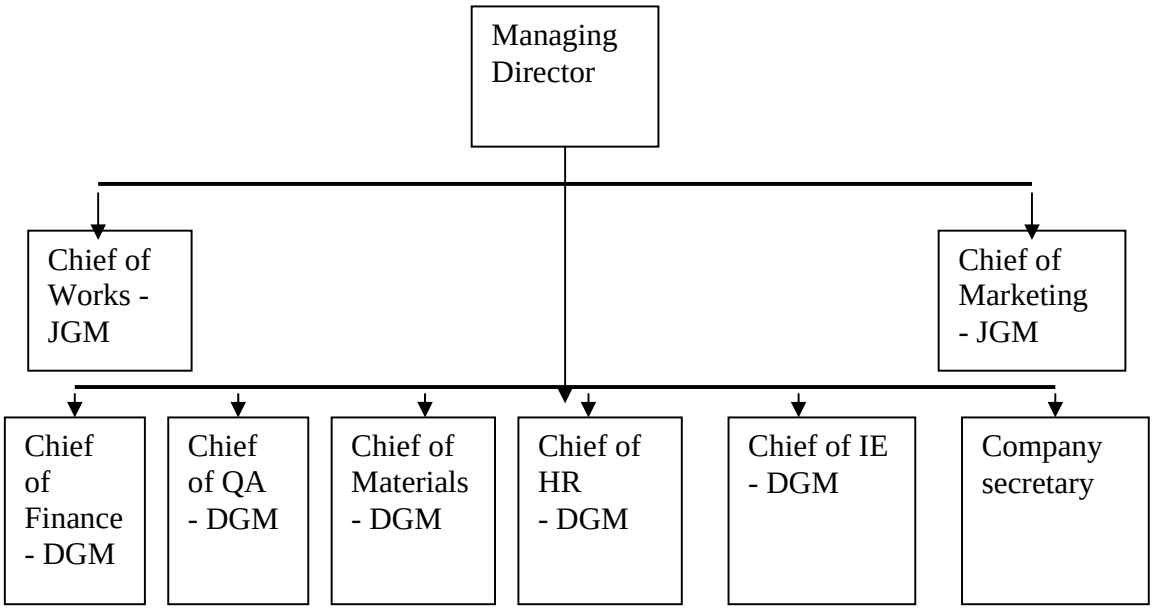
The OA was established in 1970-71. It had initial sales of Rs.0.45 crore INR and achieved its highest sales of around 48 crores INR in the year 1995-96. Its sales during the last three years amounted to 44 crores, 25 crores and 29 crores INR respectively in 2001-02, 2002-03, and 2003-04. It earned profits continuously for 13 years between 1989 and 2002 but incurred a loss of 15 crores INR in 2002-03 and 9 crores INR in 2003-04.

The total manpower of OA had come down from 867 in 1993-94 to 655 in 2002-03 and further to 376 in 2004 as a result of Voluntary Retirement Scheme(VRS) reintroduced in the year 2002-03 when 258 employees were relieved. Of its present workforce of 376; 268 are operators and clerical staff and 108 are supervisors and executive staff. The average age of employees is 48 years.

The top management team of OA comprises of a Managing Director, assisted by departmental heads such as: Joint General Manager (JGM) Marketing, JGM Works, Dy.

General Manager (DGM) Materials, DGM Quality, DGM Industrial Engineering, DGM Finance, and DGM HRM.

Figure 6.1 Organisation Chart of OA



The quality department is segregated into (1) Quality Control headed by DGM QC and (2) Quality Assurance headed by Assistant General Manager (AGM) QA. The departmental head designated as DGM, looks after both these functions. The total strength of quality department was 30, which included quality operators, supervisors, and executives.

The company served two segments of markets: Original Equipment Manufacturers (OEM) and Replacement Market. About 60% of its turnover in 2003 was from OEM and 40 % from Replacement Market.

There were two internal unions, one for officers and the other for workmen. Office bearers of both of these were represented in various committees such as productivity committee, safety committee, canteen committee, vigilance committee, etc, along with management members.

6.3 Quality Management Programs at OA

The Quality Management Program of the company includes QS9000, PIP (Productivity Improvement Program), Suggestion scheme, and Kaizen.

6.3.1 QS 9000

QS 9000 is the abbreviated name for "Quality System Requirements QS-9000." It is the common supplier quality standard for the Daimler Chrysler Corporation, the Ford Motor Company, and the General Motors Corporation. QS-9000 is based on the 1994 edition of ISO 9001, but has additional requirements that are particular to the automotive industry. These additions are considered automotive "interpretations" by the ISO community of accreditation bodies and registrars. QS-9000 applies to suppliers of production materials, production and service parts, heat treating, painting and plating, and other finishing services. It does not, therefore, apply to all suppliers of the 'Big Three'.

There are five reference manuals for QS9000 standard; they are: 1) Product Part Approval Process (PPAP), 2) Advance Product Quality Planning and Control Plan (APQP), 3) Potential Failure Mode and Effects Analysis (FMEA), 4) Statistical Process Control (SPC), and 5) Measurements Systems Analysis (MSA). The company was awarded QS9000 certification in November, 1999 by KEMA Quality B.V. – an auditing agency. The Quality head was the coordinator (Management Representative) for implementing this QMP.

6.3.2 PIP

PIP stands for Productivity Improvement Program. It was initiated by the corporate office based on the diagnosis done by Japanese consultants to improve business. The chief of Corporate Planning and Continuous improvement was made coordinator for this QMP. There are 20 elements in this program: (1)good housekeeping, (2) punctual work attitude, (3) production scheduling and control, (4) rationalizing shop-floor system, (5)maintenance of machine equipment, (6) small group activity, (7) QA system – QS 9000, (8) waste elimination, (9) reducing WIP inventory, (10) coupled manufacturing,

(11) quick changeover technology, (12) skill versatility & gross training, (13)zero monitoring manufacturer, (14)developing suppliers and vendors, (15) empowering workers to make improvement, (16) efficiency control & management, (17) value analysis of work improvement, (18) conserving energy and materials, (19) computer application, (20) application of existing technology and introducing new technology.

6.3.3 Suggestion Scheme

In order to encourage employee-involvement and bring out new ideas in work, this QMP was introduced in early 1990s. In this scheme all employees are entitled to offer suggestions for any kind of improvement in the organization. The chief of Corporate planning and continuous improvement - Department head of Industrial Engineering - functioned as coordinator for this QMP.

6.3.4 Kaizen

Kaizen means a small improvement. Any new idea which improves quality, productivity or working methods, is encouraged for implementation. Kaizen program was introduced in this company after the visit of a Japanese consultant in 1988. The chief of Corporate planning and continuous improvement - Department head of Industrial Engineering - was made coordinator for this QMP.

During the case-study interviews, the Policy, Practice, and Outcome related to QMP were studied.

6.4 Policy

6.4.1 Policy related to Long and Short Term Planning

6.4.1.1 Vision and Mission

The corporate vision, mission, objectives, and goals for the group of companies have been developed. Based on the same, OA has prepared its vision and mission statements. They were communicated through a document known as ‘Citizen’s Charter’ which portrayed the organization’s commitment to customer as well as the purpose of its

existence in business. The citizen's charter was framed and kept in MD's office as well as in the reception section. Important points mentioned in Vision statement were: world-class excellence, total performance leadership, etc. OA had not yet prepared any formal plan to convert vision, mission, and its ten commitments into action. Many of those interviewed mentioned that the company's vision is to achieve Rs. 100 crore turnover by 2010.

Though OA had expressed its intention to achieve 'world class excellence', 'total performance leadership', and 'international competitiveness', it did not have in practice, any benchmark figures for achieving the same, nor it had defined any target for them.

6.4.1.2 Quality Policy

The Quality policy was made for the group of companies including OA. The main elements of group Corporate Quality Policy were: Quality leadership of products and services, total customer satisfaction, commitment of management to quality, culture of Total Quality concept, and Total Quality performance leadership. The group Quality Policy was made available on group's website also. The Quality policy of OA was signed by MD on 1/9/1999, the main elements of this policy were: customer delight, continuous improvement, product and service of international standards, excellence in strategies, and operations, and satisfying expectations of stakeholders. Based on this policy the management of OA had developed six objectives for its monitoring at predefined frequency. These are: no defect should be produced, defect-free supply to customer, customer satisfaction, availability of resource, employee involvement, and improving reliability of supplier. The Quality policy and objectives are documented in Quality System manual of the company. However, a formal action plan to achieve corporate and organizational quality policy statements was not available.

6.4.1.3 Annual Targets

The Annual business goals of the company were prepared on the basis of its own assessment of market requirement, keeping in sight the directives from corporate and Government. These goals are further deployed to department heads and monitored every

month by the MD in ‘Unit board meeting.’ The MD reported the monthly progress as against the committed business goals to the corporate office on the first day of the following month.

Quality goals (including those of QMPs) were prepared separately and not as part of business goals. They were not reported month-wise to the corporate office and were based on: Quality policy and objectives, customer requirement, company’s own requirement to strengthen internal systems and the need identified by the consultant. The quality objectives were further divided into 11 measurable targets. The responsibility for achieving the same were defined and communicated to the respective department heads. The required goal defined for QS9000 was to get OA accredited with QS9000 quality systems. PIP was intended to improve effectiveness of operations in the organization. The objective of Kaizen was to implement small improvement in the organization and that of Suggestion Scheme was to get the workmen involved in improvement and offer suggestions. It was observed that the outcome or expectations of these programs were not documented. Hence, other than the specific target in QS9000 QMP - getting of QS9000 certificate-, the targets in other QMPs were not explicitly defined and documented.

6.4.1.4 Top Management Commitment

The top management had planned to demonstrate its commitment through release of Vision, Mission statements in Citizen’s charter’; Quality Policy’; writing ‘Forward’ in quality manual and keeping various quality related displays in the organisation. Additionally the top management had also planned to appoint internal coordinator for the QMP and CFT and a consultant to guide externally for QMP. According to the senior managers, there were no structured guidelines available from the Ministry of Heavy Industry, Government of India on QMPs. The review structure and its frequency were not defined during the planning stage of QMPs, but they were reviewed as and when felt necessary. As required in PIP, the management planned annual assessment of various subsidiaries of the group.

To sum up, in OA, though Vision and Quality Policy was documented, there was no action plan ready for its achievement. Quality goals are not considered as part of Business goals on which performance of organisation is measured.

6.4.2 Policy for QMP

6.4.2.1 Initiation

OA had initiated many QMPs during the past. Several factors had helped in initiating these QMPs. The summary is tabulated below.

Table 6.1 Summary of QMPs in OA

QMP	YEAR OF INITIATION	COORDINATOR FOR QMP	INITIATED BY	YEAR OF FORMAL CLOSING/ LOGICAL INTEGRATION WITH OTHER QMP
Kaizen	1988	In-charge IE	Corporate	No formal announcement of closure/integration
Suggestion scheme	1990	In-charge IE	Corporate	Continued
PIP	1995	In-charge IE	Corporate	Continued
QS9000	1999	In-charge QA	Customer	TS16949 expected by 2004/05

No pilot project was selected in any of the QMPs implemented.

6.4.2.2 Appointment of Coordinator

The selection of coordinator for QMPs was done by the MD. The chief of Quality was assigned additional responsibility as Management Representative (MR) to coordinate QS9000. The chief of Industrial Engineering department was assigned additional responsibility of coordinating PIP, Kaizen, and Suggestion schemes. The main selection criteria for coordinators were seniority in the organization and functional knowledge. Both the coordinators in OA were department heads and directly reported to the MD.

6.4.2.3 Appointment of Consultant

OA had engaged a consultant for QMP-QS9000. As OA was a PSU it had a company-wide consultant from the Bureau of Indian Standards (BIS). Corporate directives were given as per the advice and suggestions from the consultant. The subsidiaries were also free to get direct guidance from the consultant as and when needed. The functions of the consultant included: providing guidance on new systems like ISO9001:1994 and QS9000, conducting awareness trainings, guiding in manual preparation, and in preparation of final assessment audit. The company, in the early 1990s, had engaged Japanese consultants for assessing all subsidiaries and suggesting strategy for improving the overall effectiveness of their operations. Based on their assessment, a 20-point PIP program was introduced in all subsidiaries. Kaizen and Suggestion schemes also form part of the consultant's suggestions.

6.4.2.4 Creating Organization for QMP

Implementation of QMP was planned by coordinators based on the advice and guidance from the consultants. Initially, it was arranged that MR will handle the total project of QS9000 implementation and in the process seek need-based help for specific requirements from various departments. But due to the poor response from respective departments, the MD appointed a Cross Functional Team(CFT) subsequently for implementing the total project. The team was assisted by commercial staff for data entry in computer.

The PIP program was distributed point-wise among senior executives (Department heads or Section heads). It was their additional responsibility to implement the respective PIP point in the organization. The coordinator monitored the progress. The frequency of periodical assessment of each point was decided by senior executive of the company.

Instructions for meeting the requirements of QMP were mainly verbal. No rules were formally documented for implementation of QMP [other than those defined by the QMP itself – e.g. QS9000]. The team members for QS 9000 were expected to concentrate on this project during working hours after spending about an hour in their normal work. It

was also expected that respective department heads in their departments/functions would implement the required formats developed by the CFT.

While the responsibility of the CFT was defined in QS9000, the specific role of each member in the team was not explicitly documented. It was assumed that the member would work in developing requirements related to their departmental need; e.g. QA person would work on developing Measurement System Analysis, MR would work in Failure Mode and Effect Analysis, and Production executive would work on Control Plans etc. Similarly, the role requirement by individuals in PIP was also not defined and documented. The assignment of work was left to the team leader - department head - who was assigned the responsibility to ensure specific PIP points.

OA, in its Quality System manual, specified the following responsibilities of QC department: line inspections, plotting control charts, first piece inspection, setting and arranging gauge for process, monitoring process parameter as per control plan, issuance of NC report on process deviation, and 100% visual inspection etc. Similarly, it emphasized that the QA department was responsible for the following activities: process audit, product audit, dock audit, inward inspection, vendor visit, handling customer complaints, conducting and coordinating monthly review meetings, quarterly management review meetings, chemical laboratory and calibration laboratory conducting process capability studies, etc. Though these descriptions mainly reflected activities and not responsibilities, they were addressed as responsibilities.

6.4.3 Policy for Linking HR Practices with QMP

6.4.3.1 Reward and Recognition

In order to encourage employees for participation in Kaizen - QMP, a Kaizen Rotating Shield was awarded alongwith a letter of appreciation to the best Kaizen team. Similarly, monetary reward was given for the best suggestion received from the employees. These schemes, however, were not practiced during the time of data collection. No other reward scheme was planned for other QMPs and for substantial efforts towards achieving vision, mission, and quality policy statements and objectives.

6.4.3.2 Performance Appraisal System

OA established a three-tier system for appraising the employees. The first tier is for workmen whose appraisal is done annually by section heads. The second tier is for supervisors and executives whose annual appraisal is done by the respective reviewing officers. The third tier is for Deputy General Managers (DGM) and department heads whose appraisals were done quarterly against the goals assigned to them.

The target of QS9000 was taken up as quality target of the company. This would expect involvement of several departments -heads and employees for approving relevant forms/procedures and practicing the same. The implementation of QS9000 was defined as target of MR. Expected roles of various positions in QMP as a part of planning in their annual performance appraisal system were not planned.

6.4.3.3 Creating Environment for Change

The leaders of unions (both of officers and workers) were briefed about the initiatives of QMPs. The MD also briefed the department - heads about the prevailing market condition, and the need for change. It was expected that the respective department heads would convey the message to their employees. However, there was no formal communication planned to convey the new initiative and its new requirements to all employees in a common forum. Neither the customers nor the suppliers were formally involved in any QMP implementation.

There was no formal policy for developing internal leaders/champions. They were expected to emerge out of their own experience and performance in the company. According to the MD, OA had no formal policy related to lateral appointment at senior level.

Many departments were directly involved in the implementation of ISO9001 and QS9000. In other QMPs like PIP, the involvement of employees was ensured by direct involvement of the senior manager. Though there were teams formed for implementing QMPs like QS9000, no formal system was found to evaluate the working of the team, nor

was the HR department directly involved in counseling the team members. Some of the department heads/section heads pointed out that the implementation of QS9000 was an 'additional work' for them and hence was given lower priority.

Though implementation of QMP required a change in the existing way of organizational working, the importance of creating an environment for such change was not emphasized. The team highlighted mainly the technical requirements of this change.

6.5 Practice

6.5.1 Practice of Production, Verification and Assurance System

6.5.1.1 Production System

Production facilities at OA comprised of turning shop, press shop, heat treatment shop, rings grinding and super finishing shop, balls grinding and lapping shop, tapered and cylindrical rollers grinding and lapping shop, assembly shop, and tool room. The system of production was 'batch production'. The produced components were inspected by QC inspectors before they were transferred to another section. 'Self inspection' was not a part of production system, as a practice, Run charts were not plotted by Production operator but done by QC inspectors.

While implementing QS9000, the required new practices were introduced in production as and when suggested by CFT members. However in PIP, the required activity was addressed directly by department/functional heads, as they were held responsible for its implementation.

6.5.1.2 Verification System

Verification of the product quality was mainly done through inspections at three stages: incoming, in process, and final. At the incoming stage, the raw material was verified for its chemical properties in the chemical laboratory. The inspectors also verified material test certificate of the individual supplier. The component received at the incoming stage underwent inspection based on the sampling plan.

During the manufacturing process, several process verifications were conducted based on individual process requirements. For example, in heat treatment process, the hardness, the crack, and the metallurgical microstructure analyses were done. Similarly, in the face grinding process, the flatness and size were monitored. The requirements related to the process were mentioned in the work instructions, 'control plans' and 'check list'. An inspection table was provided near each critical machine. At the time of manufacturing, a sample from the first batch was tested for its dimension by QC department and only after its approval, the batch was manufactured. The QC inspector inspected the sample every hour and plotted on pre-control chart. In case of any deviation, he issued a Non-Conformity-Report (NCR) to the section-in-charge, who in turn took the corrective action to restart the production. The inspector also plotted the reading in control chart. Based on it the X –R chart was prepared and analyzed.

The batch was inspected for the required quality parameters before it got transferred to the second section. In addition, there were visual inspections wherein each roller and ring underwent 100% visual inspection by QC inspectors. The reference standard for such visual inspection was not available as it was done according to the experience of the inspector. In the final stage 100 % inspection was carried out on the product before it was transferred for packing.

Thus, OA practiced various verification systems like 100% inspection, visual inspection, sampling inspection, control charts, and variation measurement (cp/cpk) during various stages of manufacturing.

The target related quality objectives - rejections, rework breakdown etc - were referred as 'allowance' meaning the maximum permissible tolerance given by the management to the respective employees. The practice of preparing detailed action plan to achieve the yearly target and objectives was not evident.

6.5.1.3 Assurance System

OA practiced Assurance system which included several elements. It was mentioned in its product catalogue that each bearing underwent as many as 150 checks before it was supplied to the customer. Process capability was measured periodically in respect of all the nine identified critical machines. The data for statistical chart were plotted by QC inspectors after collecting them from required operation. The instruments used for various measurements were calibrated in-house by QC department. The product audit was done based on the annual plan prepared by selecting samples from the 100% inspected batch. A layout audit was carried out in a planned manner wherein the total component was dismantled and all dimensions of the components including cross verification with the relevant document were carried out. QA also conducted dock audit wherein the samples were picked from finished goods area.

The frequently used quality tools in OA were: pareto, trend chart, matrix chart, run chart, Xbar-R chart, and cp/cpk measurement. These charts were mainly used by QA and QC members for data analysis. Other tools used were: FMEA, Measurement System Analysis(MSA), Control Plans(CP), Product Part Approval Process(PPAP), Advance Product Quality Plan(APQP), etc which are mandatory requirements of QS9000 system standards. Measurement of Cost of Poor Quality (COPQ) was not done for all major elements like External and internal failures. However, the specific lots of products rejected and returned by the customers were tracked into money value.

OA had not established independent system to capture customer's perception related to product quality. Inputs on the same were taken by marketing executives on time-to-time basis.

6.5.1.4 Workplace Management

Housekeeping: The required cleaning of the shop was done mainly by a separate cleaning team. Unidentified materials were placed at several places. Some material was cluttered around walls, pillars and machines. Trolleys were kept at several places though no definite place was marked for that. Some of the places were dusty, (walls, windows, fans

near supervisor table, boards for slogans on the wall, etc.) At several places safety plugs as well as safety guards were not found. The yellow line marking done on the main gangway was also not visible on each machine as well as its accessories. The basic housekeeping requirements – “place for everything and everything in its place”-were not observed on the shop-floor.

Material identification: Materials were mainly transported by trolleys. The material status was identified on each trolley. However, at one place in assembly it was observed that the status was written with a pen on a paper and kept under one component. There are risks of loosing status of the entire lot kept in that trolley if the paper is missed out.

Machine maintenance: The average age of machines was more than 20 years. They were maintained mainly through breakdown maintenance and preventive maintenance by the maintenance workforce. Some of the machines were observed with oil leakage in the bottom tray and this phenomenon was considered normal. Improper wiring layout etc was also noticed. Periodical cleaning of machines was not a regular practice. The practice of involving production operators in machine cleaning and maintenance was not observed.

Visual display: Each production section was assigned its target of production for the year. Targets regarding rejection, rework and On-Time-Delivery (OTD), process capability, breakdown, actual production time, absenteeism, and customer problems were also decided for the entire year.
Throughout the plant, there were many displays related to Kaizen; however, the actual implemented Kaizen or its display was not found in the plant. During the data collection, one section-in-charge stated that many Kaizens were done in the plant and would be available with QA/QC department. However, on inquiry, the same was not found in the records. Hence, the statement was not supported by any implemented Kaizen.

Shop discipline: Fire extinguishers as well as first-aid boxes were seen at several places on the shop-floor. The dress uniform was restricted only to workmen excluding the

supervisors and officers. However, a few operators in the shop- floor were seen working without uniform and shoes.

6.5.2 Practice of Coordinating QMP

6.5.2.1 Planning for QMP

Respective coordinators mainly did the planning for QMP implementation with an aim to achieve the defined goal/s. The planning for QS9000 was done by Management Representative (MR) in light of the guidance received from the consultant. This planning was mainly in respect of implementation plans for technical tools like PPAP, APQP, MSA, SPC and FMEA, and target time for their implementation. In the beginning, no CFT was formed for implementation but after an initial review by MD its need was felt and a four-member CFT was announced. Thus, the responsibility for implementing every element of QS9000 was assigned to the core team.

In PIP, the planning was mainly done by coordinator-in charge of IE- and as per the prescribed requirements; the responsibility for every 20 points of PIP was assigned to a senior officer. All department heads were informed about the planning of QMPs and in case of PIP the assigned responsibility was also displayed on the notice board.

For all QMPs, responsibility for collecting various data and their analysis was mainly assigned to respective coordinators.

6.5.2.2 Coordinating for QMP

The coordination for QMP was done by respective coordinators. The main activities of QMP coordination included: providing guidance on the technical matters, interacting with various team members, reviewing progress, coordinating with concerned agencies within and outside the organization, providing timely feedback to the management, etc. The coordinator also interacted with HR department for providing necessary training.

The technical guidance regarding QS9000 standard was provided from time-to-time by the coordinator and the consultant. This was mainly done through discussion with CFT members while reviewing progress of QMP as well as during personal interaction.

In PIP, the nature of interaction was mainly through regular reviews with employees. For middle management, it was done through the coordinator and in quality review meetings. The coordinator used to interact with the consultant as and when necessary for seeking technical guidance e.g. seeking help in FMEA, Control plans etc.

6.5.2.3 Reviewing the Progress

The MD reviewed the progress of quality objective every quarter in the 'Management Review Committee´(MRC) meetings attended by all heads of departments.

For QMP, the progress was reviewed mainly by the coordinator in case of QS9000. It was also reviewed every month in unit QC meetings as well as by the Management Review Committee meeting before the final certification audit. Based on the need, MD also reviewed the progress of QS9000. The consultant for QS9000 reviewed the progress during his need-based visit.

For PIP, the annual review and assessment was done by senior officers of the group companies during their annual visits. During the time of data collection, the coordinator of PIP, Suggestion scheme, and Kaizen was on long leave, and in his absence no coordination was done for such QMPs. Moreover, the department heads had no clear instructions about alternate arrangement of reviewing the QMPs.

The implementation time of QS9000 was one year as originally planned. It was delayed by nine months due to "lack of priority given by the top management and insufficient time devoted initially by respective departments." The MD assessed the resource constraints and felt the need to involve more persons in the project. Subsequently a Cross Functional Team (CFT) comprising members from QC, QA, Production, and Design was appointed by him to implement the total project. One of the CFT team members mentioned that initially there was no direct review by MD, however, when the

implementation was delayed, he started reviewing the progress of QS9000. The coordinator also conducted informal reviews with his team members.

While conducting the review of QMPs, the main focus was given on activity accomplished as per the plan and not on individual member's contribution. Neither the assessment of individual performance nor of team performance was done during the reviews.

6.5.3 Practice of Documentation of QMP

6.5.3.1 Documenting the Requirements

The requirements of ISO9001 and QS9000 were documented in the quality system manual, which is a mandatory requirement for certification. The manual mainly described how the 20 clauses of ISO9001:1994 were implemented in OA. The responsibility of preparing total documentation for QS9000 was given to the CFT. The team prepared necessary documentation after discussing with the concerned employees, and after consulting the departmental heads and the Management Representative. The requirements for PIP were not documented in the form of a manual, and were explained through documentation of simple steps with visuals. Similarly, the requirements related to Kaizen and Suggestion scheme were also not documented in the form of manuals. Hence it can be stated that outcome or expectations of various QMPs were not documented.

OA maintained a library wherein various technical standards were kept. Some of the technical requirements like ISO9001 International Standards were preserved there.

6.5.3.2 Documenting the Progress

This included elements like documentation of policy, planning and periodic updation of the actual progress, decisions announced and actions undertaken, important policy decisions relating to QMP, etc. In QS9000 implementation, the progress of implementation was reviewed during the meetings but was not formally recorded. All monthly and quarterly quality reviews were recorded in the form of minutes of meetings and circulated to all concerned. Important decisions taken by the management were also

recorded in the same manner. The results of audits related to QS9000 and the periodic assessment of PIP were reported separately by respective auditors/assessors. The practice of keeping consolidated progress report of the QMP was not implemented.

Some of the modifications in policy and practices were not found updated in the respective documents. For example, the quality policy was modified in 2003, however, the previous policy (old revision) of 1999 was documented in the quality manual. It was observed that there was no practice of mentioning the date of issuing policy-related documents. For example, there was no mention of dates of issue or revision in the quality policy displayed at various places as well as in citizen's charter at the reception.

6.5.4 Practice of Data Analysis and Presentation

6.5.4.1 IT Support

Two main softwares were used in OA.: ORACLE7.1 and COBOL. The former was mainly used for production planning, requirement planning, material management system, and industrial control system whereas the latter was for finance accounting, pay roll accounting, marketing, and HRM. Both these were not compatible with each other.

The required data were entered in the system by respective departments. e.g. daily production report etc. Based on the information required by a department, various reports were generated from EDP department which prepared such reports at planned frequency and distributed them to the users. Any other information was not readily available but could be obtained by making a formal request to EDP department. It was found that dependability on EDP for any additional data was high.

6.5.4.2 Availability of Required Data

The coordinator compiled necessary quality and QMP related data. It was observed that data relating to QS9000 requirements were collected by departments and submitted to the coordinator. But their periodic consolidation was not available with the respective departments and it was expected that the coordinator would do the yearly consolidation. e.g. yearly consolidation of supplier rating, customer complaints, customer satisfaction,

training man days, rework and rejection, etc. The data relating to PIP, Kaizen, and Suggestion scheme were not readily available.

6.5.4.3 Analysis and Presentation

Required analysis of process-related data was done by QC and QA department periodically for quality reviews. This process included analysis of process capability, analysis of SPC charts, analysis of supplier quality ratings, etc. These analysis were done manually. The practice of comparing data of the current month with that of the previous year was found in many quality targets.

Data presentation was restricted to the unit quality review meeting and the quarterly Management Review Committee meeting. The required data were compiled and presented in suitable graphs with the help of the coordinator. The practice of indicating the target, date of preparation, and name of the employee preparing the file etc. was not observed in OA.

6.5.5 Practice of Communication

6.5.5.1 Communicating Policy and Targets

Quality policy was displayed at several places in the organization including cabins of heads of departments and the shop-floor. It was also translated in Hindi as well as in local language.

The vision and mission statements were documented in the ‘citizen’s charter’ documents which were displayed at two places i.e. MD’s cabin and the reception area. During the interview, while responding to company’s vision requirements, ‘citizen’s charter’ and vision and mission of the company were not referred by department heads.

OA planned various methods of communication, in order to generate basic awareness among employees. These include posters and stickers at important places in the working area. Basic technical requirement of ISO9001 and QS 9000 were provided through work instructions, control plans, and FMEA sheets. They were also planned to be translated in

local languages wherever required. The department heads were kept informed through review meetings and mutual discussions.

At several places, signboards of Kaizen were displayed with slogans like: ‘Kaizen is a continuous improvement’ along with sign-boards relating to quality e.g. PDCA. There was a big signboard at the main gate stating ‘You are entering ISO9001 and QS9000 Zone’.

At the time of data collection the coordinator - Chief of IE - was away on long leave. Clarity on coordinating QMPs in his absence was not found among department heads interviewed.

The relevant policy decisions were communicated to each level by means of meetings, memos, and notice boards. The head of manufacturing interacted regularly with functional heads but there was no direct interaction with workmen. There was no formal documented communication process available.

6.5.5.2 Communicating Plans and Progress

The basic information relating to production was provided to operators and supervisors in form of Work Instruction (WI), SPC charts, Control charts, FMEA sheets, check-sheets, etc. WI was explained in local language also.

PIP 20-point QMP was communicated visually by explaining each PIP point on a separate (A3 size) sheet of papers. All sheets were framed and kept near the main entrance of the shop-floor. These were prepared in 1994 / 95. One of the displays was on housekeeping. The 5S concept was explained in details with illustrations. On the opposite side of the passage, five levels of housekeeping board were displayed. The two different methods of housekeeping were displayed at the shop- floor entrance.

The practice of displaying targets and the status of various machines, process, production, quality, etc. was not observed.

The communication related to QMP was mainly done through meetings and notice boards. Issues/problems of a particular department were communicated to the senior management through hierarchy. According to one section head, this process of going through hierarchy resulted in delays in decision-making process especially in issues related to productivity of workmen. The coordinator of QS9000 mentioned that he did not have any specific mode of communicating progress of QS9000 to the employees.

6.5.5.3 In-house Publications

OA had 'Aaj Ka Khabar'-an in-house magazine published from its head office. There was no separate publication for the local unit.

6.5.5.4 Others

All the products of OA were displayed in the reception area, which provided awareness of the range of products manufactured by this organisation. As per the directives of the central government, Hindi was used extensively in the organisation. It was observed that many of the quality-related formats were translated in Hindi along with its English version e.g. process audit format; summary of assembly audit, etc.

The communication mechanisms were notice boards, separate board for unions, inter-office memos, meetings, etc.

6.5.6 Practice of Involving Customers and Suppliers

6.5.6.1 Involving Customers

There was interaction with customers at the time of launching a new product, to understand their requirements. The involvement of customers in any of the QMPs was not observed.

6.5.6.2 Involving Suppliers

Suppliers were mainly of two categories: raw material suppliers and subcontractors (who do machining for OA). There were about 20 suppliers and 19 subcontractors. The

involvement of suppliers assumes importance generally when the need for price-reduction is felt. Suppliers' performance was monitored and rated every month separately by Quality department and Purchase department. Suppliers were generally called in case of rejection. Supplier audits were conducted half-yearly by QA department. Corrective Actions (CA) were demanded against every problem reported.

There was no direct interaction of suppliers with the top management. During implementation of QMPs, the suppliers were not involved; however, a few suppliers were contacted during the implementation of QS9000. There was no regular practice of suppliers-meet but they were interacted on one-to-one basis and not as a group.

6.5.7 Practice for Encouraging Employee-involvement

6.5.7.1 Cross Functional Teams (CFT)

The implementation of QS9000 was initiated without constituting any team. However, when the initial review showed the slow pace of implementation, the MD formed a four-member CFT. The members were from Production, Design, Quality control, and Quality assurance departments. These members were functional heads.

In PIP, there was no CFT as each senior member was expected to get PIP implemented through his departmental team. For other QMPs also, no CFT was formulated.
Additionally, system for monitoring the effectiveness and performance of a team was not practiced. Hence, issues related to teams were not identified and resolved systematically and in time.

6.5.7.2 Education and Training

The need for training was identified at the beginning of the year by department heads and accordingly training man-days per employee were estimated. Every member of OA was made aware about QS9000 standard. The coordinators as CFT members were not provided special training on the standard, but they acquired the necessary skill by reading manuals discussing with consultants and by mutual interaction. However, OA did not

plan any formal training for improving the overall understanding of employees in: vision, mission, customer requirements, market situation, and basic understanding of quality, etc.

It was a general practice in OA that after an employee underwent an external training, he had to subsequently conduct training class for other employees. The awareness training was planned initially only for those who were involved in QMPs. No training was imparted to CFT members on specialized aspects of QMPs. In the past the union members were imparted training through separate training classes. Subsequently, this practice was discontinued and they were thereafter trained with other employees. The training for quality policy was also provided. However, the training for new quality policy was not imparted. The HR department played a major role of coordinating training for supervisors and operators in QMP implementation. Training effectiveness was also measured.

6.5.7.3 Interaction with Top Management

There was no formal practice of periodic interaction of supervisors and workmen with the top management.

6.5.7.4 Practice of Rewarding Best Contributors

Reward and recognition scheme was practiced in the past for QMPs like Kaizen and Suggestion scheme. A Kaizen trophy and an appreciation letter were awarded for the best performance in Kaizen. In Suggestion scheme, monetary reward was granted for the best suggestion received. However, this scheme was discontinued as it was found that original or new suggestions were not being received. Both the schemes are not in practice today.
For ISO9001 and QS9000, no rewards were announced. Similarly, there was no reward scheme to encourage team work.

6.5.7.5 Celebrations

After OA got QS9000 certification, the MD complimented the department heads during meetings. They in turn were expected to convey the compliments down the line. The celebration for QS9000 was arranged in a hotel where all department heads, consultants

and members of auditing body were invited. The other employees including those who contributed in the CFT were not invited.

6.6 Outcome

6.6.1 QMP

ISO9001 re-certification was done in the year 1998; preparation for QS9000 was started thereafter. The company had continued with the same manual of ISO9001 and incorporated the QS9000 specific requirements in the Quality System manual. The main objective was to get accreditation with QS9000 certification, which was achieved after a delay of 9 months.

PIP was an internally-driven program and there was no external certification for the same. Its implementation received a mixed response. The plan and achievement reports of PIP were not available. Some of the department heads when interviewed, mentioned that "PIP is not currently in practice but the management has not formally declared its completion." One of the PIP elements was housekeeping, however, the shop-floor was not maintained properly with the material lying about without status or piled-up near pillars and walls. Cleanliness was not observed as a regular practice. A similar situation prevailed in the offices also. OA had displayed 'save energy' stickers at several places; but it was observed that tube-lights and fans were kept 'ON' even when the department heads were not in their cabins. One of the senior managers admitted that "we were expected to continue PIP program but we lost the focus, pace, and priority, and the management did not give importance to this program."

Kaizen and Suggestion schemes were the QMPs planned and implemented by OA. However, during the interview, it was found that the difference between Kaizen and Suggestion schemes was not clearly understood even at the senior level of employees. According to one of the senior managers, Kaizen were done where no system was in place, and after establishing the system there was no requirement for improvement and

Kaizen. Though there were signboards about Kaizen in the plant, the evidence of any implemented Kaizen by workmen or staff member was not available.

As regards Suggestion scheme, one of the senior managers pointed out that during the initial period constructive suggestions on cost-cutting were received from employees and they were rewarded to the extent of 10% of the saved amount. However later on, no new suggestions were received and ultimately the practice was discontinued. The organization monitored the number of suggestions submitted by employees as a part of quality objective.

No consolidated progress report was available for each of these QMPs. The department heads interviewed were not aware of the status as well as of the cumulative achievement of Kaizen and Suggestion scheme.

The section heads and other employees mentioned that PIP, Kaizen, and Housekeeping were non-existent in OA. Two of the department heads clarified during their interviews that such programs were not discontinued but they were not effective. There was no formal announcement or decision on the closure of QMP.

During the interview, some department heads opined that Housekeeping, PIP, and Kaizen were required for OA only till the time they did not establish systems; later on the company had established ISO9001 and QS9000 systems and so such QMPs were not required. Others stated that these QMPs were taken care of as a part of continuous improvement in QS9000 and, therefore, it was not necessary to implement them later on. However, in reality, OA had not formally announced Housekeeping, Kaizen, and Suggestion scheme as a part of QS9000 but they were introduced to meet separate needs of the organization. Some interviewees mentioned that these QMPs were in place till ISO9001 and QS9000 certification were received and were discontinued thereafter. Thus, there was no uniform clarity on the purpose of QS9000, PIP, and Kaizen at head of department level.

6.6.2 Operational Measures

6.6.2.1 Customer Complaints

OA measured three parameters for tracking customer complaints: (i)Percentage of technical complaints with respect to numbers of invoice; (ii)Bearings returned with respect to supplies in PPM and (iii)Value of bearings returned with respect to turnover. The following data collected during the study did not fully support the statement of QS9000 coordinator that 'due to QS9000 the customer rejections had reduced' nor the opinion of DGM Marketing that 'QS9000 program had helped to reduce our customer complaints'.

Table 6.2 Trend of customer Complaints in OA

	1999-00	2000-01	2001-02	2002-03	2003-04
% Tech comp with No of invoices	0.22	2.5	0.17	0.11	0.07
Bearings returned with respect to supplies in PPM	260.75	257	37.72	22.68	5898
Value of bearings returned with respect to the turnover in Rs. Lacs	0.146	0.04	0.003	0.05	0.62

6.6.2.2 On-Time Delivery

OA had started monitoring this parameter after initiating QS9000 implementation. The analysis indicates reduction in meeting customer requirements on timely basis.

Table 6.3 Data of On-Time-Delivery in OA

	2000 to 2003 (average of three years, no separate yearly data available)	2003-2004
% OTD	87.78	76.37

6.6.2.3 Utilization

Production hours as % of total hours were reduced as shown below.

Table 6.4 Trend of Machine Utilisation in OA

	1999	2000-01	2001-02	2002-03	2003-04
Prod hrs as % of total avail. hours	71.1	55.8	57.5	65.5	34.7
Setup hrs as % of avail. hours	12	9.3	10.1	9	3.6

6.6.2.4 Rework and Rejections

Since the year 1999 when QS9000 certification was obtained, till the year 2004, the overall rejections in OA had increased by about 4%. Similarly, the percentage of rework also increased by about 4% during that period. These results contradicted the statement of one of the senior managers that rejection and rework were reduced due to QS9000.

Table 6.5 Trend of Rework and Rejection in OA

	1999	2000-01	2001-02	2002-03	2003-04
Rejection %	3.8	3.43	3.45	3.9	3.96
Rework %	3.89	3.51	3.48	3.06	4.03

6.6.2.5 Breakdown

Both mechanical and electrical breakdown had increased abnormally during the year 2002-03 as indicated below.

Table 6.6 Trend of Breakdown in OA

	1999	2000-01	2001-02	2002-03	2003-04
Mechanical breakdown	2.9	1.6	2.8	5.8	2.3
Electrical breakdown	1.4	0.8	1.4	4.7	2.3

6.6.2.6 Vendor Rating

OA had measured the relationship of vendors by calculating the number of vendors under A, and B categories meeting a minimum of 70% delivery requirements.

Table 6.7 Trend of Vendor Rating in OA

	1999	2000-01	2001-02	2002-03	2003-04
% Reliable vendor in A, B category	97.72	96.88	100	77.27	85

6.6.2.7 Other Losses

OA had also recorded other losses as 'no material' and 'no operator' as % of total time.

Table 6.8 Trend of 'No Material' and 'No Operator' Waste in OA

	1999	2000-01	2001-02	2002-03	2003-04
No material	0.6	2.4	10.5	31.9	9.6
No operator	9.2	6.3	9.2	16.2	3.1

6.6.2.8 Audit Results

The 'first time pass quality rejection' recorded an overall increase from 8.03% to 8.95% between 1999 and 2004. The product quality audit report also indicated that the total bearing lot withheld including major three bearing types had increased from 5.9% to 8.9% showing a negative improvement.

Table 6.9 Trend of First Internal Product Audit Result in OA

	1999	2000-01	2001-02	2002-03	2003-04
% lots not passed in 1st stage	8.03	8.8	6.06	6.12	8.95
Total bearing lot withheld %	-	-	5.9	5.4	8.9

6.6.2.9 New Product Development Time

About 150 new independent designs were developed after 1980. The average development time for new products was reduced to 130 days in the year 2002-03 from 165 days in 2000-01.

6.6.2.10 Product Quality

Though improvement in product quality was expected by implementation of QMP, it was not explicitly documented and mentioned in the objectives of QMP.

6.6.2.11 Customer Satisfaction Survey

OA had not formally conducted any customer satisfaction survey.

6.6.3 Other Parameters

6.6.3.1 Awareness

The coordinator informed that due to QS9000 the awareness as well as Quality consciousness in OA had improved. Other department heads also had a similar opinion. However, there was no structured measurement (internal survey or awareness tests) conducted for arriving at this conclusion.

OA had displayed Vision, Mission statements; however, some of the department heads were not aware about these statements. Similarly many department heads were not aware about the quality policy, which was modified in 2003 and was similarly displayed.

It was observed that the targets defined by the management were not known to many of section heads. For example, while asking about targets set on quality during Management Reviews, many section heads expressed their ignorance on the same. The targets were considered as allowance meaning “the maximum allowable rejection /deviation we can afford”. The awareness and consciousness about ‘housekeeping’ and ‘energy saving’ were less among staff members.

6.6.3.2 Alignment of HR Practices

The organisation did not emphasize on aligning various HR practices to increase employee involvement in QMPs. OA had measured percentage suggestion per employee. In the year 1999 it was 0.14% which subsequently came down to 0 during four years consecutively till 2003-04. The number of Kaizens implemented as well as number of suggestions offered and implemented was not available with the department heads. The

reward and recognition systems initiated with Suggestion scheme also did not result in encouraging more employee-involvement and ultimately it resulted in its unannounced and abrupt discontinuation.

6.7 Various Awards Received

OA has received various awards as listed below:

- Best Productivity Performance Award for 1989-1990 by the National Productivity Council, Delhi
- Excellent Chief Executive Award for 1990-91 by the Rajiv Gandhi Memorial National Award, Hydrabad.
- Quality Award for 1991 by the Confederation of Engg. Industry AP Committee, Madras.
- Best Productivity Efforts and Good Quality Gold Medal 1992-93 by the Council for Industry and Trade Development, Delhi.
- Udyog Ratna Award 1992-93 by the Confederation of Engg. Industry, Delhi.
- Best Industrial Relations Award for the year 1993-94 by Andhra Pradesh Productivity Council.
- ISO9001 certification in 1995 which was subsequently renewed in 1998.
- 25th International Commercial Prestige Award for the year 1995: for Good Quality Products & Services by World Trade Leaders, France.
- Best Industrial Relations Award 1996; by Andhra Pradesh Productivity Council, Vizag.
- Navratna Trophy 1996 (for contribution to Industry and Trade through all round improved Productivity) by Council for Industry and Trade Development, Delhi.
- Mini Ratna Award 1997 for Best Performance by Govt. of India, Department of Public Enterprises.
- QS9000: Certification in 1999 and its subsequent renewal up to 2006.

CHAPTER 7. DATA COLLECTION FROM ORGANISATION B (OB)

This chapter deals with the data collected from the second organisation OB. Firstly organisation OB is introduced in brief, subsequently QMPs practiced in this organisation are explained and thereafter various elements of Policy, Practice and Outcome related to QMP are described.

7.1 Data Collection at OB

After receiving approval to the four day visit for collecting data on QMP implementation at OB, attempts were made to understand the organisation. Website search was carried out and data related to the organisation were collected. Based on mutual convenience, the days of visit were fixed.

On the first day, the main coordinator of my visit – Sr. QA Manager- informed the concerned departments and prepared a tentative time schedule of interviews. Data were collected through semi-structured interviews, company records and documents and direct observation (e.g. shop-floor visit). Departments interacted were: Quality Assurance, Production, Manufacturing Engineering (Design), Marketing, Materials, Human Resources, Finance, Associate Vice President (AVP) and Coordinators of QMPs. The informants were mainly heads of the departments, executives and supervisors. In OB, out of the total time spent for data collection, about 38 % was spent in document reading; 14 % in personal observation and about 48 % in interview and discussion. The range of time spent in interview and discussion at each department varied from 30 minutes to 350 minutes. Reference documents were referred as suggested or offered during interview. Multiple source of evidence and chain of evidences were ensured while collecting data. The insight generated from the field visit was audio-recorded at the end of each day.

On return from the site, notes were transcribed on to the computer. After the data collection data were segregated and grouped. The case was documented based on the structure developed on various elements under Policy, Practice and Outcome. Finally the

draft of case study was sent to the organisation with a request for their comments, however no comment was received. Thus the criteria suggested by Yin (2003) for case study were ensured in OB.

7.2. The Context

The organisation under study was a constituent of a century-old business group comprising eight companies. Out of these, one company had three Strategic Business Units (SBU), of which, one SBU products include engine bearings and engine valves. The case study pertained to one of the two Engine bearing plants of this SBU, and is hereafter referred as O B.

The manufacturing of the engine bearings in this plant was started in the year 1957. The total turnover of the three SBUs during 2003-04 was Rs. 1000 crores of which 85% was contributed by engine bearing divisions. The group company had offices in UAE, South Africa, and Germany.

The product of OB was initially manufactured under the technical license from M/S Glacier Metal of U.K. This arrangement ceased to exist from 1999. The products of OB were sold mainly in two segments: (i) Automobile Original Equipment Manufacturers (OEM) and (ii) After-sales Market (AM). The segment of OEM included major automobile manufacturers in car, MUV, LCV, HCV, tractors, and industrial segment. OB also exported its products to Europe, Middle East, South America, and South East Asia. Its products had the highest market share and the highest turnover for last 10 years in the entire engine bearing industry.

Each department of OB was headed by a department head, who reported to the SBU head of this group. The SBU head reported to the Director of the business group who in turn reported to the Joint Managing Director. The total strength of OB was 325 including about 225 workmen and staff and 100 managers. There were 25 employees in QA department. The average age of the workforce was 42 years. The operators were ITI

qualified and the managerial staff possessed a diploma or a degree in engineering. The highest qualification in the QA department was engineering graduation. Manufacturing in OB was carried out in three shifts: i.e.7 a.m. to 3.30 p.m.; 3.30 p.m. to 12.00 mid-night and 12.00 mid-night to 7.00 a.m. The general shift operated from 8.30 a.m. to 5.00 p.m.

Each plant of the SBU was ISO 9000 certified. The company earned the distinction to become the first Indian company in the bearing industry to receive ISO9001 certificate in the year 1993.

7.3 Quality Management Programs at OB

OB initiated many Quality Management Programs (QMP) in order to achieve a world class manufacturing status.

7.3.1 Kaizen

Kaizen is small improvement. This QMP was aimed at generating continuous improvement in OB by involving all levels of employees. OB introduced this QMP in October 1999 for managers, and in October 2000 for others. Thus, every employee was covered under this QMP. The Sr. Quality Manager coordinated this QMP. Totally 11 areas were identified requiring Kaizen in the organization. These included: productivity, quality, reduction in rejection, safety, cost saving, housekeeping, improved work method, shop layout, energy savings, work fatigue, and ‘others’.

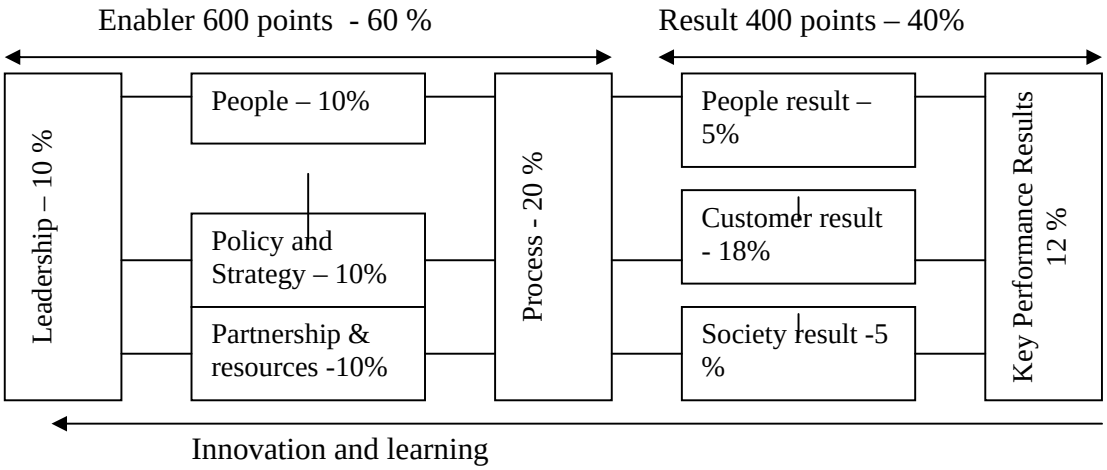
7.3.2 5 S

5 S is a program to improve housekeeping and workplace management. This was aimed to create an impact in improvement culture by work discipline, waste elimination, and ownership of work. This QMP was launched in June 2003. The entire plant was divided into zones. During the initial stage, 26 model zones were selected as pilot projects. The Associate Vice President of the plant was designated as 5S Champion and the Senior Production Manager as 5S Plant Coordinator.

7.3.3 RKQP Business Excellence

RK Quality Prize was initiated in this company in 1983 to generate internal benchmarking and competition among various SBUs and plants in TQM (Total Quality Management) implementation. The criteria for the same were modified by its governing body – RKQP Trust- in 2000 and were brought in line with CII-Exim award criteria. It was renamed as RKQP Business Excellence model. This model was based on EFQM (European Foundation for Quality Management) standard. It was mandatory for all group companies to participate in this contest every year. The highest-ranking organization was announced after the on-site assessment. Every group company had to submit the application manual (of maximum 72 pages), which was prepared for the Business group by the Chief of Quality.

Figure 7. 1 Business Excellence Model of OB



7.3.4 ISO/TS 16949:2002

OB was the first company in the engine bearing industry to be certified for TS 16949. Sr. QA Manager was the coordinator and deputy Management Representative (MR) for OB. Technically TS16949 was based on ISO9001:2000 keeping in view the special requirements of automobile manufacturing. OB obtained QS9000 certification (which was based on ISO9001:1994) and upgraded the same to the new requirement of the standard.

7.3.5 TPM

TPM is a tool to improve the overall equipment effectiveness of equipments and machinery through involvement of all employees. It was initiated in 2004 by the management to achieve the requirements of world class manufacturing status. Coordination for TPM was done by the plant head.

7.4 Policy

7.4.1 Policy for Long and Short-term Planning

7.4.1.1 Vision and Values

In the year 2002, all Vice Presidents and those above spent a total of 13 days to develop a vision statement of the company. It was then presented before the EMC (Executive Management Committee consisting of Directors, Joint MD, and MD) for comments. After discussion the document known as 'Vision 2007' was finalized. The key words in this vision were: 'total capital employed above industry average'; 'continuously drive down cost'; 'generate substantial revenue from export'; 'make brand internationally recognized and respected'; 'make ourselves preferred choice for customer'; 'be professionally managed'; 'processes to be recognized best in industry'; 'to have intelligent well-trained confident and customer-focused employees with imbibed company values,' etc.

Working on these key words, the SBU of OB developed its vision by deploying each statement to the SBU specific activity. The senior managers identified 12 elements in SBU Vision 2007, namely: sales income, Compounded Annual Growth Rate (CAGR), export market, Return On Capital Employed(ROCE), cost, service, orgnisation, brand, product, process, and society. The vision was deployed to departmental heads level.

This vision was communicated in English as well as in local language to every employee by trained facilitators. It was decided to communicate vision to all employees through vision workshops. Based on this vision, LRP (Long Range Plans) and short range plans were developed by OB.

OB also introduced its Value statement in early 1994 by involving all stakeholders including employees, unions, suppliers, customers, bankers, shareholders, and directors. This was communicated to all employees through value workshops conducted by trained facilitators.

7.4.1.2 Quality Policy

The quality policy in OB was named as 'Quality Concept' - 'to achieve excellence in everything that we do as a Company'. Its main elements were: cost effective research, engineering, development, manufacturing, sales, service and product technology, fullest satisfaction of customer at lowest cost, and continually improving the effectiveness of quality management systems. The Chairman and Managing Director of the company issued the policy statement in February 2003. The objectives were deployed to the relevant functions in the organization, and were periodically discussed and monitored in the management review meetings.

Similar to the Quality policy, OB also had formulated HR policy, Purchase policy, Marketing policy, Safety policy, Environment policy, and Travel policy. These policies were reviewed by the top management during planned meetings.

7.4.1.3 Annual Goals/Targets

The annual business plans were fixed jointly by the department heads and approved by the SBU heads in light of overall targets of the company. While finalizing them the progress during the previous year was reviewed and the inputs from external business scenario, OB's performance on RKQP, employee satisfaction, customer satisfaction, supplier satisfaction and benchmarking etc. were also taken into account. Future targets for QMP were identified. Based on the overall plan, departmental plans and targets were developed in relation to growth in productivity, quality, cost and delivery. In consonance with this, departmental key-result areas were identified and individual goals were decided. The annual goals were applicable to managers and those above them and not to executives, supervisor, and operators who were covered under the union agreement.

In 1999-2000, OB planned to achieve the status of World Class Manufacturing. This required a change from the then prevailing production system of 'batch manufacturing' to 'single piece flow' in line with the Toyota Production Systems (TPS). Subsequently in 2000, OB planned to introduce continuous improvement culture by implementing Kaizen. The target of transition to TS16949 was decided in 2004. It was also aimed to implement the basic housekeeping requirements (3S) in the selected pilot zones in OB by March 2005.

7.4.1.4 Ensuring Top Management Commitment

The commitment of top management was amply demonstrated through (i) incorporating quality and QMP goals as a part of business goals, (ii) inaugurating all QMPs in the company, (iii) communicating the need for change in every possible forum, (iv) reviewing each QMP at planned basis, (v) providing resource for QMP, and (vi) encouraging the employees to contribute in QMPs.

The management also allocated a special room for Kaizen and announced Kaizen Policy, Kaizen oath, and monetary incentives for its implementation. The senior management members participated in annual events like 'Kaizen Mela'.

The progress of Kaizen was reviewed in the top management business review meetings attended by MD, JMD, and SBU heads. The decisions related to various QMPs and their resource requirements were taken by the senior management in respective review meetings.

The Vice President (VP) addressed the entire workforce twice a year giving details about achievements and future plan. He also addressed the work force on the occasion of 'Kaizen Mela'- an annual event for Kaizen. While changing the production system in line with TPS, the management also planned annual celebration for each of the six cells. The senior management members attended these functions wherein customers were also invited. Thus, the management took every opportunity to demonstrate their keen interest in implementing QMP in OB.

7.4.2 Policy for QMP

7.4.2.1 Initiation

The SBU head decided to implement World Class Manufacturing status in various plants of the business group. In order to achieve this status on a long term basis, OB selected various QMPs. During the year 2000, a World Class Manufacturing task force was formed with the objective to implement various initiatives in Quality and Production such as, Toyota Production System, Kaizen, 5S, etc. Two of the senior managers were sent to other companies for understanding the implementation of Kaizen. Subsequently, a proposal was submitted to the management for Kaizen. Initially, the task force concentrated on changing the manufacturing practice from line-manufacturing to cellular one. As this was a major change, both the manufacturing and the human resources departments planned to handle the process jointly.

According to a Kaizen committee member there were several compelling reasons for initiating Kaizen. Firstly, the suggestion scheme did not give promising results; secondly, the company had decided to achieve world class manufacturing status which required continuous improvement in the present standard; and thirdly, the company desired to involve more employees in their improvement drive.

Thus, Kaizen was introduced in the year 1999 as a pilot project for managers only with the purpose that if they could demonstrate this continual improvement tool, it would be then easy to get it implemented at workmen level. The inauguration was planned in a premier hotel in the city. The first civilian who climbed the Mount Everest was invited for its inauguration. He shared his experience of climbing and explained the similarity of problem solving while climbing mountain and while working on the shop-floor. During the first year of the pilot project, Kaizen organization for managers was created which included Kaizen office and department-wise Kaizen facilitator. The managers demonstrated successful implementation of Kaizen in office and manufacturing area. Based on this experience, OB decided to extend this movement to workers also and a kick-off function was organized where the same guest who had come to inaugurate Kaizen for Managers was invited. This was arranged with an objective to pin point that

climbing of a mountain and continual improvement like Kaizen are much similar, as one had to overcome all hurdles everywhere in order to achieve the desired goal. OB had coined this slogan for Kaizen: 'Every small thing makes a big difference'.

OB had another QMP- Suggestion Scheme – but, as informed by senior managers, the suggestions offered in that scheme were hardly implemented; hence the main focus was on Kaizen scheme.

The RKQP model was reintroduced after revising it in line with CII Exim criteria in 1999-2000. The Directors felt the need for upgrading the model in order to give more impetus to excellence in manufacturing and made internal assessment compulsory for all group companies. The Board of Directors decided to adopt this model in all group companies. The result of assessment was taken as an input for the future annual plans.

Simultaneously with Kaizens, OB also introduced 5S. According to a senior manager, the company had initiated many QMPs at a time which resulted in confusion among the employees. The management ultimately decided to implement 5 S at a later stage and reintroduced it in February 2003. Initially 26 zones were selected across OB (including other plants also) with a purpose to learn implementation in various areas in plant and offices.

Table 7.1 Summary of QMPs implemented in OB

QMP	YEAR OF INITIATION	COORDINATOR FOR QMP	INITIATED BY	REMARKS
RKQP – TQM	1983 Reintroduced in 1999	Quality Chief	Corporate	Reframed as RKQM Business Excellence model in line with CII- EXIM model in 1999.
Kaizen	1999	QA/Kaizen office	Corporate	Element for World Class Manufacturing
5 S	2003	AVP Manufacturing	Corporate	Element for World Class Manufacturing
TS16949: 2002	2004	Chief of QA	SBU	Certification was awarded in May 2004.
TPM (Total Productive Maintenance)	2004	Plant head	SBU	Element for World Class Manufacturing

7.4.2.2 Appointment of Coordinator

In order to achieve a world class status on a long-term basis, OB had initiated several QMPs simultaneously. Various QMPs planned were based on the overall strategy decided by the management for world class status. It appointed a coordinator for each QMP, who was selected on seniority and functional expertise. Generally senior managers were assigned this responsibility alongwith their routine functional responsibility. For example, QA head coordinated TS16949, Kaizen, and RKQP; while Sr. Production Manager coordinated 5S. The Associate Vice President was designated as '5S Champion'. The TPM was coordinated by Plant head. The Corporate HR actively participated in initiating various QMPs within the organisation. The coordinators for the QMP directly reported to SBU head.

7.4.2.3 Appointment of Consultant

While conceptualizing the world class requirements, OB had taken into account various industries that had similar experiences. The programs like RKQP and Kaizen were

handled internally while 5 S, TS16949, and TPM were handled with the help of external consultants.

The coordinating work of implementing TQM principles in line with RKQP model was assigned to the RKQP Trust – an independent agency within the group company specially created to steer this QMP company-wide.

Similarly, the implementation of Kaizen was entrusted to internal experts. OB had appointed an external consultant for TS16949 who helped in planning, training, implementation, and documentation of the total system. 5 S was introduced as a corporate directive and a separate external consultant was appointed for its implementation. Total Productive Maintenance (TPM) was initiated in January 2004 for which an external consultant was hired.

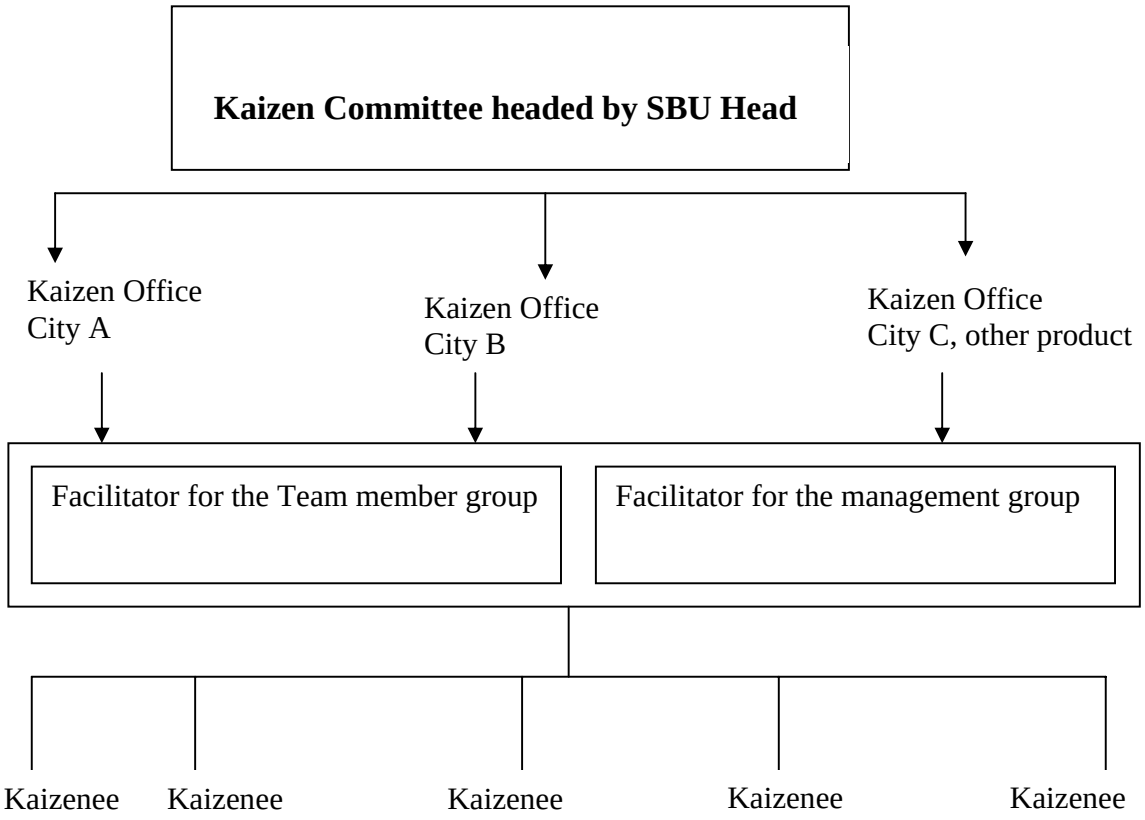
OB did not engage a single fulltime consultant for all its initiatives; but hired them based on their technical expertise. The management of OB decided the overall direction and integration of various QMPs under the world class requirement.

The role of consultants was to help the organization in understanding the basics and prepare the team during the initial period. Subsequent implementation was always managed by internal experts or coordinators.

7.4.2.4 Creating Organization for QMP

As there were several QMPs implemented in OB, their separate organizations were also created. The Kaizen organization was as shown below:

Figure 7.2 Kaizen Organisation in OB



The Kaizen Committee finalized the overall policy in consultation with VP, formulated rules, and steered the total movement. Its members included five department heads and two operatives. The Kaizen office mainly carried out administration/secretarial work related to Kaizen. This included registering the Kaizen form, updating the savings done through Kaizen, maintaining the Kaizen room, etc. The rules relating to Kaizen were issued by Kaizen office after the Kaizen committee arrived at a consensus.. Any changes in rules/policy related to Kaizen were discussed in Kaizen committee and after the approval of VP and consultation with the HR department the same were announced through Kaizen office. During the first year, five teams for managerial Kaizen, each facilitated by the department head were formed. In the second year of its implementation, the Kaizen concept was extended to non-managerial level and additional teams were formed to carryout the program. In the year 2004, there were seven managerial Kaizen teams and 12 non-managerial teams in OB.

For RKQP, the responsibility of preparing the manual in line with RKQP business excellence model for SBU was assigned to the head of Quality department of another location. This responsibility was shared by him and a local Management Representative (Sr. Quality Manager of OB). There were 16 assessors for RKQP model developed within the SBU. The RKQP Trust selected the assessors for various plants of the business group. The company/plant scoring the highest points was announced by the RKQP Trust and the winning company/plant was required to give presentation to the Directors.

For 5S implementation, the Associate Vice President of the company was designated as 5S Champion, while the Senior Production Manager was designated as 5S Coordinator. In order to meet the requirements of 5S on regular basis, one operator was shifted and posted under Senior Production Manger. OB had also allotted a fixed time schedule in each cell for 5 S. During this time all employees of the respective cells including the 5S coordinator and other managers discussed and worked for 5S implementation.

TS16949 was coordinated by Senior QA Manager, who was designated as Plant Management Representative.

The requirements for each QMP were briefed to the concerned members initially and then to all employees. According to the HR executive, the requirements of every QMP were briefed to the union members and they cooperated in all of them.

The responsibility of CMD, JMD, Directors, SBU heads, Corporate Management Representative as well as the responsibility and authority of managerial staff was documented in the Quality manual. The functions of QA as mentioned in the Quality manual were: verification of the final product, corrective action, management reviews, control of inspection measurement and test equipments, laboratory management, monitoring and measurement of product, document and data control, control of non-conforming product, handling of customer complaints, control of quality records, employee awareness of evaluation system, process audit and product audit, internal and external audit and analysis of data, and continual improvement

7.4.3 Policy for Linking HR Practices with QMP

7.3.3.1 Reward and Recognition

OB motivated its employees by several reward and recognition systems. In Kaizen, OB followed the policy of giving monetary rewards to the employees individually according to their contribution. The company gave financial incentives for every Kaizen implemented; this was done based on the reward points earned by the employees by contributing in three grades of Kaizen. (i)A grade Kaizens were those implemented in the area of productivity, quality, cost saving (>Rs 10000 annually), and safety; (ii) B grade Kaizens were those implemented in 5S, Housekeeping and cost savings (upto Rs 1000 per annum), and general safety; (iii) the rest were covered under C grade Kaizens. These rules were revised after the need was felt by the committee. A staff member involved in Kaizen activity mentioned that the rate of Kaizen would come down drastically if the company stopped these financial incentives.

The company honoured the contributors who implemented maximum Kaizens by exhibiting their photographs. The person who contributed highest Kaizens (more than 100 Kaizens) in a calendar year was sent to a foreign country on an educational tour. The team which contributed highest monthly Kaizens for maximum period was honoured with a trophy and an invitation to lunch with MD/JMD/Directors in the VIP canteen.

The Best Cell assessment (team recognition) based on the scorecard method was announced during the monthly meeting on the shop-floor. For 5S implementation, the team/zone, which successfully crossed any S, received a certificate of appreciation from the plant head. There was no special reward scheme for suppliers.

7.4.3.2 Performance Appraisal System

The total workforce of OB was divided into two broad categories: managers and non-managers. The latter category included workmen, supervisors, and other staff who were covered under the union agreement. The Performance Appraisal System was applicable only for managers. In the beginning of a year, the senior managers decided the annual goals for OB. The goals including those of QMPs were deployed to the level of

managers. The progress achieved by each of the manager was reviewed every quarter and again at the end of the year. About 20% of the pay for managerial category was directly based on their performance. The responsible coordinator of any QMP was either a manager or one higher in position. The target of implementing QMP was mentioned in the concerned coordinator/leader's annual goal. For example, the implementation of 5S was mentioned as a target for a Senior Production Manager who was also the Plant Coordinator for 5S. As informed by Assistant Manager HR, there was no direct link between contribution of employees in QMPs and their annual performance appraisal system.

7.4.3.3 Creating Environment for Change

All QMPs were planned at the top management level based on the company's long-range plan (LRP). According to the AVP, the QMP implementation passed through cyclic motion and the management had to take action to keep it alive. While implementing QMP, all concerned employees were briefed. Several awareness sessions were also planned for educating all employees. During the planning stage, the union members also are taken into confidence. In the year 2000, when OB decided to change manufacturing systems to a single piece-flow based on Toyota Production System concept the Manufacturing and HR departments made joint efforts to change the mindset of employees. In the same year, when OB decided to change their production systems in line with Toyota Production System (TPS), a detailed training was planned for all employees to prepare their mindset for the new concept. A survey was conducted by an external agency to estimate the readiness/resistance to change of workmen. Based on this, inputs were given in the training program also.

OB made every effort to ensure and encourage involvement of all employees in improvement activity. The company rewarded them in open forum, constantly tracked employees contributing in Kaizen activity, celebrated events like 'Kaizen Mela' every year, provided scope for every improvement activity, and continuously updated the progress through visuals. The company planned competitions in housekeeping, safety slogans, and posters etc. at regular intervals.

OB encouraged internal leaders by identifying their potential on specific projects as well as by reviewing their job performance from time to time. OB did not have policy for lateral appointment at senior level.

In this way, various QMPs under world-class management were planned as a part of change management and handled jointly with HR team.

7.5 Practice

7.5.1 Production, Verification and Assurance Systems

7.5.1.1 Production System

The basic raw material namely, bimetal strip rolls was manufactured in another plant of the company located 200 kms. away from OB. The strips were first loaded into the press shop which feeds the basic size of the bimetal strips to all six cells (named Arjun-1 to Arjun-6) in the company. Each cell is designed for a single piece flow and served a set of specific customers depending upon the product type. The bimetal strips go through various operations like: face-cutting and champhering, grooving, washing, deburring, coining (nicking), nick milling, control height, height and taper inspection(100%), oil hole punching ID/OD deburring, axial bore broaching, visual inspection(100%), oiling, and packing. The very first operation in the cell - face-cutting and champhering - was identified as a bottleneck operation. Self-inspection concept was practiced in these cells.
All supervisors, executives, managers, and plant heads played an important role in implementing various QMPs in the plant.

7.5.1.2. Verification System

The product was verified for quality at several stages with the self-inspection concept. The production operators did the basic in-process verification. If any discrepancy was observed, the line stopped and corrective actions were taken immediately. The operator did self-inspection. Additionally two 100 % inspection points were fixed for the operatives. These were: on-line height and taper monitoring, and plotting X bar R chart; and 100 % visual check before oiling and packing.

The QC tools like Pareto analysis, matrix diagram, check sheet, and histogram were used in analyzing the data related to manufacturing.

The material received from suppliers was inspected on sample basis. The suppliers, as per the mandatory requirement of TS16949, were ISO9001 certified suppliers. The operators performing various verifications were imparted training in the same.

7.5.1.3 Assurance System

OB had established the assurance system at three levels. The first was: in-process checking done by operators based on the checklist provided. Depending upon the requirements mentioned in the checklist, the components were measured at regular intervals at the beginning of the shift, every two hours, every four hours or at the end of the shift. The second level of assurance was performed by QA inspectors who verified the quality system-related points defined in the checklist. The third level of assurance was conducted by managers. They ensured that points raised in customer complaints in the past were covered, e.g. speed of bottleneck machine, working of poka yoke system etc. This was done as per the checklist for the particular line and product. All these checklists were reviewed periodically and updated from time to time. To reduce wastage due to first piece testing, the rejected pieces were used for setting the machines. The employees performing special tests were trained in handling such instruments. Operators, staff, and executives/managers were observed using various QC tools in their routine work. OB also monitored Cost of Poor Quality for the entire SBU.

7.5.1.4 Workplace Management

OB established the system of workplace management by developing self-sufficiency in the cell. The entire layout was neatly maintained on the housekeeping principles; machine areas and gangways were properly marked with yellow lines and maintenance of area/machine was assigned to respective operators. The complete information related to the cell was displayed through three main signboards in the cell. The first board contained information of each team-member of the cell (name with his photograph, residential address, ticket number, blood group etc), training matrix of each operator and

cell machine information (name of the machine, cycle time, setting time, tooling required, tool life, operations performed etc). The second board detailed information related to the cell- performance such as monthly projection, preventive maintenance schedule of various machines, TS16949 information related to the cell, efficiency, WIP inventory, rejections at customer's place, production achievement, productivity, rework, rejection, uptime of the machines, and absenteeism. The third board was related to improvement activities which included 5S activity as - photographs of 'before' and 'after', critical parameter checklist by manager, system audit checklist by QC inspector, 5S checklist, cell problem sheet, line-wise search time display, poka yoke implemented, customer complaint disposal, and list of files maintained.

Shop discipline: The shop discipline was of high order. All operatives as well as staff and managers were in uniforms. The timings of lunch and tea breaks were strictly followed. The discipline of updating information on various boards by operators was also similarly followed.

7.5.2 Practice of Coordinating QMP

7.5.2.1 Planning for QMP

OB had planned to achieve a world class status as their long-term plan. In order to achieve this status, several QMPs were planned strategically by the management. Implementation of the same was considered in OB's annual plan. The responsibility for implementation was assigned to one or more department heads that planned the total program with an action plan. During this stage, the help of a consultant was also solicited. The planning and progress were projected to the SBU head in a common review meeting. The SBU head also provided regular guidance on steering the programs. The planning process for QMP was in line with project management approach including major activities like assigning responsibility for implementation in the company, providing organization structure and rules related to the QMP, providing education to employees, creating motivation through rewards and recognition, review mechanism, etc. The coordinator decided the plan for the pilot projects and their deployment in the required

area. OB had incorporated the lessons learnt from such pilot projects in subsequent implementations.

7.5.2.2 Coordinating for QMP

The coordination for all QMPs was done by respective coordinators. Wherever external consultants were hired, the coordination was done according to their guidance. In case of TS16949, 5S, and TPM, the overall guidance was mainly provided by the appointed consultant: however, in case of RKQP the guidance was provided by qualified company assessors as well as RKQP trust. The main activities in coordination work included planning for QMP, planning for various reviews, helping in actual implementation, resolving issues related to implementation, preparing relevant guidelines/rules for implementation with appropriate approval, liaison with external or internal expert, liaison with various supporting departments, documenting the progress, updating top management on the progress and seeking their help on time, verifying the progress, consolidating the results, etc.

OB encouraged interaction among employees as well as with their seniors and customers. The members of various teams met regularly to discuss the progress of respective committees. Periodically, the HR department arranged ‘Speak out’ sessions with SBU head wherein selected employees got a chance to interact with him. OB celebrated anniversaries of cells where the customers of respective cells were invited. This enabled operators to directly interact with customers, understand their requirements, and also demonstrate improvements carried out in the plant. The customers, in turn, also achieved confidence about the company’s improvements.

7.5.2.3 Reviewing the Progress

OB practiced several review systems for periodic verification of the progress against the planned target. Performance of each manager was accordingly reviewed every quarter. This also included the goals related to QMP implementation.

OB established ‘Score Card’ systems for shop-floor in which each cell on the manufacturing shop was evaluated in terms of production achievement, rejection, rework, operator efficiency, 5S, Kaizen, System implementation, special projects, absenteeism, and assessment by manager. A team of assessors did this review.

5 S was reviewed once a month by external consultant as well as by the plant head. SBU head reviewed the progress during his routine shop-floor visit. Various teams on the shop spent 30 minutes daily (1:45 pm to 2:45 pm) for 5 S activities. The coordinator reviewed the progress once a week.

Kaizen committee reviewed Kaizen progress every quarter and its feedback was given to the SBU head. The review of Kaizen implemented was also done at departmental level. After two years of its implementation, the management realized the stagnancy of Kaizen program. An internal survey was conducted to know the reason and suggestions were invited to revive the scheme. Based on the survey result, the committee announced monetary benefit similar to that of Suggestion scheme, and changed the Kaizen rules. Similarly TS16949 progress was also reviewed by SBU head. In TS16949, as per the requirement of the standard, OB conducted Management review meeting every quarter. During the review process, the required resources were assessed and provided by the management.

7.5.3 Practice of Documentation of QMP

7.5.3.1 Documenting the Requirements

The company documented the requirements related to QMPs. The Quality manual as well as RKQP application manual was duly documented as per TS16949 and RKQP Business excellence model. Every year, the requirements of RKQP model were discussed among the cross-functional teams, each headed by a trained internal assessor. The job of this team was to study the criteria, prepare the report, review it jointly, and finalize the manual for submission to the trust. It was always aimed to achieve higher score than the previous year.

OB had appropriately displayed necessary requirements related to all QMPs in the plant at various places. The organization structure for Kaizen, the rules related to Kaizen as well as ‘Kaizen oath’ were documented and displayed in the Kaizen room. The TS 16949 requirements relating to production cell were displayed on the common notice boards positioned in the gangways. Similarly, TPM requirements, initial plans and progress charts were documented and displayed on TPM board on the shop-floor. The requirements related to RKQP Business Excellence Model were documented in form of a manual.

7.5.3.2 Documenting the Progress

The company followed the practice of documenting the progress of all activities related to their annual plans. Each department and team was given separate boards to display their progress periodically. The methodology for display was also standardized. Each display indicating the progress of committee/teams gave details regarding names of members responsible to update the respective records. The progress on the parameters was displayed on various boards near the main entrance, punching machine, across the main gangway, and in the Kaizen room. Some of the records and documents related to QMP were: Kaizen trend chart, distribution of Kaizen, best Kaizen winners with photographs, employee involvement in the improvement, awards won by various employees/teams, vendor rating performance, skill of employees, TS16949 board, 5S board, TPM board, safety board, accident record board, Kaizen board, customer complaints, rejection, etc.

All charts and progress reports were updated regularly. According to a Kaizen committee member and 5S coordinator, the charts were periodically updated along with various charts. The frequency of updation as well as responsibility of the person updating this chart was indicated in each chart. This kept all employees updated about the latest information on various QMPs.

7.5.4 Practice of Data Analysis and Presentation

7.5.4.1 IT Support

The company had Oracle-based system at the group level. All operational transactions were computerized as a result of which authorized employees in OB could obtain various information. In addition to this, Intranet facility was also available to all employees. All executive and staff members had access to email facility. All important policies were made available on Intranet. OB had also introduced a system – web suppliers - through which the suppliers could do the transaction electronically. Purchase order, goods received and all-important information once prepared at OB were directly seen at suppliers place. This has reduced lead-time of purchase activity as well as paperwork at both the levels. The employees did not have to manually search for the information as all relevant information was obtained from the internal IT systems.

7.5.4.2 Availability of Required Data

The data requirements were determined by various committees/teams at the beginning of the year or the program. Accordingly, the concerned employees periodically generated the key data indicating progress of the program, as well as other important processes. Throughout the shop-floor at every possible site area, the data of all activities in OB were available, including details regarding production target v/s achievement, daily production, daily rejection/rework, breakdown hours, manpower available, absenteeism, skill matrix, new product development time etc. IT systems helped OB to make all data available at any time.

7.5.4.3 Analysis and Presentation

OB demonstrated application of various basic statistical tools to analyze the data. These include tools like Pareto analysis, matrix chart, line diagram, pie diagram, bar chart, cause and effect diagram, etc. The progress of each activity as per the defined method was displayed and updated periodically. IT systems helped to conduct various analyses and reduced duplication of work resulting in reproducibility and retrieval of necessary data.

OB had standardized sign-boards and charts to display relevant information in a uniform format across the plant. Thus, the company's name and logo, title of the chart/data, font size, etc. were displayed in standardized form and method. The uniform method of presenting information was a part of the standardization process under 5S.

7.5.5 Practice of Communication

7.5.5.1 Communicating Policy and Targets

OB planned various devices for regular communication of information related to its work. Responsibility, authority, organizational structure, and processes were documented in the Quality Assurance manual. The RKQP application manual provided important information related to processes and their results related to business.

The big display board (size minimum 6' x 8') near the main entrance gave information about vision and policy of the organization. The targets of various departments as well as of QMPs were displayed on specified boards. e.g. the process to implement step one of Autonomous Maintenance on TPM model machine was displayed on TPM board, the Kaizen oath was displayed in the Kaizen room, and the vision as well as the value tree was displayed in corporate HR department. In every cabin or at every manager's desk, their annual plans were displayed. The company published a pocket card in English and local language to explain its vision and quality policy and distributed it among all employees. The management communicated quality concept and objectives along with quality policy to all concerned in February 2003. The quality policy was displayed at various places in the organization viz, Plant main entrance, cell board, department boards, etc. OB's intranet, 'Yantra,' was also used as a communication channel within the company. The same was also documented in the corporate quality assurance manual prepared for TS 16949 certification as well as in OB's intranet and in standing workstations.

As a Sr. Production Manager explained, the policy of the company was to provide essential information through visuals so that nobody wasted time in searching for the same. In order to communicate improvement-related activities to the employees, OB

maintained a Kaizen Room on the shop-floor. The communication policy of OB, inter alia, dealt with the type of policy to be communicated, periodicity of communication, and mode of communication.

Every year after declaring the annual progress results, the Chairman and Managing Director addressed all employees in a common gathering. The Vice President of the company announced the annual goals and plans at the beginning of the year in an open forum. He also addressed all employees at the mid-year meetings to update them on the progress achieved by the company and its future requirements.

7.5.5.2 Communicating Plans and Progress

The progress related to QMP was communicated through various review meetings, and published in the in house newsletter 'Baat cheet'. The MD also addressed the employees twice a year to communicate about the past performance of the company as well as its future plans.

At the beginning of the shift, every day standing meeting was conducted by respective section head wherein previous day's achievement and target for the current day were communicated; special issues were also addressed in this meeting. OB had a system of displaying every progress through visual boards. Throughout the plant, standardized boards were displayed which indicated the progress of each cell and department relating to production, maintenance, purchase, supplier quality, environment health and safety, TPM, 5S, Kaizen, TS16949, ISO14001, company news and announcements, achievements, etc. The responsibility of updating the charts at regular frequency was assigned appropriately.

The rules and information related to all QMPs were displayed on the respective notice boards.

7.5.5.3 In-house Publication

'Baat cheet' was OB's in-house publication. Information about events achievements and recognitions was published in it. There was no separate publication on QMPs.

7.5.5.4. Others

OB used other channels also to communicate all necessary information of the company. The cell supervisors conducted a daily meeting with employees to communicate the progress in production and related parameters.

7.5.6. Practice of Involving Customers and Suppliers

7.5.6.1 Involving Customers

The company had a system through which its employees were regularly kept in touch with the customers. The necessary information about product requirements was received regularly through the Marketing department. The customers were associated with designers to bring out new products for their future new models. This helped in reducing time to develop new products. OB celebrated annual anniversary of their cells by inviting customers. There were six cells in the plant and each of them manufactured specific products for their customers. Thus, each employee of the cell got an opportunity to interact with customers who in turn got confidence about improvement from OB as a supplier. The suggestion of inviting customers in such celebrations came from a workman during the 'Speak out' session with SBU head. OB also sought similar inputs from customers in the form of customer satisfaction for all segments of business - domestic and international.

7.5.6.2. Involving Suppliers

The Vision 2007 document, when prepared by OB was circulated to all suppliers. Subsequently the SBU-head addressed all these suppliers in April 2003 to clarify their mutual expectations and feedback.

OB introduced a system of organizing supplier-meet every two years. During this meet, the SBU-head addressed the suppliers and appraised them about the broad plans of the

company. A supplier satisfaction survey was conducted during the meet. New developmental projects were also discussed with the suppliers.

OB reduced its supplier base from 300 to almost 30. About 70 % of its supply came from these suppliers most of whom were ISO9001 certified. OB stopped business with those suppliers who did not show willingness to implement ISO9001 systems. The suppliers were (on need-base) provided necessary financial and technical support while implementing ISO9001 certificate at their plants. The supply of material was planned on daily basis and this helped in reducing the inventory.

The supplier's performance was monitored for quality and delivery. Corrective and preventive measures were expected from suppliers in case of rejections. About 60 % of the suppliers were web-suppliers with whom OB transacted electronically. This kind of help reduced paperwork at both ends. For example, the Purchase Order, Goods Receipt, Inspection report, etc. once done at OB can be seen electronically at the supplier's place.

OB also conducted various trainings for the suppliers. Training schedule for suppliers was seen in the Purchase department. Some of the scheduled trainings for suppliers include: TS16949 awareness, SPC, MSA, Control Plans, FMEA, Product/Process audit, Customer specific requirements, etc.

7.5.7 Practice of Encouraging Employee-involvement

7.5.7.1 Cross Functional Team (CFT)

Various CFTs were formed to implement and maintain QMPs. While preparing the manual related to RKQP, OB selected a group of trained assessors working in different departments. Clause-wise responsibility was assigned to them for which several small CFTs were formed. The CFT members were selected according to their functional knowledge as well as experience in the field. Similarly, for implementation of 5S five model areas and 26 zones were defined in the company. A Kaizen committee was formed with senior members selected according to their seniority in the department. OB also formed CFT of assessors who assessed various cells on monthly scorecard.

7.5.7.2 Education and Training

Education and training relating to the basic work was imparted to all concerned employees. OB planned need-based training for QMP implementations. While changing the manufacturing concept from line to cellular layout, the production shop was stopped for more than two weeks and the entire workforce was imparted training in the new concept, which included team building, change management, SPC, etc. All workers were sent in batches to other companies which implemented the same concept. While developing Kaizen structure, two senior managers visited Kaizen practicing companies to get acquainted about the subject.

While planning various QMPs, OB imparted need-based training to all concerned. These trainings were given either through consultants, or internal or external faculty or through participation in seminars. For TS16949, the awareness training was first imparted to all employees. Special training on Control Plans, FMEA, SPC, 5S, and MSA module was given by consultants.

With a view to assess the effectiveness of this training, a test was conducted after a month to find out what was gained or grasped by the incumbent. OB imparted training on vision, policy, and values through trained facilitators. Senior managers were trained in a specialist training so that they subsequently can become trainers for their team members. For example, Sr. Production Manager was 5S coordinator in plant, Associate VP was 5S champion, Department heads were Kaizen committee members etc. This increased accountability of the department heads in QMP implementation.

The group company has a separate Institute of Advanced Management Studies set up in 1991 for programs on general management function. The institute has started PGDM (Post Graduate Diploma in Management) Program since 1998.

7.5.7.3 Interaction with Top Management

The SBU heads interacted with senior and middle management through various scheduled and special meetings and with operators during their shop-floor visit. OB

started a ‘speak out’ forum where the HR department selected employees on random basis from various departments and sent them to SBU head at a stipulated time. Thus, the employees got direct opportunity to share their ideas and requirements with the top management. The suggestion of inviting customers at the anniversary ceremony had come from a workman during a ‘speak out’ session with VP. Various QMP committees also interacted with SBU- head from time to time to get guidance on steering the movement in the organization.

7.5.7.4 Practice of Rewarding Best Contributors

OB practiced reward and recognition mechanism to encourage employees to contribute in improvement activities. The winners of the monthly award of Kaizen were gifted with a voucher. It was the policy of the company to allot predefined reward points to every Kaizenee who implemented Kaizen. Each reward point has value of Rs 8. Based on the number of Kaizens implemented the Kaizenee could select the gift of his choice from pre-selected gift- counters in the city. The photographs of the winners were also displayed in the Kaizen room. The Kaizen trophy was awarded to the group/cell which generated maximum number of Kaizens. During the year 2003, the SBU-head decided to honour the employee who contributed 100 Kaizen in a calendar year by sending him on a foreign tour. Accordingly, the winner was sent to Germany to attend AUTOMECHA in September 2004. The company also gave monetary rewards to employees contributing in the suggestion scheme.

The group company arranged an inter-plant competition of safety slogans and posters for housekeeping, wherein OB won the award for Housekeeping competition. OB invited the customers of cells every year on the anniversary day and the employees were honored in presence of their customers. This motivated all employees and encouraged them to know more about their product performance and new requirements by directly interacting with customers.

A note of appreciation was always sent by SBU-head whenever there was any achievement in QMPs. For example, a note from Kaizen coordinator and Vice President

congratulating a person on his contribution was displayed in the Kaizen room. OB also recognized and encouraged their employees monetarily for their contribution in improvement activity.

7.5.7.5 Practice of Celebrating Special Events

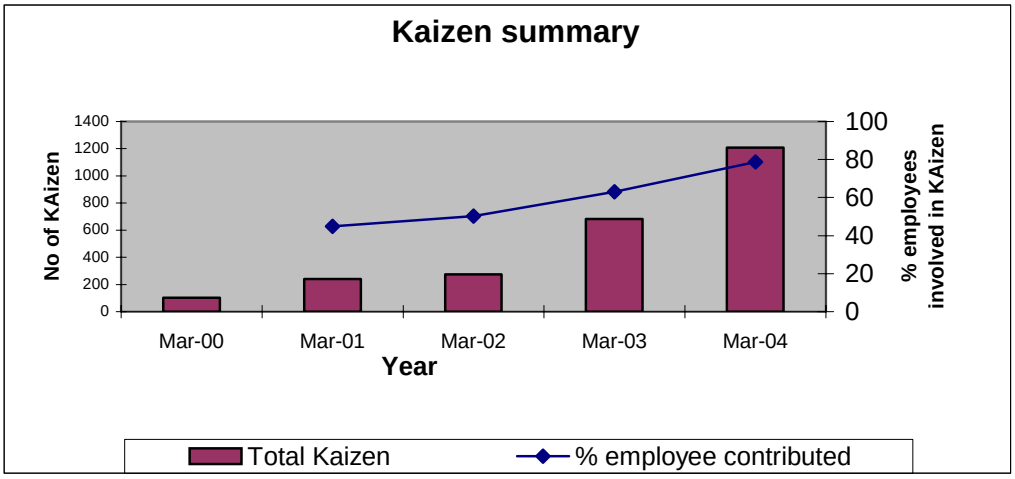
The company celebrated several events. For initiating the Kaizen movement, a kick-off function was organized in a hotel. The program of 5 S was also launched with proper celebration. The company celebrated 'Kaizen Mela' every year. There were totally six cells in production and the management celebrated anniversaries of each cell by inviting the customers of respective cells. There were competitions on Kaizen slogan and Kaizen poem; Kaizen exhibitions were organized in which the Best Kaizen award was presented. Various such celebrations kept the employees in enthusiastic mood at the workplace.

7.6 Outcome

7.6.1 QMP

Kaizen: Kaizen was implemented across the OB. The practice of generating Kaizen was evident in all departments associated with manufacturing. However, in Marketing and Finance department, the practice of Kaizen was not evident through various notice boards of the department. According to a Kaizen committee member, the rate of Kaizen improved because of the monetary reward scheme announced by the company. He believed that if the company withdrew this scheme, the rate of Kaizen would fall drastically. By initiating Kaizen for managers, the management demonstrated its commitment. There was a substantial growth in Kaizen movement among workmen, as more and more employees were involved in the Kaizen activity. The number of Kaizens submitted per month increased five times in the year 2003-04 compared to 1999-2000. In the initial three years, the highest Kaizens were contributed in 'Cost Saving' and 'Quality' areas but were subsequently generated in 'System' and 'Fatigue' area also. OB saved more than 2 million INR due to this QMP after its initiation, thus, fulfilling the objectives with which it was initiated.

Figure 7.3 Trend of Kaizen Implemented with % of Employee Involvement in OB



5 S: The 5S implementation was done in 2001 simultaneously with other QMPs in OB. According to a senior manager, it was not successful initially as employees were confused with too many schemes at the same time. The company, therefore, decided to withdraw this scheme and then reintroduced it in 2003. OB had identified 5 model areas in pilot implementation that had successfully cleared 1S requirement. More than 60% of the employees in OB were trained in 5S. The entire unit, including shop floor and offices, maintained proper cleanliness, orderliness, and cleaning standards. After the introduction of 5 S, the number of Kaizens implemented in housekeeping and safety areas increased substantially. This brought discipline, orderliness, and high consciousness in the workshop and high consciousness in the work-force about rejection and rework.

TS16949:2002: The company was the first in Engine bearing industry to get certified for this international standard TS16949:2002 in May 2004. According to the Purchase Manager, after implementation of TS16949, the operators became more sensitive to nonconforming material received from suppliers. He stated that he did not get any direct feedback from the operators in the past but after implementation of TS16949, he received valuable feedback from operators when they came across any quality deviations in the material. The supplier quality system improved as a result of this system which demonstrated that suppliers should have ISO9001 quality management systems in their organization.

RKQP: The quality excellence model was renamed as business excellence model after the year 2000 when the RKQP trust, in view of the directives of the top management, aligned their criteria in line with CII Exim model. OB was adjudged the best in 1999 under the old criteria. OB had a detailed manual to meet RKQM requirements, which explained existing practices of the company.

The implementation of such QMPs made positive improvement in the employee awareness and consciousness, and helped in aligning them in the direction of OB's vision.

Employee satisfaction survey: OB introduced the employee satisfaction survey in 1994 and subsequently repeated it in 1996, 1998, and 2003. The results of the same were analyzed and the HR department prepared improvements plans, which were compared in subsequent surveys. Various attributes considered in the survey were: challenges of creativity, learning and development, work climate, physical environment, salary and emoluments, growth opportunity, working in reputed company, professionally managed, etc. Satisfaction level in area of work environment, and professionalism recorded a better satisfaction trend after 1998.

7.6.2 Internal Measures

7.6.2.1 Customer Rejections

OB monitored the following parameters related to customer rejections: OEM rejections, replacement market rejection, OEM customer complaints per month, and customer returns due to OB's faults. As a result, after market rejection, in ppm. reductions to the extent of 83% and 66% were possible on OEM. The average customer complaint per month from OEM market came down by 66 % in last three years. The average response time to customer complaint was 34 hours in 2002-03 which was reduced to 30 hours in 2003-04. Details about customer rejections are shown in the following table.

Table 7.2 Table of Rejections during Past Four Years in OB

Year		00-01	01-02	02-03	03-04
OEM rejection (Inland+Export)in PPM	Target	2500	2000	1000	300
	Actual	2530	2550	1080	429
Replacement market rejection (internal + Export)PPM % involvement	Target	4000	2500	2500	1500
	Actual	4600	2500	3100	1581
OEM customer complaint No of complaint / month		-	3	2.8	1
Customer return from market for OB's fault ppm		-	2054	1581	840

7.6.2.2 Customer Satisfaction

The company measures its customer satisfaction periodically. The details are tabulated below:

Table 7.3 Table of Customer Satisfaction in OB

	01-02	02-03	03-04
Customer satisfaction Index	120.09	104.77	78.91 (Modified method based on TS 16949 criteria)
Overall customer satisfaction Index (on 1 to 7 scale)	NA	5.05	5.39 (5.5 in 2006 Target)

While implementing TS16949 standard the company changed the measuring mechanism. One of the three important parameters for customer satisfaction are: product, commercial, and service. In all these parameters, the ratings of OB were higher than those of the nearest competitors. OB improved other parameters also. For example, it had improved on the following criteria in 2004 as compared to 2002; product-range, life, pre-fitment, post-fitment, packing, service visits, availability, accessibility, service support, distribution support, communication, commercial price, replacement, availability, and schemes.

7.6.2.3 Order Fulfillment

OB's order fulfillment improved from 90 % in 2001-02 to 96% in 2003-04 as shown below.

Table 7.4 Table of Order Fulfillment in OB

	2001-02	2002-03	2003-04
Production v/s actual achievement %	90.44	96.30	96.71

7.6.2.4 Rework and Rejections

OB measured its rework and rejection in ppm level. In spite of an increase in volume of production, the rework (30% reduction) and the internal rejection was reduced subsequently as shown below.

Table 7.5 Table of % Rework and Rejection in OB

		01-02	02-03	03-04
Rework in PPM	Target	65000	60000	50000
	Actual	69468	66837	48831
Internal Rejection in PPM	Target	25000	37000	25000
	Actual	31005	35326	29198

7.6.2.5 Up Time of the Machine

With increase in production volume, the uptime of the machine increased to 95 % and the machine line efficiency to 93.6 % in 2003-04 as detailed below.

Table 7.6 Table of Machine Uptime in OB

		01-02	02-03	03-04
Uptime %	Target	92	92	94
OB	Actual	91	93	95
M/C line efficiency %		82	90	93.6

7.6.2.6 New Product Development

There was substantial improvement in the development time of new products. From the average of 11 weeks in 1999-2000 it came down to 8 weeks in 2003-04. The number of samples submitted to customers also increased from 65 to 123 during that period.

The net marker share of OB improved to about 39 % in 2003-04. The other parameters which were improved in the last three years were: number of accidents per year, power and water consumption, hydraulic oil consumption, solid waste generation, grinding dust generation, etc.

CHAPTER 8. DATA COLLECTION FROM ORGANISATION C (OC)

This chapter deals with the data collected from the third organisation OC. Firstly organisation OC is introduced in brief, subsequently QMPs practiced in this organisation are explained and thereafter various elements of Policy, Practice and Outcome related to QMP are described.

8.1 Data Collection at OC

After receiving approval of my four day visit for collecting data on QMP implementation at OC, attempts were made to understand the organisation. Website search was carried out and data related to organisation were collected. Based on mutually convenient date, the visit was made.

On the first day, the main coordinator of my visit – Sr. QA Manager- informed the concerned departments and prepared a tentative time schedule of interviews. Data were collected through semi-structured interview, company records and documents and direct observation (e.g. shop-floor visit). Departments interacted were: Quality Assurance, Manufacturing, Maintenance, Human Resources, Product Engineering, Purchase, Finance, Marketing, besides Head Technology and Coordinators of QMPs. The informants were mainly head of the departments, executives and supervisors. In OC, out of the total time spent for data collection, about 29 % was spent in document reading; 18 % in personal observation and about 53 % in interview and discussion. The range of time spent in interview and discussion at each department varied from 15 minutes to 160 minutes. Reference documents were referred as suggested or offered during interviews. Multiple sources of evidence and chain of evidences were ensured while collecting data. The insight generated from the field-visit was audio-recorded at the end of each day.

On return from the site, notes were transcribed on to the computer. After the data collection, the same were segregated and grouped. The case was documented based on the structure developed on various elements under Policy, Practice and Outcome. The

draft of the case study was sent to the organisation with a request for comments; however no comment was received for the same. Thus criteria suggested by Yin (2003) for case study were ensured in OC.

8.2 The Context

The organisation under study was a constituent of a four decade old business group comprising of nine manufacturing locations. Engine bearing was manufactured at two of these locations. The older of these two, (here referred to as OC) was in Himachal Pradesh. It started manufacturing engine bearing in the year 1978 in collaboration with a US based engine bearing company.

The product of OC included low range engine bearings, flanges, washers, and bushes. The turnover of its engine bearing division was 282 million INR in 2003-04. The product mainly served Automobile Original Equipment Manufacturers (OEM)s in the field of heavy vehicles, tractors, generation sets, after sales market and export market. The plant of OC was the first of its type in India, manufacturing a complete range of bimetal bearings, flanges, and washers.

The chief of the plant was designated as President, who reported to the Managing Director stationed at New Delhi. The President was assisted by a Technology Head (responsible for product engineering, tool room, plant maintenance, and quality assurance department each headed by functional heads); a Plant Head responsible for total plant operations; a HR Head, and a Finance Head. The responsibility and authority of senior executives were specified in the QS9000 quality manual of the company. These included responsibility and authority of Chief Executive Officer and the heads of departments like Operation, HRD, Maintenance, Production, OEM Market and Exports, Product Engineering, Production Planning, Purchase, etc.

The total strength of OC was 350 employees, of whom 164 were operators (associates) who were mainly ITI qualified. The average age of employees was 42 years. The Senior

Manager QA was the head of QA department and reported to the Technology head. He was assigned additional responsibility as Management Representative (MR) for QS9000 also. The members of QA department included two assistant managers, one officer and 19 inspectors out of which the manager and assistant managers were recruited in the year 2004 only. Till then the department was headed by an officer. Majority of the inspectors were ladies as the policy of the group was to recruit ladies wherever possible. In QA department, most of the associates (about 75%) were ladies as they " detect and check every parameter very carefully and do not compromise on quality." The working hours were: 6 a.m. to 2.30 p.m.; 2.30 p.m. to 11.00 p.m.; 11p.m. to 6 a.m. for the first, second, and third shifts respectively and 8.30 a.m. to 5.15 p.m. for the general shift.

8.3 Quality Management Programs at OC

OC had initiated the following Quality Management Programs (QMP) in the past; namely, QS9000, Six Sigma, Total Productive Maintenance (TPM), and QCDGP.

8.3.1 QS 9000

QS 9000 is the abbreviation for "Quality System Requirements QS-9000". It is the common supplier-quality standard for the DaimlerChrysler Corporation, the Ford Motor Company, and the General Motors Corporation. QS-9000 is based on the 1994 version of ISO 9001, but has additional requirements that are particular to the automotive industry. These additions are considered automotive "interpretations" by the ISO community of accreditation bodies and registrars. QS-9000 applies to suppliers of production materials, production and service parts, heat-treating, painting and plating, and other finishing services. It does not apply to all suppliers of the Big Three.

8.3.2 Six Sigma

Six Sigma is a methodology that provides businesses with the tools to improve the capability of their business processes. The increase in performance and decrease in process-variation leads to defect reduction and improvement in profits, employee morale and quality of product.

8.3.3 Total Productive Maintenance (TPM)

TPM is a tool to improve the overall equipment effectiveness of equipments and machinery through involvement of all employees. OC had initially targeted this QMP in 2003, however, due to labor problems in that year it was initiated in 2004.

8.3.4 QCDGP

Quality, Cost, Delivery, Growth, and Productivity-QCDGP- program was implemented in the entire group company as an internal corporate-driven program.

8.4 Policy

8.4.1 Policy for Long and Short-term Planning

8.4.1.1 Vision and Values

The group company documented its vision in their corporate philosophy and belief document. The key elements of the group's philosophy were: world class manufacturing; growth ahead of market, people orientation, return on investment, and continuous improvement. The key elements of vision were: develop corporate competence to act globally; aspire and dare to be innovative; attain leadership in technology; achieve excellence through entrepreneurship; and bridge the gap between precept and practice. During the data collection process, it was found that the deployment of corporate vision, philosophy, and belief to OC was not documented.

8.4.1.2 Quality Policy

The quality policy of OC was formulated in 1992 during the process of ISO9002 implementation. Subsequently, it was reviewed in 1998 during QS9000 implementation and adopted without any change. Thus, OC maintained the same quality policy developed in 1992. The Quality policy was signed by MD and displayed at several important places in the premises of the organization. It enumerated four objectives: (i) customer satisfaction, (ii) employee development, (iii) continuous improvement, and (iv)housekeeping. According to the data collected from functional heads, there was no formal plan prepared for achieving these objectives at functional levels.

8.4.1.3 Annual Goals/Targets

As mentioned in the Quality manual, the annual business plan was prepared every year based on the past performance and market expectations. The responsibility for compiling this plan was assigned to the Finance head. The parameters included in the business plans were: market-related issues, financial planning and cost, growth projection, path/facilities plan, cost objectives, HR development, projected sales figure, quality objectives, customer satisfaction plan, key internal quality and operational performance measurable, and safety and environmental issues.

It was specified in the quality manual that benchmark will be used for defining goals and objectives for short and long-term. A part of manager's salary was based on achievement of Key Result Areas (KRA). It was recorded in the quality manual that the following parameters related to quality were collected monthly and trends were analyzed quarterly. These included monthly overall rejections, production for each plant, strip rejection, steel rejection, powder yield, complaints, return from customers, productivity index, monthly sales, cost of quality, and pareto analysis. The last parameter i.e. pareto analysis was only a tool to analyze. The distinction between the parameter required to monitor and the tool to be applied was not evident at policy level. The quantification, deployment and benchmarking of OC's defined quality objectives were not prepared.

Every financial year, the projects under QCDGP (Quality, Cost, Delivery, Growth and Productivity) were selected and linked with Key Result Area of the related department head. For the year 2004-05, a total of nine areas were identified wherein every employee was expected to contribute. The estimated savings through this program for the specified year was ~ 202 Lacs INR.

8.4.1.4 Top Management Commitment

The top management commitment was demonstrated in various ways in OC. It decided at the beginning of every year about the implementation of QMP for that year. The projects related to QCDGP were similarly defined in the beginning of the year. These were taken as a part of annual business goals and their targets were reviewed in business review

meetings. They also formed part of reviews during the corporate business review meetings. The issues related to resources were discussed during these reviews. For each QMP, a coordinator was assigned to coordinate the QMP in the organization. The selection of the coordinator was mainly done with reference to his functional expertise and availability.

Respective coordinators at predefined frequency did the review of QMP on TPM and QS9000. The review meeting was attended by the chief (the President) whenever he was available. The progress, resource requirements, and specific issues related to the implementation were discussed in these meetings.

The top management conducted communication meeting every month wherein the President (along with HR and plant head) briefed about the past progress and future requirements to all employees. The resource requirements were decided by the central committee comprising of President, HR head, plant head, and the respective department head. The management had allocated 30 minutes everyday for TPM wherein all employees working under this pilot project were expected to meet on the model machine selected. A separate area known as -'TPM square'- was also provided for communicating progress related to this project.

8.4.2 Policy for QMP

8.4.2.1 Initiation

QCDGP: (Quality, Cost, Delivery, Growth, and Productivity)-QCDGP program was implemented in the entire group company during 2000-01. Its aim was to improve operational effectiveness of all units of the company by involving the employees in continual improvement philosophy of the group. Every year, a few improvement projects were selected and responsibility for their implementation was assigned to respective department heads linking them with their Key Result Area (KRA).

QS-9000: The main reason for initiating QS9000 was customer requirements. The major OEMs had demanded this system requirement. Earlier, OC was certified for ISO9002 in 1993-94. QS-9000 was initiated in 1998-99 and the certification was awarded in 2000-01.

Total Productive Maintenance (TPM): A plant of this group located near New Delhi was among the first cluster-group approach for TPM implementation which was initiated in Automobile companies of India. One of the senior executives of that group was transferred to OC as its chief and he decided to initiate TPM in OC. TPM was originally planned to be introduced in 2003, however, due to labour problems in that year, the plant was shut down for a few weeks. The efforts of the management were focussed on restarting the machines as a result of which TPM implementation was postponed to 2004. A pilot project was started in January 2004 by creating various cross-functional teams.

Six Sigma: OC initiated Six Sigma program in 2002 by sending two of their senior employees for Black Belt training. Two projects were taken up in that year; however, in the later part of the year there were labour problems in the company. No separate organisation was created for Six Sigma. Subsequently OC decided to implement TPM and hence Six Sigma was not given priority.

The table below gives details of various QMPs initiated in OC

Table 8.1 Summary of Various QMPs of OC

QMP	YEAR OF INITIATION	COORDINATOR FOR QMP	INITIATED BY
QS9000	1998-99	Technology Service Manager / QA head	Customer requirements
QCDGP	2000	Maintenance Head	Corporate
TPM	2003-04	Head Technology Service group	Top management
Six Sigma	2002	Maintenance Head	Top management

8.4.2.2 Appointment of Coordinator

The management had appointed coordinators for each QMP for coordinating the total program in OC. The coordination work included planning the total program, reviewing

the program through various planned meetings, guiding the team in implementation, preparing necessary documentation, updating the management from time-to-time, etc.

At the time of QS9000 initiation, its coordinator was a QC member; thereafter in 2000 this responsibility was given to a Manager of Technical Support Group who had previously worked in a ISO9002 company. In 2001 again, this responsibility was assigned to another person in QA department and within a year it was re-assigned to the Manager, Technical Support. Again in 2004, the responsibility was transferred to a newly appointed QA chief.

The TPM project in its initial stage was handled by the Maintenance chief. Subsequently within four months, the responsibility of QMP was given to the head of Technical Support Group (a group focussed to improve machine efficiency) as the maintenance head was given additional responsibility of handling a production line. The new coordinator did not have any past exposure in the subject nor was he attached directly to production and/or maintenance department. Thus, the perceived criteria for selecting the new coordinator were changed every time and were mainly aimed to utilize the officer's availability and not his exposure on the subject.

The coordinator for QCDGP was Maintenance head. Its targets and expected benefits were projected at the beginning of the year based on the corporate directive and were monitored in every management review meeting.

No coordinator was appointed for Six sigma project. There were two trained employees for Black belt out of whom one had left after completion of the belt training. The other executive, Maintenance head, had implemented two projects and was the only knowledgeable executive in Six Sigma. He also left the company subsequently.

8.4.2.3 Appointment of Consultant

The group company of OC had established a separate university as a part of its corporate function. The dean of the university was stationed in the same city as OC. The university

provided guidance for various inputs related to training. There were full-time and part-time experts employed in this university, who developed training module based on the latest trend in the automobile industry and trained the concerned employees in the group companies. For TPM and Six Sigma, the employees were trained in skill-based trainings. The university dean also participated in the review meetings of QMP. There was no external consultant for QMP; however for QS 9000 implementation OC had close interactions with the auditing agency.

8.4.2.4 Organization for QMP

Separate organization was created for various QMPs. Responsibility and authority of various positions were defined in OC's Quality Manual. Those related to housekeeping were assigned to the head HR, and those of continuous improvement process to the head of Production department.

For QCDGP program, projects were assigned to various functional heads and the chief reviewed the same in periodic business review meetings. These projects were planned during the annual business plans and deployed to department level by integrating with KRA of respective departmental heads.

For QS9000 the appointed coordinator was expected to implement all requirements of QS9000 with the need-based help from various departments. A cross-functional team was announced subsequently in the year 2000 for QS9000 implementation. The coordinator reported to the chief of technology and engineering department and not to the chief of the plant.

TPM was initiated in early 2004 and the organization was created for the same. The Chief of the Technology and Engineering was designated as the chairman of TPM Steering committee. The president - the chief of the plant - was not the chairperson of the same. Initially, the Maintenance head was made TPM coordinator but subsequently the responsibility was assigned to the head of Technical Service Group. There were four teams announced for pilot projects headed by leaders who were department heads. The

announcement of various positions – like coordinators, team leaders and team members - was done through office orders, circulation of minutes of meetings or through email communication within the organization.

While creating organizational structure, no rules were formulated specifically for QMPs.

8.4.3 Policy for Linking HR Practices with QMP

8.4.3.1 Reward and Recognition

The organisation introduced various schemes to motivate its employees. The schemes initiated in 2004 were: best operator award, best housekeeping award, and suggestion scheme, etc. The winners were selected monthly by the chief in presence of all employees.

The group company had a scheme –'Operating Engineer'- under which the corporate office selected one or two operators (based on merit and skill) from each plant and trained them. By such regular training they were upgraded to the Diploma level within two years, to handle the work independently. The company had suggestion scheme under which a cash reward (of Rs. 65) was given for every suggestion received. There were no specific rewards for suppliers.

8.4.3.2 Performance Appraisal System

OC had annual performance appraisal system based on the groups' corporate system. Each department head was given a few manageable KRAs in a particular year in line with the overall goal of the company. The annual appraisal system was known as MIBP - Management Incentive Business Plan - and linked with the pay package of executives. The executive received monetary reward based on the extent to which KRA were achieved as well as the time frame in which they were achieved.

The responsibility for QMP was normally assigned to the manager who coordinated the total implementation. The same was recorded in his annual performance appraisal review. Implementation of QS9000 was mentioned as KRA for all six members of cross-

functional team. Similarly TPM implementation was a KRA for TPM Coordinator. As regards operators (associates), a part of their salary structure was linked with their performance. In QCDGP project, linkage with annual appraisal was established except for the high-risk projects.

8.4.3.3 Creating Environment for Change

Each QMP was planned either at corporate level or at organization level. The requirement and the targets for the QMP were reviewed at the beginning of the year. The introduction of QMP was communicated to all concerned at the beginning of the year. The union members were made aware about QMP before its initiation. For QS9000, awareness programs were conducted for all employees. For Six Sigma and TPM, awareness training was not conducted till the time of data collection. The internal leaders within the companies were identified through monitoring the performance of employees. The employees selected for 'Operating Engineer' were also encouraged to improve their performance. The company did not have a policy for lateral appointment at senior level, nor did it encourage new recruit after the age of 45 years.

OC faced labor problems in August, 2003 after which it took a few initiatives for creating an environment for change. Some of the new initiatives were: monthly communication from the management regarding the progress of OC to all employees, stress on communicating important requirements through notice boards, encouraging best performing operators and staff members, etc. The new schemes initiated for employee-involvement were: suggestion scheme, best operator award, and best housekeeping award. There were frequent reviews planned for QMP progress including a quarterly review of TPM by head of technology. In order to increase involvement of the employees, the goals for QMPs were linked with the annual Key Result Area of the respective functional head. Annual performance system was linked with remuneration package wherein about 70% was fixed on individual performance and the rest on the company performance. The group company also engaged itself in welfare activity under which it started a hostel for working women. Each QMP was treated as a tool or technique to bring improvement in the system.

8.5 Practice

8.5.1 Practice of Production, Verification and Assurance Systems

8.5.1.1 Production System

The products of OC included low-size engine bearings, flanges, washers, and bushes. The production facility of OC comprised of powder plant, sintering lines, press and machine shop, platting shop, tool room and metrology, and chemical lab. The required powder for sintering line was manufactured in-house and kept in pre-identified colour drums. The bimetal strips Cu-Tin or Al-Tin were produced out of sintering furnaces with the required powder and strips as the inputs. The bi-metal strips were then fed to a machining line which was automated. The rolled bimetal was cut and shaped to size in the press- shop. There were six cells in press-shop. Of these, one was blanking and forming cell which was a common feeder to all other cells. The other cells included: con-rod cell, main bearing, flange cell, and Cummins line. Two of the production lines were designed for single-piece flow out of which one was bought from collaborators and the other was made indigenously. Finally the platting was done and the product was stored in the main stores.

Throughout the production process, the identification and traceability was maintained. E.g. the strip was identified by stickers, powder was identified by tags, and coil code of strip was recorded with heat number to trace powder used. OC had thus put in extra efforts for reducing setup time through mistake- proofing.

8.5.1.2. Verification System

The product manufactured in OC was verified at several stages through inspection. There were in all 19 QA associates for verifying the product requirements at various stages. A majority of quality associates were ladies. The associates inspected the products by selecting samples at an interval of 45 minutes from the manufacturing process. The process capability was measured and monitored for critical process parameters. The product manufactured was mainly inspected at the final stage and in few cases at various stages during the production process. The concept of self-inspection was not

implemented and was still under discussion. The incoming inspection was carried out as per the sampling plan; however, during the interview it was found that the incoming inspection was not adhered to in the past due to resource constraints. Important parameters were displayed on the machine and were monitored periodically. OC followed the practice of 100% visual inspection of all products. It had a metrology lab handled by trained personnel to calibrate and maintain gauges and a chemical lab to check chemistry, microstructure and metallurgy of raw material.

8.5.1.3 Assurance System

The assurance system was mainly practiced through audits including the final product audit and layout audit. OC implemented a 7 step problem-solving methodology to take corrective and preventive action analysis from time to time. It was observed during the interview that policy implementation had become stricter only since mid-2004.

In the plant, boards like ‘critical problem faced in the plant’ were seen; however, the same were not regularly updated in last three months. OC implemented final audit and layout inspection of all parts based on customer requirements. OC had mentioned in its Quality Manual that the following techniques were demonstrated in the organization: Cp, Cpk, Design of Experiments (DOE), Theory of Constraints (TOC), Cost of Quality (COQ), PPM (parts per million) analysis, Value analysis, Problem solving, Benchmarking, Ergonomics, and Mistake proofing. The gauge R & R study for critical instruments was also carried out. OC used a variety of QC tools for analyzing its data, some of them were pareto analysis, matrix diagram, run chart, cp/cpk, 8D problem solving, etc. Executives and managers mainly used this analysis.

Customer satisfaction was one of the objectives defined by OC. The same was not measured on planned frequency with the help of independent agency. Neither, it was regularly captured internally by OC. The cost of quality was not measured within the plant, however, the data related to customer complaint and internal rejections were collected on regular basis.

8.5.1.4 Workplace Management

The shop discipline was of high order. All employees were in common uniform. The shop-floor was well maintained and cleaned at regular intervals. The entire floor was of white colour and the gangway of gray colour. The yellow line discipline was maintained. Places for all required items were marked on the floor e.g. place for trolley. Flower plants were also kept on the shop-floor. There were benches in the shop for use during the break as well as for discussions during any meeting.

Target and progress boards were displayed at several places in the plant. Some of these boards were online boards which were maintained on regular basis by respective persons. For example, housekeeping board for cleaning of shop floor was maintained and signed by the concerned employee on daily basis. All the measuring instruments used by QA for stage inspection were of white colour, which visually communicated the responsibility of QA department.

Inspirational slogans like ‘our mind is like parachute, it only works when it is open’ were displayed at OC’s workplace. Photographs of important events as well as of reward ceremony were also displayed on the notice boards.

8.5.2 Practice of Coordinating QMP

8.5.2.1 Planning for QMP

The planning for various QMPs was done mainly by the respective coordinators except in case of QCDGP where it was done by the corporate office. OC had developed the corporate vision, however, the deployment of the same in relation to QMP requirement on long-term basis was not done. As a result, each QMP was practiced and reviewed as an independent program.

OC had QCDGP program wherein improvement projects were identified every year. During the year 2004-05, nine areas were identified for improvements with an estimated cost saving of ~ 200 Lacs INR. These projects were allocated to respective heads of

department. The progress report was presented every month by the coordinator in business review meetings.

The main coordinator for QS9000 was changed more than three times. Due to this, planning for QS9000 was not done in an uninterrupted manner. The target planned for this QMP was to get accredited with QS9000 certification.

The Six Sigma program was not implemented in OC after the initial projects, which were completed by the trained employees.

Total Productive Maintenance (TPM) program, initiated in January 2004 was planned with a model machine. The program planning for the next four years was done under the guidance of a Dean of the (company) university. The organization structure was prepared by a steering committee. Its chairman was not the chief of the plant. The review of the TPM was planned fortnightly by the coordinator. The target for pilot project was implementation of the first three steps of Autonomous Maintenance of TPM by October 2004. This was a highly optimistic target and there was no planning and preparation to achieve this target on the shop-floor. The progress of pilot project was communicated through 'TPM Square'.

8.5.2.2 Coordinating for QMP

The main coordination relating to QMP was done by the respective coordinators. In case of QCDGP, the same was done in consultation with corporate office. The coordination work included activities like: planning the program, assigning the responsibility, planning for the objectives based on management requirements, communication related to QMP planning, guiding during the implementation, documenting the requirement and progress, liaison with various internal and external functions/agencies, monitoring the progress against the plan, taking counteractions whenever required, reviewing the progress, providing timely feedback to the top management, etc.

The Dean as well as other professors of the group university provided necessary guidance from time to time and also participated in review meetings.

The interaction among team members was planned through group meetings and review meetings. For QS9000, supervisors along with the operatives fulfilled the requirements of the system standards on the shop-floor e.g. various process control charts etc. OC had formed cross-functional teams to meet specific requirements like FMEA, Control Plans in the processes. In addition to the normal requirement for the systems, periodic review by the management was planned wherein all senior and middle level executives were given opportunity to interact and review the progress.

In TPM and QCDGP programs, teams were formed and the members interacted with each other to achieve the target. Periodic reviews by the senior management were planned at predefined frequency. For example, QCDGP review was done in monthly business review meetings.

8.5.2.3 Reviewing the Progress

QCDGP and TPM programs were reviewed by the program coordinator and necessary reports provided to the top management. As QCGDP program was under group corporate office, it was reviewed quarterly by its top management. TPM program was reviewed by a steering committee where the chief of OC, the President, was not the chairman. The chief of the plant attended the planned review meetings of QMP whenever he was available in the office. The monthly review of TPM was done in the presence of the Dean of group university. Six Sigma program was initiated for a specific project and hence after completion of the project no further review was done. QS-9000 was initiated in this unit in 1998-99, however, there was no substantial progress till 2000. The management, after reviewing the progress formed a core-team for QS-9000 implementation by involving six members of whom one was devoted fulltime for this program. The members were given complete flexibility and full resources for meeting the requirements. It was found that adherence of total quality systems in OC was not reviewed periodically which resulted in non-adherence in some subsystems like incoming inspection, corrective

and preventive actions, etc. Some of the functional heads interviewed, expressed their concern about the adherence to QS9000 system, its review meeting, and its recording.

The other forums in OC for review include: monthly business progress review, management operations review by MD, quarterly group operation review, customer complaint review, etc.

8.5.3 Practice of Documentation of QMP

8.5.3.1 Documenting the Requirement

Requirements of QS9000 were documented through manuals, processes, procedures, formats and review reports. However, for other QMPs, there were no such manuals. The formats and processes were documented.

All manufacturing-process flow charts were displayed on the respective processes indicating their inputs and outputs and critical control points were added. The process capability was also monitored on critical processes. Checklists were displayed at all important processes and operations e.g. Housekeeping checklist.

8.5.3.2 Documenting the Progress

The responsibility for periodic updating of the QMP progress was assigned to the coordinator of respective QMP. The progress of QMP once reviewed was recorded in the form of minutes and circulated to concerned members. For TPM, the progress was also displayed on TPM square.

The progress on processes was documented by displaying control parameters of the critical process, updating checklist at predefined interval, displaying rejections at several stages, etc.

The practice of annual consolidation of data-related key quality parameters as well as QMP was not evident. Consolidated record before 2003-04 on rejection, rework,

customer complaint etc was not available. It was also observed that several charts in the plant were not updated. Team progress in TPM square was not updated.

8.5.4 Practice of Data Analysis and Presentation

8.5.4.1 IT Support

The system support for processing the routine data and QMP data was not effective. All transactions were not computerized. Executives were given email facilities. The data as well as analysis (related to manufacturing and QMPs) were not monitored through the software directly, but were done manually or in MS Office software. This created duplication of work to some extent.

8.5.4.2 Availability of Required Data

The requirements of necessary data related to QMP were generated by respective coordinators. In case of QCDGP, the data related to various projects were generated by respective team leaders and were submitted to the coordinator for monitoring and subsequent reporting. For QS9000 and TPM various data were displayed on the shopfloor, external rejection board, in-process rejections, vendor material board etc.

The consolidated data for key indicators were not compiled for the past few years. For example in data on scrap, details of rejection for the past five years were not available.

8.5.4.3 Analysis and Presentation

OC had demonstrated application of some of the tools like Pareto, matrix diagram, run chart in displaying progress on various QMPs. However, the application of some of the tools mentioned in quality manual - like problem solving, benchmarking, theory of constraint - were not seen on the shop-floor.

The presentation of data was done through visuals by displaying various activities performed in TPM, QS9000 etc. Progress on important parameters related to QS 9000 was displayed in the respective department. For presenting the progress of TPM, separate arrangement was made on the shop- ‘TPM square’. However, some of the information

pertaining to manufacturing rejections as well as QMP activities was not updated. There was no standardization in presenting the data.

8.5.5 Practice of Communication

8.5.5.1 Communicating Policy and Targets

The vision, mission, and value statements were displayed on notice boards. The quality policy was also displayed at several important places; however, the date of their issue was not mentioned. The target related to various departments was mentioned in respective departments. The chief of the organisation (the President) addressed all employees every month. The past progress and future plans were conveyed in this forum. Employees who performed best in respective months were rewarded by the chief in presence of all employees. There were few slogans displayed in the plant like: ‘Mind is like parachute, it only works when it is open.’

8.5.5.2 Communicating Plans and Progress

The management held monthly communication meetings for all employees to communicate important business-related information, which also included process rejections, customer complaints, and plan for the next months. OC practiced various devices for regularly communicating information related to its work. These devices included: internal email, internal memo, display boards in the reception, notice boards in the reception and plants, process flow charts in the plant, work instructions, ‘TPM square’, departmental boards, housekeeping boards and checklists, etc.

Communication was also ensured through display of important information, For instance, at the incoming inspection area, information about customer complaints, daily inspection clearance, and vendor inspection note etc was displayed. Similarly, at the final inspection area details about external rejection with photograph and analysis and sample analysis table were displayed. In the sample analysis table, the rejected material of the previous day was kept for analysis. Display on shop-floor included 5S board, steps for shaping up workplace, notice for best housekeeping award, 5S award scoring guide, and section

related critical issues. A check-sheet for cleaner, a suggestion box, and other information related to daily operations of the shop were also displayed.

Important information displayed in the main reception area related to product display, skill matrix, winners of suggestion award and best operator award, QS9000 certificate, philosophy and beliefs of the group, corporate organization chart and information pertaining to outstation visits of employees. The progress relating to the QMPs was communicated through various review meetings.

8.5.5.3 In-house Publication

OC had no in-house publication.

8.5.6. Practice of Involving Customers and Suppliers.

8.5.6.1 Involving Customers

The customers were involved during the new product development. Their main requirements of specifications were communicated to OC based on which new products were designed. The average time to develop a new product was not tracked by OC.

8.5.6.2. Involving Suppliers

The involvement of suppliers in QMP was not evident. There were seven vendors supplying semi-finished parts to OC. The feedback on quality was given to the suppliers when raw materials were rejected in the plant. There was no direct interaction of top management with the suppliers, neither was any supplier-meet organized by OC. The poor quality of suppliers had resulted in high rejections at in-house and at customer's stage. In 2004, the management gave special assignment for improving the quality and as a result executives from Production and from QA had started frequent dialogues with suppliers.

8.5.7 Practice for Encouraging Employee-involvement

8.5.7.1 Cross Functional Team (CFT)

OC had planned working on QMPs based on cross-functional involvement. In programs like TPM, a cross-functional team was developed for implementing the required steps. In QS9000, the CFT was announced and was made responsible to implement all requirements of the standards. In Six Sigma program, due to its different nature, the project was handled by specialists trained in the methodology. There was no practice of measuring effectiveness of various teams involved in QMP.

8.5.7.2 Education and Training

The necessary training skills related to QMP implementation were imparted to concerned employees of OC. Majority of the trainings were imparted through group's university experts. Various courses were planned for and attended by coordinators and key personnel in QMP. These were: TPM implementation course, Six Sigma black belt, QS 9000 internal auditor course, etc. OC had also conducted several internal programs through internal faculty.

OC laid stress on educating its employees. The case of an ITI pass operator rising to a supervisor-level during the stipulated time of on-the-job training under 'Operating Engineer' scheme, serves as an example.

For TPM, the awareness training was not imparted to all during the phase of pilot project. QS9000 awareness training was imparted to all employees. The formal training on Quality as well as on OC's vision, belief, values, Quality Policy etc. were also not conducted for all employees.

8.5.7.3 Interaction with Top Management

Senior managers had direct interaction with employees during their shop visits; but there was no standard system in which an employee could interact with the top management. The only means of such interaction was review meetings. However, in QS9000 and TPM,

the chief of the plant was not a chairperson and hence such direct interaction with the chief in these programs was minimum.

8.5.7.4 Practice of Rewarding Best Contributors

OC initiated reward mechanism for encouraging its employees. Suggestion award, housekeeping trophy and best operator awards were given every month during monthly communication meetings. Every year the best operator was selected based on group and individual norms. The award for best housekeeping was also regularly announced. Every suggestion was rewarded with Rs. 65 irrespective of its implementation. All these schemes were introduced during the year 2003 after the labor disputes were resolved. There was no practice of celebrating various events related to QMP.

8.6 Outcome

8.6.1 QMP

The various QMPs initiated in OC demonstrated progress as mentioned below:
QCDGP program was able to give the expected result as it was directly a part of the business goals and monitored by group corporate office. Moreover, the projects undertaken were linked with individual performance.

QS9000 helped in establishing certain systems within OC. However, according to many executives the positive result of the system was not evident as there were many lapses in its implementation. The executives interviewed mentioned that OC had given less focus on system establishment in the past. MR was changed many times. This view was further supported by one of the managers involved in QMP who admitted that the main objective of QS9000 was not achieved. The main reasons were lack of seriousness on QS9000 demonstrated by the top management and lack of understanding of problems and collection of data. The company had hired highly qualified persons many of whom left resulting in a high turnover of employees in production and QA function.

TPM initiated in the beginning of 2004 had lost its effectiveness according to the executives and managers interviewed. TPM is highly management-driven and the concerned executives felt that demonstration of commitment from the top management was not evident. The discipline on part of members to devote regular time on the model machine was not observed. The employees interviewed mentioned that the production employees were not clear about the requirement and the expected benefits of TPM. This resulted in poor adherence to cleaning-time allotted to the model machine affecting enthusiasm of the executives. However, according to the coordinator, slackness in the program was due to lack of basic awareness and proper communication regarding the expected benefits. As against this, the other team leader felt that it was mainly due to lack of commitment from the top.

Six Sigma was initiated by sending two officers for Black Belt training. Subsequently, there was no company-wide plan for its implementation. Only a few projects were undertaken as one of the officers left the organization immediately after the training and the other left in the beginning of 2005. Hence, the Six Sigma project did not show company-wide effective implementation.

OC's decision of initiating Six Sigma prior to initiating TPM was wrong according to an executive who was trained in both the QMPs.

The group company of OC was ranked among the best 20 places to work in India. The HR head of OC mentioned that this itself was a parameter of satisfied employees and hence the employee satisfaction survey within OC was not done.

8.6.2 Internal Measures

8.6.2.1 Customer Rejections

The consolidated report of customer rejections was available for 2003-04 which showed 32 complaints from OC. The record of previous years was not traceable. Moreover, the customer satisfaction survey was not conducted.

8.6.2.2 On Time Delivery

This parameter was not a part of regular reporting in any of the selected QMPs.

8.6.2.3 Utilisation

This parameter was not a part of regular reporting in any of the selected QMPs.

8.6.2.4 Rework and Rejections

The consolidated data on total rejection of all products was 4.63% in 2002-03 and 4.21 % in 2003-04. The strip rejection for 2002-03 and 2003-04 was 1.6 % and 1.9% respectively. The record of previous years was not traceable.

8.6.2.5 Vendor Rating

The rating of vendor was done mainly on 'quantity rejected' at the incoming stage. Yearly consolidated analysis for the past few years was not available.

8.6.2.6 Audits

The audits were conducted as a part of QS9000 system standard; however, the consolidated assessment of past few years was not done by OC.

8.6.2.7 New Product Development

The time to develop new product was not monitored in QMP.

8.6.3 Other

8.6.3.1 Awareness

The awareness related to QMP was different in various programs. In TPM, the employees, even after initiating TPM in model machines were not made aware about the benefits and requirements of QMP for OC. QS9000 awareness was imparted to all employees. As Six Sigma was restricted for few employees, the others were not aware about the program. QCDGP being a group company-wide program, it created high understanding among the employees.

8.6.3.2 Sales and Profit

The turnover of OC was Rs. 27.7 crore in 2001-02 which slightly rose to Rs. 28 crore in 2002-03, but came down to Rs. 25 crore in 2003-04. The PBT for the respective years were: - 5.71, - 5.53 and - 4.58 crores.

CHAPTER 9. DATA COLLECTION FROM ORGANISATION D (OD)

This chapter deals with the data collected from the fourth organisation OD. Firstly the organisation OD is introduced in brief, subsequently QMPs practiced in this organisation are explained and thereafter various elements of Policy, Practice and Outcome related to QMP are described.

9.1 Data Collection at OD

After receiving their approval to visit the organisation for collecting data on QMP implementation at OD, attempts were made to understand the organisation. Website search was carried out and data related to organisation were collected. Based on mutual convenience, the visit was made.

On the first day, the main coordinator of my visit – assistant to Vice Chairman and Managing Director (VC&MD)- informed the concerned departments and prepared tentative time schedule of interviews. Data were collected through semi-structured interview, company records and documents and direct observation (e.g. shop floor visit). Departments interacted were: Quality Assurance, Manufacturing, Engineering, Personnel and Administration (P&A), Purchase, Finance, Marketing, IT, Head of plant, VC&MD and Coordinator of QMPs. The informants were mainly head of the departments, executives and supervisors. In OD, out of the total time spent for data collection, about 35 % was spent in document reading; 13 % in personal observation and about 52 % in interview and discussion. The range of time spent in interview and discussion at each department varied from 20 minutes to 235 minutes. Reference documents were referred as suggested or offered during interview. Multiple source of evidence and chain of evidences were ensured while collecting data. The insight generated from the field visit was audio-recorded at the end of each day.

On return from the site, notes were transcribed on to the computer. After the data collection the same were segregated and grouped. The case was documented based on the

structure developed on various elements under Policy, Practice and Outcome. Finally, the draft of case was sent to the organisation with a request for comments. Based on the comments, the draft was suitably modified. Thus the criteria suggested by Yin (2003) for case study were ensured in OD.

9.2. The Context

The organization under study was a constituent of one of the largest suppliers of engine components in India established in 1970s with headquarters in south Maharashtra. This unit is hereafter referred to as OD. It was established in 1993 and was working under technical collaboration with a company in Israel till 1998. Its main products are bi-metalic bearings, bushes, and thrust washers.

The products of OD were sold mainly to three segments of markets: Original Equipment Manufacturers (OEM) of automobile and engine; Replacement Market (RM) and export market which was confined to USA, UK, France, Turkey, and the South East Asia. OD‘s turnover for the year 2003-04 and 2004-05 was Rs. 20.2 and Rs. 27.4 crores respectively.

The top-management of the organization comprised (i)Vice Chairman and Managing Director (VC&MD); (ii)Joint Managing Director (JMD) and (iii)Executive Director (ED). Each department was looked after by a Department head who reported to ED. Total employee strength of OD was 193 including 137 workers and 56 staff members. The total strength of the QA department was nine.

The factory operated in two main and one general shift. Each unit under the group was QS9000 certified, one of which was the first in India to get certified for QS9000.

9.3 Quality Management Programs at OD

OD was certified for ISO9002 in 1996. It initiated its preparation for QS9000 in October-November 1999 and was accredited with it in December 2000. The QMP was

coordinated by Management Representative (MR). OD had also implemented concepts like continual improvement and housekeeping. Every year various departments planned improvement projects in their own areas and implemented the same throughout the year. Housekeeping principles, mainly cleanliness and orderliness, had been properly implemented in the shop-floor area.

9.4 Policy

9.4.1 Policy for Long and Short-term Planning

9.4.1.1 Vision and Mission

The group vision and mission were documented. The main elements of group vision were to (a) create an environment where employees experience the joy of learning, creativity, and growth; (b) create the organization through initiatives alongwith development of employees; (c) continuously pursue improvements in technology, management practices, and employee commitment to quality and productivity; and (d) encourage and support employment representing diverse background.

The group mission was explained in the following terms: “We dedicate to the service of the Indian nation through industry; will strive to create institutions of excellence which will serve as role models in terms of product quality, customer service, employee relations and integration with society; will strengthen the institution by the use of honest business practices to maximize efficiency and profits as only those that are strong will be of use to society.”

OD prepared business plans wherein long-term and short-term goals were mentioned. These business plans were prepared by the top management and signed by VC & MD. The long-range goals include achievement of 20% market-share by 2009 and increase in profitability by more than 15 %.

Linkages of requirements of vision and mission statements of OD with its annual goals mentioned in ‘business plan’ and in Quality manual were not observed.

9.4.1.2 Quality Policy

The quality policy of OD was prepared in 1994 with the following main elements: conformance to requirements by way of product performance, cost, delivery and service; commitment to meet or exceed these requirements to give their customers consistent satisfaction.

Based on its policy, the unit defined its objectives as follows: “Every activity of OD will be coordinated to achieve improvement in the areas of quality systems, employee involvement and work practices on a continuous basis. It will be always our endeavor to upgrade technologies and manufacturing capabilities to meet the challenges of time; we will periodically monitor our own performance and put efforts to achieve higher goals.” However, actual fulfilment or quantification of these objectives was not evident.

OD‘s quality policy and objectives were enunciated in 1994 and since then there was no modification of the same. OD also formulated its Laboratory policy which was displayed in its Quality laboratory. It did not enunciate other policies like purchasing policy; HR policy, marketing policy, etc.

9.4.1.3 Annual Goals

OD’s annual goals were determined by the top management and recorded in its business plan document. They included goals and plans for short-term (current and next two years) as well as long term (three years or more). The business plan was prepared at the beginning of every financial year based on the analysis of competitive products and benchmarking inside and outside the automotive industry. It covered the market situation, OD’s position therein long-and short-term goals, and the annual operational targets.

The parameters covered in this business plan included: sales turnover (including export turnover, and OEM turnover); market share; internal rejections; external rejections; improvement of Cpk above 1.69 for special characteristics; cost of poor quality; powder consumption; production level; manpower; FG inventory, and profitability. Other objectives defined by OD, but not quantified were in the areas of customer satisfaction, plant and facility upgradation, financial planning and cost objectives, human resource

development, health, safety, and environment. The detailed business plans were assigned to the respective departments; however, department- wise targets were not quantified. Moreover, these targets were not linked with managers/executives annual goals.

The implementation of QS9000 was planned in 1999. OD had also planned to implement TS16949 as well as ISO14001 during the year 2003 but could not do so. Kaizen was also planned to be initiated in OD but was not taken up as a separate QMP as the company was already engaged in Continuous Improvement project covering a majority of the departments. Moreover, the department heads and top management felt that both were similar in nature and should not be treated as separate QMPs.

9.4.1.4 Top Management Commitment

The commitment of the top management was ensured in several ways. The MD explained the market situation and the demand of customers to all staff members and department union leaders. The QMP was reviewed every two months during management review meetings. The required resources relating to expert support and appointment of coordinator were also provided.

9.4.2 Policy for QMP

9.4.2.1 Initiation

During 1995, the chairman of the group decided to implement quality system in line with international standards – ISO9000. As a result, OD initiated its efforts to implement ISO9002 and was accredited with the same by 1996.

In the year 1998, QS 9000 standard was published especially for automobile suppliers. The customers demanded for the implementation of the same in OD. Also the organisation being automobile supplier, it became mandatory for it to comply with the requirement of QS9000. The MD conveyed this to all employees through group meetings and the work was initiated with the appointment of a coordinator - Management Representative (MR) - who was also head of the production department. There was no pilot project planned for the same.

9.4.2.2 Appointment of Coordinator

After deciding to implement QS9000, the MD appointed the Production head as Management Representative (MR) and coordinator for QS9000. OD changed three MRs during the last four years. The main reason was that all of them were assigned the responsibility as an additional one, and could not devote full time for QS9000. OD had recruited one person specially for coordinating this QMP; however, the selected person left the organization within a few weeks. This happened twice. Subsequently in 2004, OD appointed one fulltime MR of superintendent level. In the event of his absence the head of sintering section acted as MR.

The other improvement activities like Continuous Improvement (CI) projects were coordinated by the plant head. These were started in 2000 to fulfill the requirements of QS9000. The coordination for ISO14001 was assigned to the head of Personnel and Administration department.

9.4.2.3 Appointment of Consultant

OD appointed a consultant for QS9000 implementation. The nature of his work involved: training, counselling, document preparation, and technical guidance. For activities like continuous improvement projects and housekeeping, no consultant was appointed.

9.4.2.4 Organization for QMP

There was no separate organization for QMP implementation. The requirements were studied by the consultants and converted in the form of a manual. Each department head was assigned specific requirement for the QMP. Biweekly review meetings were planned by the MR to monitor the progress. The CI projects were coordinated by the plant head for maintaining documentation requirements. Their responsibilities and authorities were recorded in the Quality manual.

9.4.3 Policy for Linking Various HR Practices with QMP

9.4.3.1 Reward and Recognition

The target-oriented incentive scheme was planned both for staff and workers. There was no formal policy for rewarding employees for their best contribution. However, the MD, after consulting the plant-head, rewarded the employee contributing the best in continuous improvement projects. In order to ensure the requirements of QMP, the top management pursued the punishment policy of deducting salary of the concerned employees, however, their minor mistakes were overlooked. For example, salary of inspectors was deducted when defective material was returned from the customers.

9.4.3.2 Performance Appraisal System

There was no structured performance appraisal system planned by OD. According to a senior officer, the total staff (other than operatives) strength being only 39, the top management knew every member personally and hence it was not necessary to have a formal appraisal system.

9.4.3.3 Creating Environment for Change

To demonstrate their commitment to create a proper environment for discipline and punctuality,the MD and ED themselves reported to the office at 8.00 sharp a.m. everyday. The required quality and QMP targets were defined in annual business plans. Subsequently, MD communicated the need for change to all department heads and union representatives. After every visit to a foreign country, the MD imparted training to all department heads and union representatives to appraise them about the global requirements. He also conveyed this message from time to time in various management review meetings.

While initiating QMP in 1999-2000, the MD had called meetings of all employees who were then briefed about the changing requirements of the customers. Subsequently, need-based training programs were planned to understand and implement technical requirement for QMP. In order to get more productivity with improved quality, OD entered into an agreement with union members in 1998-99 to connect salary directly with

production. This agreement was considered to be the first of its kind in the entire region. OD's policy of multi-skill and rotation of department heads helped in creating a proper environment for change.

According to the MD and the department heads interviewed, the main reason for improved productivity and quality was the target-based agreement made with the workmen union. The management planned to give monetary benefit to employees when the rejections were less compared to the previous months. It was also planned that whenever OD introduced any new product or program, the requirements of the same will be adhered to by the operatives.

There was no separate Human Resource department in OD but the Personnel and Administration (P&A) department looked after the HR needs of the organisation. Every QMP was seen as a technique for improvement.

9.5 Practice

9.5.1 Production, Verification and Assurance Systems

9.5.1.1 Production System

The basic raw materials - copper alloy powder and bimetal sintered strips - were manufactured in-house. The high frequency induction furnace melts the copper-based alloys to the required composition. High-pressure water spray is then applied to convert molten metal into copper alloy powder. The steel strip is thoroughly degreased and sanded in an automated degreasing plant. The copper alloy powder is then sprayed on the sanded surface evenly and passed through a furnace for sintering in an inert atmosphere. The strip is then rolled to an intermediate thickness and again sintered to the second furnace and finally rolled to the required size.

The bimetal strips are fed to the press, which blanks, forms, and coins the bearing. The coined semi-finished bearing is then processed for machining, lipping, oil hole, oil groove, and boring operation. Subsequently, it undergoes electroplating process. Both

sintering and plating are considered special processes. The production was batch type with self-inspection concept.

9.5.1.2 Verification System

Based on the requirements mentioned in control plans, and FMEAs, the operators measured various dimensional parameters during production. At every stage, work instruction and flow charts were displayed for guiding and assisting operators in performing various operations.

OD introduced the self-inspection concept during 1998-99. In this concept, each operator checked his products as per the control plans and recorded the same in the inspection report. The part which was fault-free passed to the next operation. Incoming material was inspected or otherwise verified in the test laboratory. At the end, all products were checked by Quality department for final inspection according to the control plan. Primary quality characteristics of bearings like 'crush height' and 'wall thickness' were measured. Accordingly the final audit/pre-dispatch report was prepared. The inspected products were then sent for 100% visual inspection. Reference samples for major defects were kept for ready reference. The products were segregated based on material and process defects.

9.5.1.3 Assurance System

The main assurance mechanism was self-inspection for product dimension check. Under this concept, dimension check once done by operators, was not subsequently done at any stage. During the process, the audit engineer verified twice in a day that all requirements of operators were fulfilled. The auditor also verified every setting done by the operators. The auditors had authority to stop the machine if any abnormalities were observed. OD's engineer at vendor's premises carried out vendor inspection. Dock audit and layout audits were carried out annually covering all types of products, and customers.

Various statistical tools were used by operatives and inspectors during the production and verification. Some of the tools used in OD included: Xbar R chart, Cp/Cpk analysis,

cause and effect diagram, run chart, pareto analysis, matrix chart, Design of Experiment (DOE) etc. The reliability tests were not conducted at OD as they were carried out at customers' end. OD followed the practice of conducting customer satisfaction internally.

9.5.1.4 Workplace Management

During the case study visit, it was found that the layout of the shop-floor was neatly maintained. The gangways were regularly cleaned and no material was kept there. The shop-floor was divided in various sections by yellow lines. However, the employees were found not maintaining strict discipline of walking on walkways. The entire shop-floor had only two visual boards on display, one of which was kept in the sintering section and the other board on a pillar near the gangway. The first one recorded cumulative production figures with powder stock, and the kind of strip to be made. The other one displayed information related to daily production of bearing, flange and bush as well as the cumulative production. Though enough space was kept to record rejection it was not recorded. In addition to these two boards, there were a few sign-boards, related to safety and customer satisfaction. Information relating to breakdown, rejections, customer returns as well as targets and achievement were not displayed on the production shop-floor.

The operators were in uniform and used personal protective equipment whenever necessary. There was no uniform for staff members.

9.5.2 Practice of Coordinating QMP

9.5.2.1 Planning for QMP

QS9000 was planned in detail with a deadline to complete it within nine months. However, there was no task-force to meet and ensure the requirements. The relevant requirements were allotted to concerned departments. During the planning stage a consultant's help was solicited. Review meetings were planned to monitor the progress. There was no separate center for its implementation. For the activity like CI projects, a separate coordinator was assigned.

9.5.2.2 Coordination for QMP

The coordination for QS9000 was done by MR who was also production-in- charge in OD. Assistance of external consultant was solicited as and when required. The work related to various departments was assigned to respective department heads. The main activity of the coordinator included: planning the total project, organizing training, reviewing progress, providing technical help on time to time basis, and liaison with various agencies. MD also reviewed the progress informally during his regular shop-floor visits.

During the last four years, there were three different MRs. The first two MRs were given additional responsibility alongwith their routine work as production head and engineering head. Subsequently, the top management realized the need for a full-time executive.

The coordination work for CI projects comprised of collecting titles of improvement projects from various departments, conducting review meetings, and monitoring and compiling results of various projects on annual basis.

9.5.2.3 Reviewing the Progress

The progress during implementation was reviewed by the MR twice a month. The necessary technical guidance was provided by MR and also by the consultant. The MD also reviewed the total project during bimonthly management review meetings. During such review necessary resource-requirements were discussed. The records of meetings were preserved as a part of the minutes of management review committee.

The OD also had monthly quality rejection review meetings in which quality related problems were discussed. The review of CI projects was done once a month by the coordinator and reported to the MD.

9.5.3. Practice of Documentation of QMP

9.5.3.1 Documenting the Requirements

The requirements related to QS9000 were documented in Quality manual in four parts namely Level 1, Level 2, Level 3, and Level 4. Those related to CI projects were also documented in the Quality manual.

OD' s business plans were recorded in business plan manual, which was updated every year. It was stated during an interview that the company benchmarks for deciding various targets, but the actual data of 'Best In Class' for quality related parameters were not evident either in manual or in business plan. The requirements related to housekeeping, too, were not documented in the form of a manual.

9.5.3.2 Documenting the Progress

The progress of QMP was recorded in the form of minutes of the review meetings. There was no system of documenting the progress and displaying it through visuals or sign boards. Various progress reports and charts were prepared and discussed in several meetings related to quality. The same were updated as and when required, e.g. at the time of reviews or reporting to the top management.

9.5.4 Practice of Data Analysis and Presentation.

9.5.4.1 IT Support

OD had Fox Pro based system, which was used for some of the important activities like purchase order preparation, inventory management, sales management, finance management, Excise, etc. All these modules were not compatible with each other and hence required duplicate entry of documents to some extent in various departments.

The selected reports were prepared by the user departments. However, the additional requirements or information were not easily available through software. OD had LAN connectivity. There was no Intranet facility; email ids were allotted to departments and not to individuals. There were about 20 computers in the entire unit.

9.5.4.2 Availability of Required data

The work related information – what to do' and 'how to do'- were made available to all concerned employees through control plans and work instructions. In addition flow diagrams were made available in manuals and displayed in the shop- floor.

The required data regarding daily work were predefined and made available through software. However, the requirement for CI projects as well as other progress was generated manually. Information related to statistical analysis was supplied by SPC software specially procured by OD.

The necessary analysis of achievement and non-achievement of targets was not made available to all employees. Moreover, the operation indicators like daily rejections, daily breakdown, daily productivity, and daily absenteeism were also not made available through display to all employees.

9.5.4.3 Analysis and Presentation

OD used statistical process control software for analysing data related to manufacturing. The required potential failure modes were analyzed by using Failure Mode and Effect Analysis (FMEA) tool. Moreover, optimum value of critical parameters was identified by using Design of Experiments (DOE) method. The data related to customer rejections were analysed by applying the problem-solving approach. Thus, various tools and techniques were applied for data analysis.

The required analysis was presented in the form of report or charts. However, the important operational parameters were not displayed.

9.5.5 Practice of Communication

9.5.5.1 Communicating Policy and Targets

The communication relating to policies was done directly by MD through meetings with department heads and the union representatives.

The quality policy was found displayed at various places in the organization beginning from the entrance gate to all departments and shop-floor. The vision and mission and the targets were not displayed anywhere in the organization.

Once a year, a common communication meeting was organized wherein all staff members were invited. In this gathering, details about performance of the previous year and plan for the new year were communicated by the top management.

The unit being small in size, there was no internal publication to communicate company related news and achievements.

The MD and ED apprised about the changing market situations during various meetings including bimonthly management reviews. This was evident in minutes of management review meetings.

Intranet facility was not available and email facility was restricted to departmental heads. In the shop-floor few inspirational slogans related to customer satisfaction were displayed. The soft-board provided to each cubicle in the Marketing and Finance offices was mainly used for maintaining day to-day information. The usage of soft-boards was not standardized.

9.5.5.2 Communicating Plans and Progress

Communication relating to various activities within OD was mainly done by circulating inter-office memos, minutes of meetings conducted for reviews, and reports prepared for various requirements.

Formal and informal meetings were conducted to communicate the progress under various activities and issues of the organisation. The progress of activities like new product development, housekeeping, and Continuous improvement projects were discussed through personal or group meetings and not communicated through visual

boards. OD being a small organization, communication was mostly through informal channels. But the top management was in constant touch with all employees.

9.5.5.3 In-house Publication

OD did not have any in-house publication.

9.5.6 Practice of Involving Customers and Suppliers

9.5.6.1 Involving Customer

Before introducing a new product, there was close interaction with customers. This helped in understanding market requirements, conducting feasibility study by engineering and production department, and conducting techno-commercial negotiations with customers. During the last customer-satisfaction survey, the need for reducing lead-time for new product was identified and several initiatives were taken for the same. As a result of this, lead-time was reduced to 12 weeks in the current year as compared to 16 weeks in previous years. However, monitoring of the lead-time was not discussed in management reviews.

9.5.6.2 Involving Suppliers

There were about 25 active suppliers, who were involved in quality improvement initiatives. They were trained and encouraged by OD to implement ISO9001 system requirements in their plants. Due to this initiative a majority of the suppliers, excluding packing suppliers had implemented ISO9000 systems in their respective organizations. OD did not follow the practice of suppliers meet, as their supplier-base was relatively small. The suppliers were called during bimonthly management review meetings. In cases where the suppliers did not attend the meeting, a penalty of Rs. 5000 was charged by the organization under the instruction of the top management. There was no reward system for suppliers.

9.5.7. Practice of Encouraging Employee Involvement

9.5.7.1 Cross Functional Team (CFT)

Multi-disciplinary teams were encouraged to undertake continuous improvement projects in OD. While introducing new products a multi-disciplinary team conducted contract review as well as feasibility study. At the time of implementing QS9000, no such teams were formed and the work was distributed among respective departments.

9.5.7.2 Education and Training

Training requirements were earlier coordinated by the head of Personnel department but later on, were transferred to MR. This was mainly due to non- fulfillment of targets by the concerned employee as well as underutilization of MR. The company followed the practice of providing job rotation to all department heads. This helped in creating multi-skill capability in the department heads. Every executive was provided time to learn various processes during the initial period of his joining. As a result of this, dependence on operatives was reduced as executives could run the machines in their absence.

According to the MD, training was planned to include each new entrant so as to develop multi-skill. The top management had accepted job rotation as a policy by which department heads were internally transferred once in year.

As regards, QS9000, though awareness training was not provided to every employee, the need-based training module was prepared to cover all those directly related to its implementation. The top-management also frequently imparted various technical and non-technical training to various groups. For instance, JMD imparted training for improvement of marketing systems.

9.5.7.3 Interaction with Top Management

OD being a small organization, its MD, JMD, and ED were directly in touch with all employees through their regular shop visits as well as meetings.

9.5.7.4 Practice of Rewarding Best Contributors

Practicing target-based incentive scheme generated the main source of motivation for workmen and staff. Operators were given incentives, based on the value of their total production in respective months. Staff members were given incentives according to the value of their product sold in the market. Due to this scheme, both operators and staff were always eager to increase production and sales respectively.

Sometimes the employees who contributed in bringing a drastic improvement in production/quality were referred to the top management for recognition and were appropriately rewarded. However, there was no formal system to motivate employees who contributed in improvement work.

While referring the old minutes of meetings, it was found that the ED had ordered to deduct salary of the visual inspector who had not detected visual defects during inspection. It was also recorded in one of the minutes that ED had decided to deduct Rs. 500 from the salary of those in charge who did not attend the meeting. Similarly the suppliers were fined Rs. 5000 for such absence.

9.5.7.5 Celebration

A get-togather was organized once a year for staff members in a hotel where the performance of the previous year was presented and plans for the current year were discussed. However, no such gathering was held for the operatives.

9.6 Outcome

9.6.1 QMP

As stated earlier, QS9000 in this organisation was planned to be implemented within nine months from its initiation; however it took almost twelve months to comply with the minimum requirements. The main reason for this delay was the excess time taken by some of the departments in complying with the requirements. Secondly, the coordinator

was not a fulltime coordinator. He was holding additional responsibility along with his normal job as production head.

While initiating QMP, improvement in the following areas was expected; (i) reduction in rejections (ii) defect-free product to customer, and (iii) customer satisfaction. According to Ex-MR, OD had achieved a more systematic way of working due to this QMP. Monthly rejections were monitored and corrective actions implemented for all major problems; continuous efforts were made by all employees to reduce rejection. As a result, QMP brought about a systematic approach for reducing rejections and also ensured that actions taken were deployed effectively in relevant areas.

According to the finance head, this QMP had indirectly helped the company to get more business. Due to its implementation OD could attract those customers whose main requirement was QS9000 implementation. As a result, it received more orders from domestic as well as international market. OD recorded the successful implementation of this QMP in its annual report continuously from 2000-01 to 2004-05.

The Department heads who were interviewed, mentioned that this QMP could give more systematic approach on preventing normal problems or solving them. Due to such systematic efforts, OD was able to improve its position every year.

OD planned other QMPs like TS16949 and ISO14001 in 2003. The project plan was prepared and training was initiated for concerned employees; however, the plan could not be implemented due to low priority given to it by the management. The department heads interviewed also mentioned that their new efforts for TS16949 would take care of ISO14000 requirements. However, it appeared that the concept was not correctly grasped. As regards other activities, housekeeping was initiated on the shop-floor only and not in offices area. Kaizen was discussed in management review meetings but the department heads and management felt that the projects undertaken for continuous improvement were the same as Kaizen and hence special attention was not paid to initiate this QMP.

Kaizen is a small improvement done by operatives and staff members in their respective areas to improve their own efficiency and effectiveness.

9.6.2 Internal Measures

9.6.2.1 Customer Rejections

The management had made an agreement with workers of deducting from their incentives, the cost incurred by a customer due to rejection. This, according to the top management proved very beneficial and as a result customer-complaints were resolved rapidly. The following table shows the trend of customer complaints received annually.

Table 9.1 Trend of Customer Complaints in OD (in numbers)

1999-00	2000-01	2001-02	2002-03	2003-04	2004-05
27	22	17	11	11	13

9.6.2.2 Customer Satisfaction

A customer satisfaction survey was conducted for Original Equipment(OD) manufacturers. Inputs were taken by marketing department based on parameters like: acceptance of material, delivery as per schedule, delivery in urgency, OD's documentation, response to communication, business share, response to complaints, product development time, packing/ labeling /transport, and business prospects. The survey conducted in 2004 revealed the need to reduce new product development time. According to the marketing in-charge, there was no annual consolidation of results of such surveys. He complained that sometimes customers did not provide feedback for such surveys and gave less importance to this activity.

9.6.2.3 Order Fulfillment

The order fulfillment is measured through percentage of On Time Delivery. This was measured in every management review meeting. Almost every time, this achievement was more than 95 % for OD customers. There was no annual consolidation of this data.

9.6.2.4 Internal Rejections

The rework was linked with incentives of the operatives, which resulted in its continuous reduction. According to the department heads, operators have become more alert about rejection and its corrective action.

The trend of periodic percentage of rejection; material rejection and process rejection is shown in the following table.

Table 9.2 Trend of % of Total Rejection with Material and Process Rejection in OD

	2000-01	2001-02	2002-03	2003-04	2004-05
Rejection %	1.5	1.32	1.22	1.08	0.98
Material rejection %	0.63	0.73	0.367	0.51	0.47
Process rejection %	0.87	0.59	0.55	0.57	0.51

9.6.2.5 New Product Development

The new product was given utmost importance in OD. There were several reviews conducted for monitoring the progress on such development. OD had also made special efforts to reduce the total development time as it was identified during customer satisfaction survey. However, there was no consolidation of monitoring the lead-time for new product development.

9.6.2.6 Cost of Poor Quality

OD monitored the cost of poor quality and brought down the total cost as % of sales value. The results recorded are as follows.

Table 9.3 Trend of Cost of Poor Quality as % of Sales Value in OD

	2001-02	2002-03	2003-04	2004-05
COPQ %	1.73	1.32	1.41	1.29
Appraisal cost %	0.45	0.45	0.31	0.26
Prevention cost %	0.53	0.53	0.42	0.35

9.6.2.7 Continuous Improvement (CI) Projects

OD has initiated a system of every department undertaking atleast one CI project in a year. This increased the employee-involvement as each project was handled by more than two persons. The following table shows the trend monitored by the company on the number of projects undertaken and benefits received.

Table 9.4 Trend of Continuous Improvement Projects with Savings in OD

	2000-01	2001-02	2002-03	2003-04	2004-05
No of CI projects	21	11	16	32	39
Savings in Rs. Lacs	35.47	24.24	21.13	22.48	42.28

9.6.3. Others

9.6.3.1 Awareness

OD created basic awareness of quality requirements among all employees. Some of the requirements like housekeeping were taken as requirements related to shop- floor only and not for office area. Awareness about Kaizen was not clear and it was misunderstood as the same activity as Continuous Improvement projects. Some of the department heads mentioned that they had started monitoring Overall Equipment Effectiveness (OEE) of the machines by implementing Total Productive Maintenance(TPM). The practice of TPM was understood as restricted to cleaning of machines and maintaining housekeeping requirement alongwith improving OEE. A mention about implementation/inculcation of Company - Wide Quality Control (CWQC) and Self-Managed Team (SMT) was found in OD ‘s publicity brochure; however, many department heads were unaware about this concept and its meaning.

9.6.3.2 Alignment of Various QMPs

QMPs were seen as an independent improvement activity. Efforts to integrate such QMPs to achieve overall vision of the company were not evident.

9.6.3.3 Alignment with HR Practices

There was no Human Resource department in OD and the relevant requirements were fulfilled by the Personnel and Administration department. While implementing QMPs, many HR practices were not linked with the same.

9.6.3.4 Employee Satisfaction Survey

No independent survey had been conducted to estimate the extent of employees' satisfaction.

CHAPTER 10. ANALYSIS AND FINDINGS

The literature reviewed for this study revealed the gap that existed in the study of QMP from the perspective of policy, practices implemented, and measures derived. Therefore, an attempt has been made here to analyse these components on the basis of data collected from four organisations. All the four organisations were from Auto Ancillary segment. Out of these four, one organisation – OA was public sector organisation manufacturing Ball and Roller Bearings; other three (OB, OC and OD) were private sector organisations manufacturing Engine Bearings. The data collected are grouped under policy, practice, and outcome elements.

This chapter presents analysis of data collected from four organisations.

10.1 General

Data related to QMP implementation were collected from four organisations. All the four organisations were from Auto Ancillary segment. Out of these four, one organisation – OA was public sector organisation manufacturing Ball and Roller Bearings; other three were Private sector manufacturing Engine Bearings.

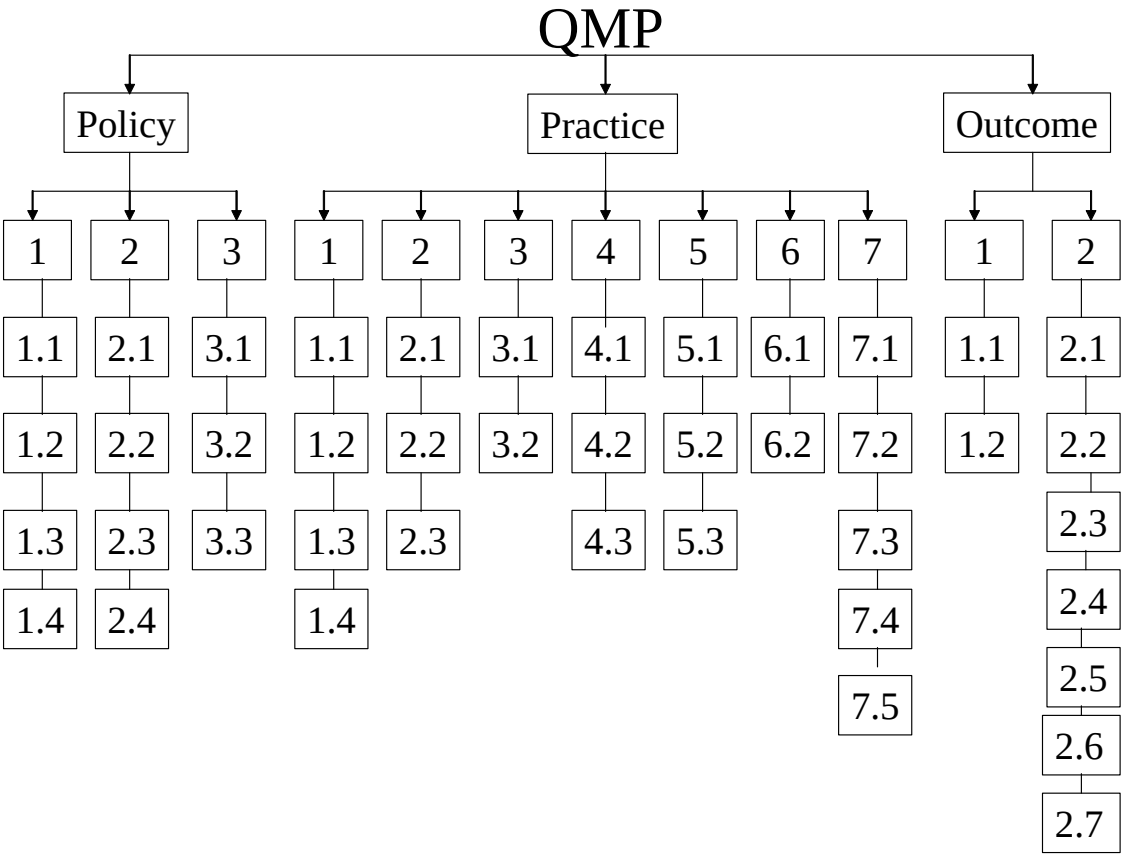
This research work is aimed at studying QMP implementation and identifying various elements related to Policy, Practice and Outcome. Based on the framework evolved from literature review (chapter 2.3.3), data were collected from these four organisations. As compared to ten elements identified in literature review, actually twelve elements were observed. Newly identified elements are: Practice of documentation of QMP and Qualitative outcome.

Based on data collected from these four organisations in QMP implementation, ‘Policy’ exhibited three main elements and eleven sub-elements; ‘Practice’ exhibited seven main and twenty two sub-elements; and ‘Outcome’ exhibited two main and nine sub-elements.

Thus QMP implementation as a whole exhibited twelve main elements and forty two sub-elements.

The framework thus evolved is explained in the following figure.

Figure 10.1: Structure of QMP



Names of these elements and sub-elements are given in Table 10.1 .

Table 10.1: Elements and Sub-elements of QMP

ELEMENT	NO	DESCRIPTION
Policy	**1**	**Policy for Long and Short-term Planning**
	1.1	Vision and Mission
	1.2	Quality Policy
	1.3	Annual Targets
	1.4	Top Management Commitment
	2	**Policy for QMP**
	2.1	Initiation
	2.2	Appointment of Coordinator
	2.3	Appointment of Consultant
	2.4	Organisation for QMP
	3	**Policy for Linking HR Practices with QMP**
	3.1	Reward and Recognition
	3.2	Performance Appraisal System
	3.3	Creating Environment for Change
Practice	**1**	**Production, Verification and Assurance Systems**
	1.1	Production System
	1.2	Verification System
	1.3	Assurance System
	1.4	Workplace Management
	2	**Practice of Coordinating QMP**
	2.1	Planning for QMP
	2.2	Coordinating for QMP
	2.3	Reviewing the Progress
	3	**Practice of Documentation of QMP**
	3.1	Documenting the Requirement
	3.2	Documenting the Progress
	4	**Practice of Data Analysis and Presentation**
	4.1	IT Support
	4.2	Availability of Required Data
	4.3	Analysis and Presentation

	5	**Practice of Communication**
	5.1	Communicating Policy and Targets
	5.2	Communicating Plans and Progress
	5.3	In-house Publication
	6	**Practice of Involving Customers and Suppliers**
	6.1	Involving Customers
	6.2	Involving Suppliers
	7	**Practice of Encouraging Employee Involvement**
	7.1	Cross Functional Team (CFT)
	7.2	Education and Training
	7.3	Interaction with Top Management
	7.4	Practice of Rewarding Best Contributors
	7.5	Practice of Celebrating Special Events
Outcome	**1**	**Qualitative outcome**
	1.1	On Time Completion of QMP
	1.2	Meeting Objectives
	2	**Quantitative outcome**
	2.1	Customer Complaint
	2.2	Rejection and Rework
	2.3	Breakdown of machines
	2.4	On Time Delivery
	2.5	New Product Development Time
	2.6	Customer Satisfaction Survey
	2.7	Savings

These elements were identified during the study of various QMPs implemented in the four organisations. The QMPs implemented in all these organisations i.e. OA, OB, OC and OD can be summarized as shown in the following table.

Table 10.2: Summary of QMPs Implemented in Organisations

ORGANISATIONS	QUALITY MANAGEMENT PROGRAM (QMP)
O A	Kaizen
	PIP (Productivity Improvement Program)
	QS9000
	Suggestion Scheme
O B	5 S
	Business Excellence Model
	Kaizen
	Total Productive Maintenance (TPM)
	TS 16949
O C	QCDGP (Quality Cost Delivery Growth and Productive improvement program)
	QS9000
	Six Sigma
	Total Productive Maintenance (TPM)
O D	CI (Continuous Improvement program)
	QS9000

During the data collection from the four organisations, as many as fifteen QMPs were studied. In subsequent sections, all these elements are described and analysed.

10. 2 Elements of QMP – Policy

Policy is the statement of aim, purpose, principles or intentions, which serve as continuing guidelines for management in accomplishing objectives (Johannsen & Page, 1975).

10.2.1 Policy for Long and Short-term Planning

Policy is the purpose, principles or intentions on the overall improvement plans of the concerned organisation for long-term (3 to 5 years) as well as short-term basis. (1 to 3 years)

10.2.1.1 Vision and Mission

Vision is an overarching statement of the way an organisation wants to be; an ideal state of being at a future point. Mission is an organisation's purpose. (ASQ Glossary of terms)

All the four organisations had their group vision and mission statements. The same were deployed to plant vision and mission in OA and OB. Additionally in OB, the vision was developed by the top management by spending considerable time together. Subsequently long and short range plans as well as department goals arising from vision statement were deployed. Benchmarking was also done at OB while developing targets based on its vision statement. In the other three organisations, such deployment was not observed. These organisations developed vision statements for their group companies, and not specifically for the individual organisation. Moreover, these statements were not deployed to department level in OA, OC and OD.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.3: Summary of Attributes Exhibited under Policy for Long and Short-term Planning - Vision and Mission

ATTRIBUTES/CHARACTERISTICS	OA	OB	OC	OD
Availability of the corporate vision and mission	Yes	Yes	Yes	Yes
Deployment of the vision for the organisation based on the corporate vision	Yes	Yes	No	No
Deployment of long and short-range plans based on vision	No	Yes	No	No
Linkage of vision and mission with departmental objectives	No	Yes	No	No
Benchmarking of the elements mentioned in the vision	No	Yes	No	No

Thus, exhibition of clear vision statement directly complies with the available literature. E.g. 'Factors favouring QMP' contributed by Ramirez & Lonely (cited in Thiagarajan and Zairi, 1997), Raju and Balasubramanian (2002), Beer et. al. (1990), Ahire (1996) and 'Factors inhibiting QMP' contributed by Macdonald (1994).

While analyzing data, it was also observed that all four organisations used different words such as 'World Class Excellence' etc. for expressing their vision or 'wishes' for the future. They were documented in their vision, mission and philosophy statements. They are 'Abstract' which have different interpretation from one organisation to the other and it is difficult to measure them directly. The 'abstract' definitions are then deployed in time-bound measurable parameters in order to make them more operational. Deployment of 'abstract' definition in 'customer' or 'supplier'-base quality helps in creating a common level of understanding among all employees. e.g. OB had deployed its vision in twelve measurable points such as specifying measures for Sales, Return of Capital Employees (ROCE) etc. keeping other parameters like World Class Bearings, or Best-in-class processes, etc. as 'abstract'.

10.2.1.2 Quality Policy

Quality policy is a general statement of the organisation related to its belief about quality (ASQ Glossary of terms). Documenting Quality policy is a necessary requirement for receiving quality system certifications. viz. ISO9001, QS9000, TS16949, etc.

All the four organisations had documented their Quality policy, which is a mandatory requirement for ISO9001, QS9000 or TS16949 Quality system accreditation. In their Quality policy, the top management had expressed their commitment to quality by focusing on customer needs and achieving customer satisfaction. Quality policy also developed companywide common definition of Quality. Organisations OA, OB and OD had their corporate quality policy for their respective group and had displayed them at several places within their organisations. The quality policy of OC and OD were not updated for past ten years whereas that of OA updated it in the year 1999 and OB in 2003. Specific managerial objectives were developed based on quality policy in all the

four organizations. While doing so, OB had also used benchmark data whereas the other three had not done so. Considering benchmarking data in setting annual goals also helped in creating higher demand for performance. Thus it appears that, development of vision based on active participation of top management in OB led to the development of the new quality policy in line with vision statements. OB attempted to keep it simple and measurable deploying it upto department level. Such a linkage was not evident in other three organisations.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.4: Summary of Attributes Exhibited under Policy for Long and Short term Planning – Quality Policy

ATTRIBUTES	OA	OB	OC	OD
Availability of corporate quality policy	Yes	Yes	Yes	No
Availability of organisation/plant quality policy	Yes	No	No	Yes
Year since its last updating	1999	2003	1992	1994
Development of measurable objectives based on quality policy	Yes	Yes	Yes	Yes

This exhibition of Quality Policy directly complies with the available literature. E.g. 'Factors Favouring QMP' by Raju and Balasubramanian (2002), Shin & Kalinowski (1998) and 'Factors Inhibiting QMP' by Salegna & Fazal (2000) and Mahoney & Thor (1994). As expressed by Crosby, the top management of all organizations had communicated their commitment to quality through Quality policy.

The group quality policy of these organisations mainly addressed to 'abstract' quality definitions as observed in OA, OB and OD. It was only in OB that the Quality concept started with 'abstract' concept – "excellence in all areas" - was deployed to the four objectives for which benchmark data were available.

10.2.1.3 Annual Targets

Annual Targets constitute the specific goals decided by the management for a particular year or a period of time.

Annual business goals were developed in all four organizations, however, quality goals were part of business goals in OB, OC and OD and not in OA. These quality goals were developed based on the inputs from market, benchmark data and organisations' past performance. All QMPs were part of annual goals in OB. Only one QMP (QCDGP) was treated so in OC. The annual goals were deployed up to the level of the department heads and managers in OA, OB and OC. Deployment was also linked with salary of the individual in OB, OC and OD. This internal measurement system -annual targets- in OB and OC and OD were derived from various inputs from outside (e.g. benchmark, customer satisfaction) as well as from inside the organisation (e.g. past performance) and were deployed directly to departmental level.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.5: Summary of Attributes Exhibited under Policy for Long and Short-term Planning – Annual Targets

ATTRIBUTES	OA	OB	OC	OD
Inclusion of Quality targets as part of business goals	No	Yes	Yes	Yes
Inclusion of all QMP targets in annual business goal	No	Yes	No	No
Deployment of annual goals to department and manager level	Yes	Yes	Yes	No
Using Benchmarking data while setting annual goals	No	Yes	Yes	Yes

The exhibition of Annual Targets directly complies with available literature. E.g. 'Factors Favouring' by Ramirez & Lonely (cited in Thiagarajan and Zairi, 1997), Shin & Kalonowski (1998), Fine (cited in Dale and Plunkett, 1990), and Cohen (1994).

Annual goals were based on vision statement, long-range plans, quality objectives and other needs generated by the stakeholders. Here the organisations deployed ‘abstract’ definition expressed in vision and mission at operational level (‘supplier’ and ‘customer’ quality) so that it can be easily understood and monitored by all employees.

10.2.1.4 Top Management Commitment

The top management commitment is defined as the way in which the senior management demonstrate their commitment in the process of QMP implementation.

In all the four organisations vision and policies were signed by the management and displayed at several places. In OA, the need for QMP was communicated through the quality manual and in OB through the top management during occasions and events specially organized for QMP. OB organized special reviews on QMPs by the top management, which addressed the workforce and communicated need for QMP besides planning special events related to it. Such policy was not planned in other three organisations. Additionally, in OB the top management executives arranged meetings (about 2 weeks) to develop vision and mission for the entire group, and planned various QMPs as means to achieve the same. Besides, it linked managers and departmental goals with vision and mission. Thus though the top management in all four organizations were committed for QMP, demonstration of their commitment was higher in OB than in other three organizations.

The attributes exhibited by these four organisations under this element can be summarized in following table. ‘Yes’ indicates its presence and ‘No indicates its absence.

Table 10.6: Summary of Attributes Exhibited under Policy for Long and Short-term Planning – Top Management Commitment

ATTRIBUTES	OA	OB	OC	OD
Vision and quality policy signed by the chief	Yes	Yes	Yes	Yes
Investment of time by the top management in developing vision and mission	Low	High	Low	Low
Planning of need for QMP communication by the chief to all	Yes	Yes	Yes	Yes
Planning of regular reviews of QMP by the chief	No	Yes	No	No
Planning of special events related to QMP	No	Yes	No	No
Participation of top management in special events on QMP	No	Yes	No	No

The exhibition of Top management commitment directly complies with the available literature. E.g. 'Factors Favouring QMP' identified by Ahire (1996), Jha (1997), Telly (cited in Raju and Balasubramanian, 2002), Ramirez and Lonely (cited in Thiagarajan and Zairi, 1997) and others. It also complies with the available literature on; Factors Inhibiting QMP' identified by Mahoney & Thor (1994), Macdonald (1994).

All these organisations, thus demonstrated the commitment of their top management to QMP in various ways. With respect to quality definition, such a commitment helped in converting 'abstract' definition of quality expressed in OB's vision into 'supplier' and 'customer' base definition through deploying them up to department manager level. The same level of deployment of 'abstract' definition was not observed in OA, OC and OD where some of the 'abstract' terms expressed in vision remained unaddressed.

10.2.1.5 Summary

The top management of all four organizations had developed policy for long and short term planning by developing vision, quality policy and annual targets. The strategy for quality management developed by the management of OB was different than that of other three organizations which was demonstrated several ways in OB e.g. investment of time in developing vision, deployment of annual goals from vision and policy, considering

QMP targets as part of business goals, converting `abstract´ definition into operational level. Quality improvement through QMP became mandate and long term goal for employees in OB.

While analysing various elements of 'Policy for long and short-term planning' nineteen attributes were identified and exhibited by the four organisations. Out of these, seventeen were direct 'attributes' which were reported as 'Yes' or 'No'. These are summarized in the following table.

Table 10.7: Summary of Nineteen Attributes Exhibited under 'Policy for Long and Short Term Planning' in Four Organisations

	VISION AND MISSION	QUALITY POLICY	ANNUAL GOALS	TOP MANAGEMENT COMMITMENT	TOTAL
No of attributes	5	4	4	6	19
OA	2	3	1	2	8
OB	5	2	4	5	16
OC	1	2	3	2	8
OD	1	2	2	2	7
Highest	OB	OA	OB	OB	OB

OB has demonstrated presence of maximum attributes related to 'Policy for long and short-term planning' as compared to other three organisations. Further, while comparing sub-elements wise it can be further stated that this distinction was mainly demonstrated in two sub-elements namely 'Vision and Mission' and 'Top Management commitment'.

The top management of OB had expressed their commitment to QMP which resulted in their active participation in developing vision, mission and quality policy. These were communicated to all employees in several ways including special workshops by trained facilitators. Quality policy and other policies (namely HR policy, purchase policy,

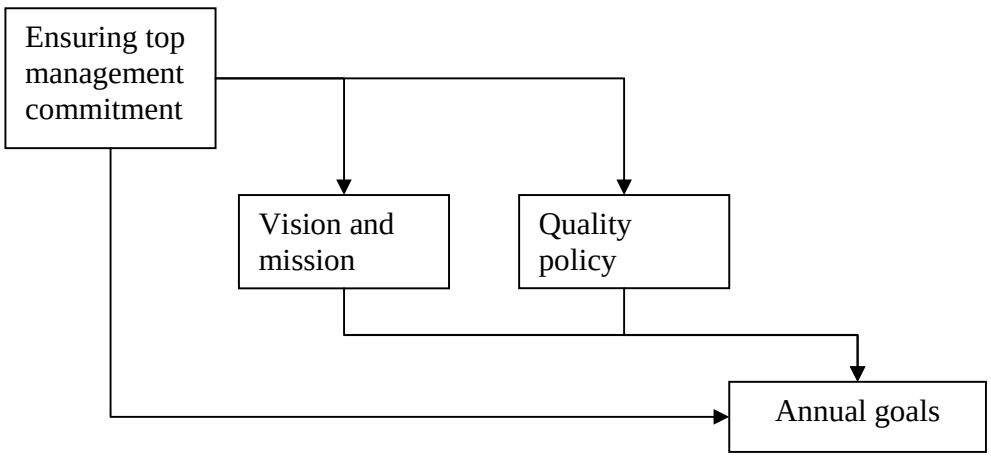
marketing policy, etc.) were developed based on the vision and mission requirements and communicated to all employees. Both policy and vision and mission requirements were deployed up to the department manager level. Further, QMPs were identified in OB as a means to achieve their vision statements due to which they became part of business goals and were given importance similar to other business goals.

The vision, mission and quality policy of an organisation generally expressed its quality requirements in 'abstract' type. The level of top management commitment on QMP at OB helped in converting 'abstract' definition of quality into 'supplier' and 'customer' base definition through deploying them up to department manager. Thus, all elements of vision and mission were linked up to that level.

From the table given above it can be concluded that OB demonstrated its 'policy for long and short term planning' in a manner significantly different from that of OA, OC and OD.

Based on this discussion, relationship (NOT causal) among various elements as observed in these organisations can be arrived at as presented in Figure 10.2

Figure 10.2: Relationships Among Various Elements of 'Policy for Long and Short-term Planning'



10.2.2 Policy for QMP

It is a statement of broad aims, principles or long-range objectives which provide basic and detailed planning (Johannsen & Robinson, 1968) related to QMP.

10.2.2.1 Initiation

It is related to the planning and decision making of an organisation to initiate and implement various QMPs. The following table gives a list of such QMPs.

The table mentioned below gives names of various QMPs implemented in four organisations along with other details like year of their initiation, reason for initiation and designation of QMP coordinator.

Table 10.8: Summary of QMPs in OA, OB, OC and OD.

ORG.	QUALITY MANAGEMENT PROGRAM (QMP)	INITIATED BY	COORDINATOR	YEAR OF INITIATION
OA	Kaizen	Management	In charge IE	1988
	Suggestion Scheme	Management	In charge IE	1990
	PIP (Productivity Improvement Program)	Management	In charge IE	1995
	QS9000	Customer	In charge Quality	1999
OB	Business Excellence Model	Management	Chief of Quality	Reintroduced in 1999
	Kaizen	Management	Chief of Quality & Kaizen office	1999
	5 S	Management	Chief of Production	2003
	TS 16949	Management	Chief of Quality	2004
	Total Productive Maintenance (TPM)	Management	Chief of Plant	2004
OC	QS9000	Customer	Technology Service Manager /QA head	1998-99

	QCDGP(Quality Cost Delivery Growth and Productivity improvement program)	Management	Maintenance head	2000
	Six Sigma	Management	Maintenance head	2002
	Total Productive Maintenance (TPM)	Management	Technology Service group head	2003-04
OD	QS9000	Customer	Production Manager, Superintendent	1999
	CI (Continuous Improvement program)	Management	Plant head	2000

It was observed that QS9000 was initiated due to customer demand in all three organisations except OB where all QMPs were planned by the management in order to achieve vision statement. The top management of OB demonstrated their importance by inaugurating all QMPs in presence of employees and guests. Further, the management of OB also demonstrated QMP implementation by the managers through pilot project before extending it for all employees. It can be stated that QMPs in other three organisations were treated as isolated programs to meet specific requirements of customers or management and special inaugural sessions were not planned for them.

All QMPs implemented in OB were initiated as an integrated approach to achieve its vision statement whereas one out of four in OA and OC and one out of two in OD were initiated due to requirements demanded by customers. This indicates that the management of OB had proactively initiated various QMPs to achieve their vision statements.

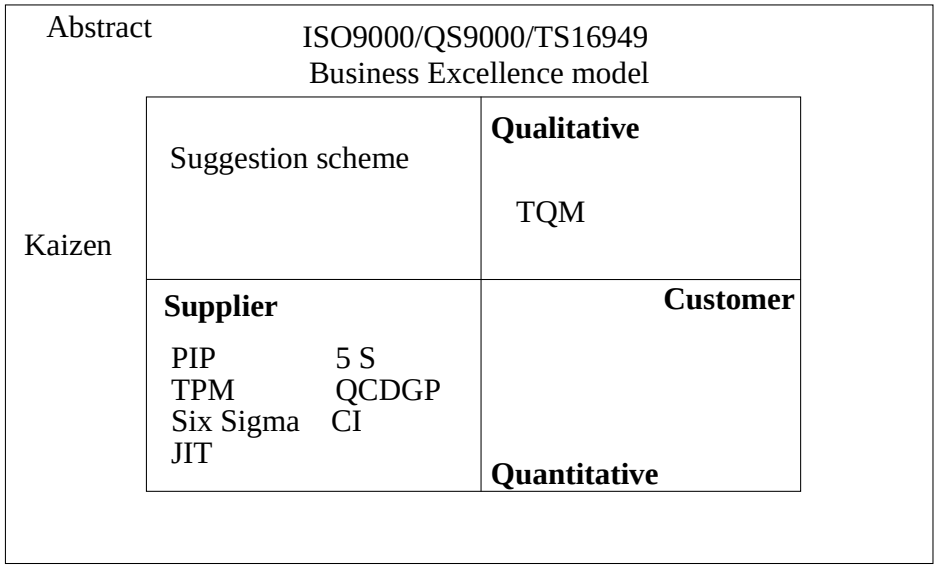
Table 10.9: Summary of Attributes Exhibited under Policy for QMP – Initiation

ATTRIBUTES	OA	OB	OC	OD
QMP initiated to meet vision statement of organisation	No	Yes	No	No
Approach of QMP; isolated or integrated	Isolated	Integrated	Isolated	Isolated
Years of initiation of QMP	> 6 years	~ 6 years	~ 6 years	~5 years
QMP initiation mainly due to management or customer demand	Management	Management	Management	Customer
Initiation of pilot project before companywide implementation	No	Yes	Yes	No

While referring the available literature on 'Factors Favouring' and 'Factors Inhibiting' QMP, there was no direct reference was found on this element.

The various QMPs mentioned above address different types of quality definitions as stated in Chapter 2. They are 'abstract', 'supplier' and 'customer' types. Further, both 'supplier' and 'customer' types can be divided into qualitative and quantitative terms. As summarised in the figure below.

Figure 10.3: Categorization of QMP according to Quality Definition.



10.2.2.2 Appointment of Coordinator

Coordination is a process of ensuring that different parts of an organisation and the people within work smoothly together (Johannsen & Page, 1975) in QMP. As a normal practice, every organisation appoints a resource-person/s to coordinate one or more QMPs in the organisation. He may be a full-time employee or a regular employee given additional responsibility as a resource person.

As mentioned in Table 10.8, main responsibility for coordinating QMPs was assigned to Industrial Engineering (IE) department in OA; Quality department in OB; Tech. Service and Maintenance departments in OC and Production department in OD. Thus role of Quality department in QMP was higher in OB then in other three organizations.

Both OA and OB assigned the responsibility of coordinating work to the departmental heads who directly reported to the chief of the company. In OB, the role of coordinator was assigned to senior persons directly responsible for manufacturing. This was due to the importance given by the management to this aspect. In OC, the coordinators for QS9000 and TPM did not directly report to the chief of the unit whereas in OD, the newly appointed coordinator for QS9000, though at a junior level, reported directly to the chief. OD was the only organisation which appointed a full-time coordinator for QS9000.

The main job of a coordinator includes: planning of project, coordinating with various departments for timely adherence, providing needful liaison with external agencies, documenting their requirements, timely review of the progress with all concerned and providing feedback to the top management on regular basis. It is important for the coordinator to understand the type of quality definitions of respective QMPs and convert the requirement at operational level so that it is easily understood by all employees. For example, 'abstract' quality definition addressed in ISO or Business Excellence model or Kaizen needs to be deployed to operation level so that every functionary can understand its meaning. Neglecting this activity at coordinator level may create confusion about the requirement of QMP resulting in failure.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.10: Summary of Attributes Exhibited under Policy for QMP – Appointment of Coordinator

ATTRIBUTES	OA	OB	OC	OD
Selection of coordinator for each QMP	Yes	Yes	No	Yes
Selection criteria is mainly based on both seniority and direct relation to the QMP implementation	No	Yes	No	No
Coordinator for QMP reports directly to top management	Yes	Yes	No	Yes
Coordinator responsible for QMP is assigned additional responsibility along with his other job	Yes	Yes	Yes	No

Though literature referred e.g. Cohen (1994) mentioned about creating appropriate infrastructure, there is no direct reference available related to appointment of coordinator in literature related to 'Factors Favouring' and 'Factors Inhibiting' QMP.

10.2.2.3 Appointment of Consultant

Organisations usually take help from independent experts – consultants - for seeking their guidance in policy formulations, deploying different practices and defining various measures in QMP.

The nature of consultancy provided pertains to preparation of manuals, training employees and providing need-based technical guidance on the subject. All the four organisations appointed consultants for one or more of their QMPs. In OA and OC, the consultants played a vital role in identifying QMP requirements. However there was a difference in both. In OA, the consultant was external, whereas in OC the consultant was a manager from a company belonging to the group. OB hired services of consultants to each QMP requirements (QMPs are addressed as integrated approach to achieve its vision) mainly for initiating the program. The policy of OB was to get their help to initiate QMPs and then develop internal experts within the organisation who can coordinate subsequently.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.11: Summary of Attributes Exhibited under Policy for QMP – Appointment of Consultant

ATTRIBUTES	OA	OB	OC	OD
Appointment of consultant for QMP	Yes	Yes	Yes	Yes
Consultancy were sought need based in line with company's overall direction	No	Yes	No	No
Organisation had independent department/function who acted as internal consultant as part of the group	No	Yes	Yes	No
Need for QMP mainly identified by organisation	No	Yes	No	Yes
Consultant involved in overall guidance and training	Yes	Yes	Yes	Yes

Though Schaffer & Thompson has mentioned program consultant driven as ´Factor Inhibiting QMP´, it was observed that all four organizations have used service of consultants.

10.2.2.4 Organisation for QMP

A formal structure is constituted by the management within the organisation to support QMPs. It may be in form of teams, committees, steering committees or it may function as a separate office.

Formal organisation was created by OB and OC (mainly for TPM and QCDGP) to generate momentum of QMPs. Additionally in OB, steering committee was formed e.g. Kaizen steering committee. Out of the four organisations, high level of clarity was provided by defining procedures and rules as well as roles and responsibility of involved members related to each QMP was observed in OB. In OD, there was no separate organisation due to its size and nature of requirement.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.12: Summary of Attributes Exhibited under Policy for QMP – Organisation for QMP

ATTRIBUTES	OA	OB	OC	OD
Creation of formal organisation for QMP	No	Yes	Yes	No
Defining roles and responsibility for QMP	No	Yes	No	No
Defining various rules and policies related to QMP	No	Yes	No	No
Cross Functional Team approach in QMP	Yes	Yes	Yes	No

The exhibition of Organisation for QMP complies with the available literature. E.g. 'Factors Favouring QMP' by Juran (cited in Broka, 1992), Ramirez & Lonely (cited in Thiagarajan & Zairi, 1997) and in 'Factors inhibiting QMP' by Mahoney & Thor (cited in Tatikonda & Tatikonda, 1996).

10.2.2.5 Summary

Policy for QMP was not directly covered in the referred literature, but it was given importance by all organizations studied. In all organizations QMPs were initiated mainly as part of management requirements except in OD where it was due to customer requirements. Required infrastructure including coordinators, consultants and organization were created in all these organization. It was observed that in OB, Policy for QMP was developed based on Policy for long and short term planning. For example, QMP was initiated as management initiatives to meet overall vision of the company; higher responsibility was given to Quality department in coordinating QMP; consultants were selected for specific help in QMP; and QMP organization was planned and scheduled as integrated effort to meet overall vision requirements. This was in line with Ramirez and Lonely (cited in Thiagarajan 1997), Cohen (1994) and Guru´s like Crosby.

While analysing various elements of 'Policy for QMP', eighteen attributes/characteristics were identified and exhibited by the four organisations. Out of these, fifteen were direct 'attributes' which were reported in 'Yes' or 'No'. The summary can be tabulated below:

Table 10.13: Summary of Eighteen Attributes Exhibited under 'Policy for QMP' in Four Organisations

	TOTAL ATTRIBUTES	OA	OB	OC	OD	HIGHEST
Initiation	5	0	2	1	0	OB
Appointment of coordinator	4	3	4	1	2	OB
Appointment of consultant	5	2	5	3	2	OB
Organisation for QMP	4	1	4	1	0	OB
Total	18	6	15	6	4	OB

OB demonstrated maximum attributes related to "Policy for QMP' as compared to the other three organisations. Further, while comparing sub-elements, it can be further stated

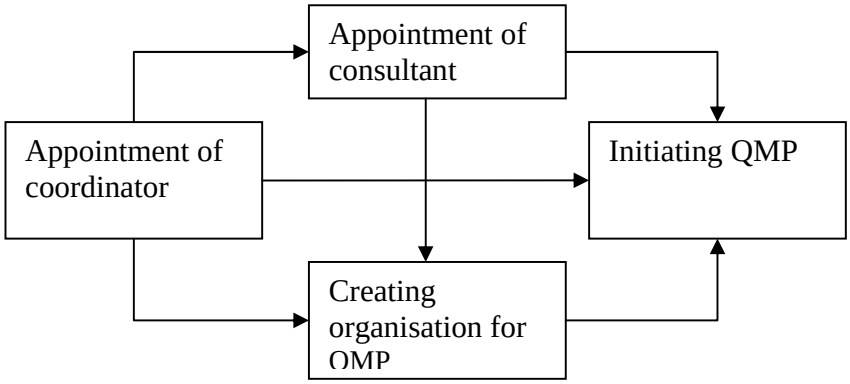
that this distinction was mainly demonstrated in sub-elements like 'Organisation for QMP, and 'Appointment for Consultant'.

In OB, QMPs were initiated as an integrated approach to meet overall direction to achieve 'World Class Status'. Based on annual targets decided from long and short term planning, a QMP coordinator was appointed who then selected a consultant based on QMP requirements. Simultaneously QMP organisation was created which includes organisation structure, roles, responsibility, procedures and rules. Subsequently QMP was initiated as pilot project.

Attributes of OA and OC demonstrated similarity. OD demonstrated minimum presence under this sub-element i.e. 'Policy for QMP'. This was mainly due to small size of OD where formal organisation for QMP is not required. This leads to future question, to find out relationship between organisation size and formal QMP structure.

Based on the above discussion, relationship (NOT causal) among various elements as observed in these organisations can be arrived at as presented in Figure 10.4

Figure 10.4: Relationships Among Various Elements of 'Policy for QMP'



10.2.3 Policy for Linking HR practices with QMP

The role of the Human Resource (HR) function is to attract and select qualified job applicants, to develop performance management and compensation system that align employee behavior with organisational goals, and to assist in the development and

retention of a diverse workforce to meet current and future organisational requirement (Encyclopedia of Management, 1998).

10.2.3.1 Reward and Recognition

Reward is a return or recompense for a service or merit whereas recognition is to show the appreciation of (The Oxford Dictionary for the Business World, 1993) a person or service. In order to encourage employees who perform better than others in activities related to QMP, rewards in cash or kind are given by their employers.

While analyzing data collected on this element, it was observed that OB had planned various kinds of rewards and recognition systems; this was mainly due to the higher importance given by the management to QMPs as their commitment expressed in vision could be fulfilled when all QMPs delivered their desired results.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.14: Summary of Attributes Exhibited under Policy for Linking HR Practices with QMP – Reward and Recognition

ATTRIBUTES	OA	OB	OC	OD
System of rewarding exist for QMP	No	Yes	No	No
Recognition of best contributors in presence of all employees	No	Yes	Yes	No

Reference to 'Reward and Recognition' identified in this study complies with the available literature related to 'Factors Favouring QMP' e.g. Juran (cited in Broka, 1992). Additionally contribution was observed in the available literature related to 'Factors Inhibiting QMP' by Mahoney &Thor (cited in Tatikonda & Tatikonda 1996).

10.2.3.2 Performance Appraisal System

It is the process of identifying, observing, measuring, and developing human performance in organisations (Encyclopedia of Management, 1998).

The policy for Formal Performance Appraisal System was available. Annual goals decided by the management were considered while deciding performance targets of the employees. The targets of QMP coordinators were mentioned in their annual appraisal system in OA, OB and OC. Moreover, in OC, in respect of QS9000, a target for QMP was also mentioned in case of those involved in implementation. Including QMP targets in company´s annual appraisal system inspires managers to increase his commitment to achieve the defined targets. However, in smaller organisations where such system does not exist, the success of QMP depends on the importance given to it by the top management.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.15: Summary of Attributes Exhibited under Policy for Linking HR Practices with QMP – Performance Appraisal System

ATTRIBUTES	OA	OB	OC	OD
Formal appraisal system planned	Yes	Yes	Yes	No
QMP requirements linked with annual appraisal of concerned coordinator	Yes	Yes	Yes	No
System of performance based pay	No	Yes	Yes	Yes

The reference of 'Performance Appraisal System' identified in this study complies with available literature related to 'Factors Favouring QMP' by Shin & Kalinowski (1998). Though Deming has identified 'Annual Appraisal System' as one of seven deadly diseases this system was implemented in three organisations namely OA, OB and OC.

10.2.3.3 Creating Environment for Change

It is the organisation´s plan to create system and environment conducive to inspire their employees for better performance with least resistance.

QMP in OA, OC and OD was mainly perceived as a technical tool for improvement whereas in OB it was perceived as a change management program to achieve overall objective of the company. This was mainly done by active participation of top management in developing vision of the OB, linking Policy and Targets with that of vision, deploying annual targets upto department managers. Various activities were planned before initiating QMPs to prepare employees for new requirements. Additionally, these targets including QMP were part of performance appraisal systems. Additionally, OB had developed recognition system to encourage employee involvement in QMPs. High involvement of various departments was evident in QMP including that of HR which played vital role in molding the employees for future requirements. Thus well defined transition plan to achieve vision of the company and developing various supporting systems to achieve the same had created good environment for change in OB. The role of HR in OA, OC and that of P&A in OD was restricted to imparting need-based training. This was mainly because they considered QMP as an independent requirement to achieve specific objectives.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.16: Summary of Attributes Exhibited under Policy for Linking HR Practices with QMP – Creating Environment for Change'

ATTRIBUTES	OA	OB	OC	OD
Union members informed before QMP initiation	Yes	Yes	Yes	Yes
Need for QMP communicated to all by the chief	No	Yes	Yes	Yes
Training planned for all concerned	No	Yes	No	Yes
Customers are invited on special occasion	No	Yes	No	No
Involvement of HR in planning for QMP	No	Yes	No	No
QMP seen as change management rather than technical requirement	No	Yes	No	No
Inaugural sessions and celebrations related to QMP planned	No	Yes	No	No

The reference of 'Creating environment for change' identified in this study complies with the available literature related to 'Factors Favouring QMP' by Remirez & Lonely (cited

in Thiagarajan & Zairi, 1997), Broka & Broka (1992), Fine (cited in Dale & Plunkett, 1990), Beer et. Al (1990) and in 'Factors Inhibiting QMP' by Macdonald (1994), Cohen (1994), Salegna & Fazal (2000) .

10.2.3.4 Summary

While analysing various elements of 'Policy for linking HR practice with QMP'; twelve attributes/characteristics were identified and exhibited by the four organisations. This can be summarized in the following table.

Table 10.17: Summary of Twelve Attributes Exhibited under 'Policy Linking HR Practice with QMP' in Four Organisations

	TOTAL ATTRIBUTES	OA	OB	OC	OD	HIGHEST
Reward and Recognition	2	0	2	1	0	OB
Performance Appraisal System	3	2	3	3	1	OB, OC
Creating environment for change	7	1	7	2	3	OB
Total	12	3	12	6	4	OB

OB has demonstrated maximum attributes related to 'Policy for linking HR practice with QMP' as compared to the other three organisations. Further while comparing sub-elements wise it can be further stated that this distinction was mainly demonstrated in sub-elements like 'Creating environment for change'.

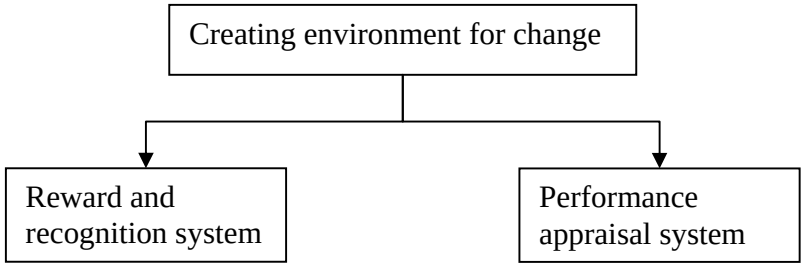
The presence of minimum attributes in OA (e.g. 3) may be due to its being a Public sector organisation. In OD it may be due to its small size as well as 'Punishment' policy exhibited by its top management. OC exhibited the same attributes as OB in Performance appraisal systems; however OC planned each QMP as individual program only.

Organisations plan various kinds of rewards and recognition to encourage employee involvement in QMP. Either a punishment for non fulfilment of QMP requirements or an

encouragement for contributing in the best manner is planned by the organisations. Role and objectives related to QMPs are also part of the formal appraisal system in some organisations. When the QMPs are planned in an integrated manner (e.g. OB) to achieve vision of the company, they are treated as a part of 'change management' requirement within the organisation. HR department plays a vital role in such programs. In other organisations (e.g. OA, OC, OD), the role of HR department was restricted to coordination for training only. It was observed that policy for linking various HR practices with QMP was mainly based on the way top management views various QMPs.

Further, while comparing elements of all three organisations, the relationship emerged among various attributes and elements can be illustrated in the figure below.

Figure 10.5: Relationships Among Various Elements of 'Policy for Linking Various HR Practices with QMP'



10.2.4 Summary of Policy

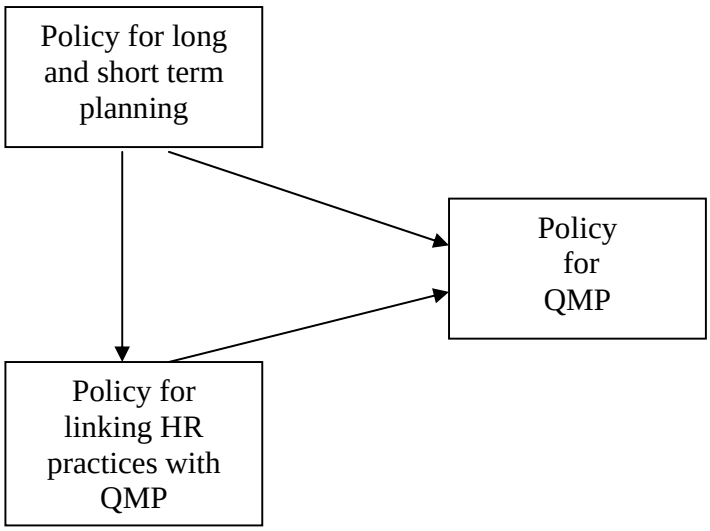
While analysing various elements of 'Policy' as many as forty nine attributes/characteristics were identified and exhibited by the four organisations. The summary can be tabulated as shown:

Table 10.18: Summary of Forty Nine Attributes Exhibited under 'Policy linking HR Practice with QMP' in Four Organisations

	TOTAL ATTRIBUTES	OA	OB	OC	OD	HIGHEST
Policy for Long and Short term planning	19	8	16	8	7	OB
Policy for QMP	18	6	15	7	4	OB
Policy for linking HR practice with QMP	12	3	12	6	4	OB
Total	49	17	43	21	15	OB

OB demonstrated maximum attributes related to 'Policy' as compared to the other three organisations. Further, while comparing the elements, it may be further stated that this distinction was demonstrated in all three elements namely 'Policy for long and short term planning', 'Policy for QMP' and 'Policy for linking HR practice with QMP'. Thus it can be concluded that OB had planned its QMP as distinctly different from that of other three organisations.

Figure 10.6 : Macro Relationship Among Three Elements of Policy



10.3 Elements of QMP – Practice

Practice is a habitual action or performance (The Oxford Dictionary for the Business World, 1993). In its present context, it is a repeated activity undertaken to perform QMP requirements within an organisation.

10.3.1 Practice of Production, Verification and Assurance System

10.3.1.1 Production System

It is the total series of stages by which a material is changed from one form into another by the utilisation of labor, tools and machinery according to a plan (Johannsen & Robinson, 1968).

Both OB and OC had deployed single piece flow through cellular concept. Due to the cell concept deployed by these two organisations, planning and manpower allocation for production was managed by those independent cells and hence separate production planning and control function was not present. Requirement of production based on annual target was divided into monthly plan and was monitored on daily basis by respective cells. On the other hand, in OA and OD, the batch production concept was implemented and planning related to production of various sections was done separately under production planning department. Production operators in OB, OC, and OD looked after process monitoring on various process control charts whereas in OA the same was done by QC inspectors. The decision for implementing single piece flow was taken up in OB by the top management in order to achieve the “world class manufacturing” status, whereas in OC the same concept was implemented as an independent decision to improve effectiveness. Bottleneck operations were clearly identified and were closely monitored in OB whereas the same was not observed in OC.

The attributes exhibited by these four organisations under this element can be summarized in following table. ‘Yes’ indicates its presence and ‘No indicates its absence.

Table 10.19: Summary of Attributes Exhibited under Practice of Production, Verification and Assurance System - Production System

ATTRIBUTES	OA	OB	OC	OD
Type of production system	Batch	Single piece flow	Single piece flow	Batch
Concept of cell in practice	No	Yes	Yes	No
Responsibility for routine production planning with production employees	No	Yes	Yes	No
Nature of involvement of production for collecting data for analysis	Not evident	Yes	Yes	Yes
Identification and control of bottleneck operations	Not evident	Yes	Yes	Yes

No direct reference on required type of production system observed in referred QMP literature. Though its reference has been available in literature related to JIT implementation, surprising it is not referred by contributors in factor favouring or inhibiting to QMP implementation.

10.3.1.2 Verification System

This system consists of physical verification of the product at several stages of its manufacturing process. It ensures that the product satisfies the standards specified for it.

The responsibility of product verification lay mainly on QC inspectors in case of OA and OC, and on production operatives in case of OB and OD. This was mainly due to the practice of 'self-inspection' concept in which deviation, if any, was detected immediately and corrective actions were taken before the product passed to the subsequent operation. Due to this, reductions in rejections were higher in OB and OD than in the other two organisations. In OD, the management had made agreement with the workers to pay incentive where one of the criteria was reduction in rejection; whereas in OB it was the need felt to control rejections at source to achieve the overall vision requirement.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.20: Summary of Attributes Exhibited under Practice of Production, Verification and Assurance System - Verification System

ATTRIBUTES	OA	OB	OC	OD
Verification is main responsibility of Production department	No	Yes	No	Yes
Self inspection mainly done by production	No	Yes	No	Yes
Monitoring critical parameters done by production operator	No	Yes	No	No
Availability of relevant reference standards on production line	No	Yes	No	No
Plotting of various statistical charts by production operator	No	Yes	No	No
Responsibility for detecting problem/abnormality lies with production	No	Yes	No	No
Responsibility for resolving problem/abnormality lies with production	Yes	Yes	Yes	Yes

The reference of 'Practice of verification' identified in this study complies with available literature related to 'Factors Favouring QMP' by Telly (cited in Raju and Balasubramanian, 2002), Deming (cited in Broka, 1992). Additionally the practice of reliance on QC/QA department to take care of problem was in line with 'Factors inhibiting QMP' by Deming (cited in Broka, 1992). Other than OB, all organisation relied on QC/QA department to detect abnormality in the system. OA demonstrated heavy reliance on Inspection by QC department which was in line with 'Factor inhibiting QMP' identified by Deming (cited in Broka, 1992).

10.3.1.3 Assurance System

The assurance system consists of planned and systematic activities that can be demonstrated to assure confidence that the product or service will fulfill necessary requirements for quality. (ASQ Glossary of Terms)

The nature of work performed by quality functions was similar in all the four organisations. The role of Quality Assurance department in OA and OB was more of counselling, facilitating, auditing and guiding as internal consultant. In OA, OB and OD, the heads of quality department were reporting to the chief of the company/SBU, whereas in OC the quality head reported to the department head that was peer to production head. The system adherence of quality practices was lower in OC than in other three

organisations. Customer satisfaction study was conducted by an independent agency in OB and by marketing department in OD whereas the same was not practiced in OA and OC. Both OB and OD were in advance stage of Quality management as several assurance techniques were in place. This was mainly due to the higher management commitment to produce high quality products as per their agreement with workers in OD and vision requirements in OB.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.21: Summary of Attributes Exhibited under Practice of Production, Verification and Assurance System – Assurance System

ATTRIBUTES	OA	OB	OC	OD
Audit conducted mainly by QA	Yes	Yes	Yes	Yes
Practice of ensuring mistake proofing on major customer problems	Absent	Yes	Yes	Yes
Application of advance quality tools	Yes	Yes	Yes	Yes
Measuring customer satisfaction	No	Yes	No	Yes
Customer problem communication	No	Yes	No	No
Periodic quality review conducted by the top management	Yes	Yes	Yes	Yes
Counselling and facilitation by QA	No	Yes	No	No

The reference of 'Practice of assurance' identified in this study complies with the available literature related to 'Factors Favouring QMP' by Ramirez and Lonely (cited in Thiagarajan and Zairi, 1997) and Motiska (1990), Cole & Scott (2000), Wali et. al. (2000).

10.3.1.4 Workplace Management

A proper management of workplace is a prime requisite for efficient operations with minimum wastages.

OB and OC gave more importance to workplace management as compared to OD and OA. This was mainly due to the cellular design of the shop-floor. Proper displays about targets were found only in OB; however in OC they were not regularly updated. In OA and OD they were totally absent. More employees were assigned responsibility to regularly update visual boards in OB. Both OB and OC employed latest maintenance techniques like productive maintenance wherein machines were regularly kept clean by both maintenance and production operatives. The downtime of machines was less in OB than in OA (Data on OC and OD not available). Due to the concept of cell manufacturing; a comparatively low level of work- in-progress inventory was seen in OB and OC shopfloor. The practice of cleanliness in OB and OC was observed both in office and shopfloor areas. High importance was given to discipline and safety issues by OB, OC and OD. Higher workplace management observed in OB and OC was mainly due to the nature of production system i.e. single piece flow with cell design. In order to meet these requirements, inventories between stations were observed to be lower, machine and shop cleanliness were maintained to keep high uptime of machine; latest maintenance techniques were in practice to reduce downtime. Additionally in OB higher importance was observed in visual display which was mainly due to higher importance given by the management on communication.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.22: Summary of Attributes Exhibited under Practice of Production, Verification and Assurance System – Workplace Management

ATTRIBUTES	OA	OB	OC	OD
Items and equipments related to shop and office are kept at their identified places	No	Yes	Yes	Yes
Yellow line discipline practiced in shopfloor	No	Yes	Yes	No
Material of various stages with their status identified	No	Yes	Yes	Yes
Latest maintenance technique –productive maintenance introduced	No	Yes	Yes	No
All machines of the shop are kept cleaned	No	Yes	Yes	Yes

Safety requirements demonstrated on shop floor	No	Yes	Yes	Yes
Targets and progress are displayed	No	Yes	Yes	No
Visual boards are displayed to communicate progress regularly	No	Yes	Yes	No

Workplace management relates to shopfloor and its production system. Though there are many references available in literature of workplace management, 5S etc , direct reference of the same was not found in the available literature on 'Factors Favouring QMP and 'Factors Inhibiting QMP'.

10.3.1.5 Summary

Both OA and OC changed their production, verification, assurance and workplace management system. They have developed processes oriented approach in their shop flor. The literature reviewed focused on mainly two sub elements – verification and assurance system, however it was observed from field data that organizations have given equal focus on type of production system and work place management.

While analysing various elements of 'Practice of Production, verification and Assurance system' twenty seven attributes/characteristics were identified and exhibited by the four organisations. Summary can be presented in Table 10.23:

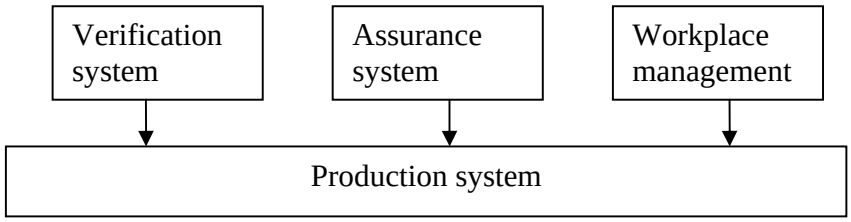
Table 10.23: Summary of Twenty-Seven Attributes Exhibited under 'Practice of Production, Verification and Assurance System' in Four Organisations

	TOTAL ATTRIBUTES	OA	OB	OC	OD	HIGHEST
Production	5	0	4	4	2	OB, OC
Verification	7	1	7	1	2	OB
Assurance	7	3	7	4	5	OB
Workplace management	8	0	8	8	4	OB, OC
Total	27	4	26	17	13	OB

OB has demonstrated maximum attributes related to 'Practice of Production, verification and assurance system' as compared to the other three organisations. Further, while comparing sub-elements, it can be stated that both OB and OC had similar attributes in Production System due to 'Single piece flow' production system. Additionally, both OB and OC demonstrated similar attributes related to workplace management. The main distinction demonstrated by OB was in demonstration of verification and assurance system. It appears that OC had modified its production system in line with 'Single piece flow' however other supporting systems like Verification and Assurance systems were not modified simultaneously as demonstrated in OB. OA demonstrated least attributes due to continuation of its old 'batch production' system and high reliance on inspection by separate department (QC).

Further, based on the implementation steps, the following relationship has emerged.

Figure 10.7: Relationships Among Various Elements of 'Practice of Production, Verification and Assurance System'



10.3.2 Practice of Coordinating QMP

The manner in which QMP is coordinated within the organisation assumes high importance for its success.

10.3.2.1 Planning for QMP

Planning is delineating goals and ways of achieving them (Johannsen & Robertson, 1968). The coordinator usually does the operational planning for QMP.

There was a distinct difference in the planning of OB as compared to that of OA, OC and OD. This was due to the integrated planning approach adopted by OB to achieve its overall objective of World class manufacturing status. Each QMP was planned with cross

functional team based on the guidance received from consultants and the chief. While planning each QMP in a detailed project management way, experience of pilot project was also considered. This planning helped to set direction for total implementation of QMP.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.24: Summary of Attributes Exhibited under Practice of Coordinating QMP – Planning for QMP

ATTRIBUTES	OA	OB	OC	OD
Responsibility for planning of QMP assigned	Yes	Yes	Yes	Yes
Active involvement of top management in planning	No	Yes	No	No
Involvement of consultant in planning	Yes	Yes	Yes	Yes
Change of plan due to initial problems	Yes	Yes	Yes	Yes
Sequence and interdependence of various QMPs planned	No	Yes	No	No

The reference of 'Planning for QMP' identified in this study complies with the available literature related to 'Factors Favouring QMP' by Ramirez and Lonely (cited in Thiagarajan and Zairi, 1997),Beer et. al. (1990).

10.3.2.2 Coordinating for QMP

The nature of coordination work was similar in OA, OC and OD, but not in OB. Frequent change of coordinators in OC and OD created time lag in implementation. Interaction of coordinator with the chief of organisation was not regular and frequent in OA and OC. In OB, interaction with the chief as well as with HR and all team members was frequent and regular. Coordination was assured by inviting customers and suppliers for participating in special events related to QMP. Various activities were planned and coordinated with HR department for increasing employee-involvement as all QMPs were considered as means to achieve its vision statement. Thus, coordination work included various supporting activities.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.25: Summary of Attributes Exhibited under Practice of Coordinating QMP – Coordinating for QMP

ATTRIBUTES	OA	OB	OC	OD
Responsibility for coordination assigned	Yes	Yes	Yes	Yes
Responsibility for data collection and compilation mainly assigned to respective coordinators of QMP	Yes	No	Yes	Yes
Regular interaction with top management	No	Yes	No	No
Regular interaction with employees	Yes	Yes	Yes	Yes
Involvement of HR department other than training	No	Yes	No	No
Organising various events related to QMP	No	Yes	No	No

No direct reference of 'Practice of coordinating for QMP' identified in this study observed with available literature related to 'Factors Favouring QMP'.

10.3.2.3 Reviewing the Progress

The top management of OA and OC devoted less time in reviewing QS9000 as compared to OB and OD. It was done regularly in OD as a part of bimonthly management review meeting. In OB, reviews were conducted at various levels i.e. plant, coordinator and top management levels. Periodic reviews of QMPs by the top management demonstrated its higher importance and helped in better coordination work related to QMP in the organisation.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.26: Summary of Attributes Exhibited under Practice of Coordinating QMP – Reviewing the Progress

ATTRIBUTES	OA	OB	OC	OD
Regular review of QMP by top management	No	Yes	No	Yes
QMP review as part of business review meetings	No	Yes	No	No
Regular review of QMP by coordinator	No	Yes	Yes	Yes
Addressing constraints and resource requirements in reviews	No	Yes	Yes	Yes
Team and individual assessment as part of review process	No	Yes	No	No

The reference of 'Reviewing the progress' identified in this study complies with available literature related to 'Factors Favouring QMP' by Jha (1997) and Juran (cited in Broka, 1992).

10.3.2.4 Summary

While analysing various elements of 'Practice of coordinating for QMP' sixteen attributes/characteristics were identified and exhibited by the four organisations and were reported in 'Yes' or 'No'. Its summary can be tabulated below:

Table 10.27: Summary of Sixteen Attributes Exhibited under 'Practice of Coordinating for QMP' in Four Organisations

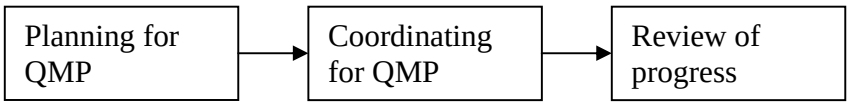
	TOTAL ATTRIBUTES	OA	OB	OC	OD	HIGHEST
Planning for QMP	5	3	5	3	3	OB
Coordinating for QMP	6	3	5	3	3	OB
Reviewing of progress	5	0	5	2	3	OB
Total	16	6	15	8	9	OB

OB has demonstrated maximum attributes related to 'Practice of coordination for QMP' as compared to the other three organisations. Further, while comparing sub-elements wise it can be stated that both OC and OD demonstrated similar attributes in practice.

There was difference in 'practice of coordinating QMP' at OB as compared to the other three organisations. In OA, the initial planning and review was mainly conducted by the coordinator with limited involvement of top management. In OC, the chief of the plant was not participating in reviews of QMPs except the QCDGP for which he was made responsible by the corporate headquarters. In OD, the coordinators did not spare enough time in planning and coordination work. Reviews by the top were done bimonthly. In OB, the QMPs were planned as a means to achieve its vision statement and as a result higher involvement of top management was observed in its initial planning and approval process. Coordination related to production, documentation, data analysis and progress reporting, communication etc was done. For all QMPs CFT approach was practiced. Coordination was done at various levels for all kinds of supporting work for QMPs. Various events related to QMPs were planned with the involvement of HR department. Coordination was also done for inviting customers and suppliers for participating in special events related to QMPs. Frequent reviews were conducted at various levels and immediate corrective actions were taken whenever necessary.

Further, based on the analysis of the implementation steps, the following relationship has emerged.

Figure 10.8: Relationships Among Various Elements of 'Practice of Coordinating QMP'



10.3.3 Practice of Documentation of QMP

This is a new element identified in this research of QMP implementation. It is related to documentation of basic requirements – policy and practices – and documenting progress related to QMP implementation. Initially, the top management develops policy related to QMP which includes main three elements as explained in the chapter 10.1. These include,

vision, policy, annual goals, plans for QMP, organisation structure and roles and responsibility. Additionally, there are certain practices or procedures deployed by the organisation in line with policy of the company to meet desired results. Thus, this element is related to the extent to which documentation related to requirements and its progress is done by the organisation

Reference for documentation is already available in literature of Knowledge Management. It is interesting to note some research on the effort spent on the documentation as reported by Bellaver and Lusa, (2002): American business generates about 90 billion document per year, and each of these document is copied an average 11 times; A Nielsen report notes that it costs 20$ to file and retrieve a document, but, if it is misfiled, it cost 120$ to properly retrieve it; According to Gartner group, knowledge workers spend 20% of their time performing document management in non automated environment. Such research shows that documentation is an important activity and it helps in creating explicit knowledge within organisation (Kluge et. al., 2001). Though it is an important element already described in Knowledge Management literature, it does not seem to have attracted attention of writers and researchers on QMP implementation.

10.3.3.1 Documenting the Requirements

Documenting the QMP requirements is mainly related to documentation of ´what is to be done´ and ´how it is to be done´. This new sub-element describes how four organisations have documented their requirements related to QMPs.

There were 15 QMPs implemented by four organisations. Out of them, QS9000 and ISO/TS 16949 were common among all. Both these standards were developed to meet specific requirements of automotive industry and were based on ISO9001 standards. Various requirements mentioned in these standards are audited by independent agencies and certificate of compliance is given thereafter to the organisation. One of the mandatory requirements of this standard is documentation of all quality system requirements. Therefore, all the four organisations prepared documents and manuals for

implementation of their QS9000 or ISO/TS16949. These requirements include policy and practices related to Quality Systems.

Unlike QS9000 or ISO/TS 16949, there is no certification awarded by third party for other QMPs. It is discretionary to document various requirements mentioned in these QMPs.

It was observed that OB had documented requirements related to policy, practices and output related to all QMPs implemented. OD had also documented their requirements related to QMP. Documentation of required policy and procedures for other QMPs was not done in OC, whereas, in OA, part of the requirements related to one QMP – PIP (Productivity Improvement Program), was documented.

It was a general practice to document all QMP requirements in the form of manuals. For example, OB had documented requirements of other QMPs in the manuals for their Business Excellence Programme as well as on specific sign-boards. OD had documented requirements of CI (Continuous Improvement) program in their QS9000 Quality manual. OA had not documented all other QMPs except for PIP whose requirements related to practice were visually displayed through sign boards in the shop floor. When asked during the interview, it was found that these requirements were not current. Additionally, there was no evidence of documenting requirements of other QMP observed either on the shop floor or during the interviews. During the data collection, the responsible person mentioned that there was no documentation for requirements of Kaizen and Suggestion schemes. It was also observed that explanation given by respondents on these QMPs were also different, which indicated that understanding on requirements of QMPs were not uniform. In OC, documents related to TPM were prepared but not updated and for their Six Sigma programme, no formal documentation was done. Additionally, QCDGP (Quality, Cost, Delivery, Growth and Productivity improvement) program was monitored by the top management as it was a cost saving project run by the corporate. However its requirements were not made available to the author.

It appeared that the management of OB had realised the importance of documentation requirement of ISO/TS16949 and ensured the same benefit from other QMPs also. It was policy of OB management to document all requirements of QMPs. Management in OB also expected their employees to document their targets, steps and progress against each step. The same documentation was used by the management in reviewing the progress. During the data collection, such document was extensively referred. As a result, it created uniform basis for all levels to develop understanding of QMP. Such emphasis seems to have resulted into high discipline of documentation in OB to achieve their business goals. QMP was considered as part of these goals.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates their presence and 'No indicates their absence.

Table 10.28: Summary of Attributes Exhibited under Practice of Documentation of QMP – Documenting Requirements

ATTRIBUTES	OA	OB	OC	OD
Policy and procedures related to all QMPs documented	No	Yes	No	Yes
Total requirements related to each QMP is made available in documents	No	Yes	No	No

No direct reference of practice of documenting requirements of QMP identified in this study was found in the available literature related to 'Factors Favouring QMP'.

10.3.3.2 Documenting the Progress

Documenting the QMP progress is related to the systematic documentation of every planned step and its achievements. This new sub-element describes how four organisations have attempted for documenting their progress related to QMPs.

It was a policy of top management in OB to document all progress on QMP. As a result OB followed practice of consolidating their progress on QMP wherein intense

documentation related to progress was observed. Progress was also measured on all elements based on vision and mission statements and recorded in Business Excellence manual. Responsibility for updating was assigned to all concerned persons working in related areas. This helped in creating a sense of awareness among the employees as well as in better coordination. In OD, consolidation was recorded mainly in the form of `minutes of meeting´ by the responsible coordinator. Contrary to this, there was no consolidation of progress in other two organisations. As a result, individuals associated with implementation of QMP, including the coordinator, were not able to provide documents pertaining to the progress of the assigned QMPs.

Documentation of progress also helped OB and OD in monitoring their own performance against their defined targets for QMPs. For example, in OB, periodical progress in the form of Gantt chart with milestone achievement was documented and displayed at various locations in the plant at assigned boards so that employees of various functions can see them. Such display also provided documentary proof of completing specific steps and goals. Responsibility for updating such record in standardised format was also defined clearly. The usage of computer was extensive in storing, standardising and updating the required data.

On the contrary, in OA and OC such documentation was not observed as it was not emphasised by the top management. As a result, communication regarding completion of intermediate steps and targets was difficult.

The attributes exhibited by these four organisations under this element can be summarized in following table. ‘Yes’ indicates their presence and ‘No indicates their absence.

Table 10.29: Summary of Attributes Exhibited under Practice of Documentation of QMP – Documenting the Progress

ATTRIBUTES	OA	OB	OC	OD
Consolidation of progress with milestones recorded	No	Yes	No	Yes
Necessary modifications reflected in documents	No	Yes	No	No
Progress displayed in standard format	No	Yes	No	No

No direct reference of practice of documenting progress of QMP was available in the literature related to 'Factors Favouring QMP'.

10.3.3.3 Summary

`Practice of documentation of QMP´ is a new element identified during this research which comprises of two sub-elements - Documenting the requirements and documenting the progress. In the first sub-element requirements related to `what´ and `how´ of QMPs are documented which are supported by the second sub- element which is related to systematic documentation of progress of QMP.

Though the documentation process seems simple, it requires intensive efforts in designing and maintaining this practice on a regular basis. Many a times, importance of the documentation is not fully grasped by practicing managers and less attention is paid on this practice. Documentation helps in creating common base of understanding; recording the requirements and progress in a standard format increases level of standardisation; and recording progress of every steps helps in providing a clear feedback to the employees. All these together, increases probability of success in QMP implementation. It was in OB, where policy decision was taken to document all requirements as well as progress of QMP on regular basis. This decision by the top management helped the coordinator in multiple ways: QMP requirements and progress were updated in standard formats regularly, which helped in monitoring the outcome e.g. rejection, customer complaints etc.; in timely communication of progress to all levels of employees; arranging periodic reviews related to QMP etc. Absence of this element in

QMP is likely to create problems like lack of awareness, lack of transparency as expressed in table 10.50.

As argued by various authors including Ashford and Commings (1984), Ilgen et. al. (1979, as cited in Flynn et. al., 1994), feedback to employees about quality performance provides learning and maintaining quality oriented behaviours. For maintaining customer focus, organisation must ensure prompt feedback of customer survey and other relevant information to the appropriate function and work station (Ahire et. al. 1996). This new element of documenting QMP requirements creates base on which needful periodic feedback is provided to the employees.

While analysing various elements of 'Practice of documentation' five attributes/characteristics were identified. The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates their presence and 'No indicates their absence.

Table 10.30: Summary of Five Attributes Exhibited under 'Practice of Documentation for QMP' in Four Organisations.

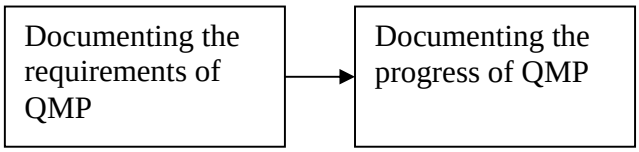
	TOTAL ATTRIBUTES	OA	OB	OC	OD	HIGHEST
Documenting requirements of QMP	2	0	2	0	1	OB
Documenting progress of QMP	3	0	3	0	1	OB
Total	5	0	5	0	2	OB

As shown above, OB demonstrated maximum attributes related to 'Practice of documentation' as compared to the other three organisations.

Thus `Practice of Documentation´ is an important element in QMP implementation.

Based on the analysis of the implementation steps, the following relationship has emerged.

Figure 10.9: Relationships Among Various Elements of 'Practice of Documentation'



10.3.4 Practice of Data Analysis and Presentation.

It is a practice deployed by organization for systematically analyzing available data using IT infrastructure for its presentation.

10.3.4.1 IT Support

The latest application of IT infrastructure was evident in OB but not in other three organisations. Various kinds of data were made available from systems including Intranet which could be used by suppliers also. This helped in better availability of required data. Extensive usage of computer softwares was evident in OB. The IT softwares used by OA, OC and OD were not compatible and caused duplication of work at staff level as they were not compatible, this also increased dependability of IT person for any additional data.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.31: Summary of Attributes Exhibited under Practice of Data Analysis and Presentation – IT Infrastructure

ATTRIBUTES	OA	OB	OC	OD
Availability of latest IT platform	No	Yes	No	No
Compatibility among various software	No	Yes	No	No
Low dependability on IT person for additional data / information	No	Yes	No	No
Availability of emails for communication within organisation	No	Yes	Yes	Yes
Concept of web supplier initiated	No	Yes	No	No

No direct reference of practice of IT infrastructure was found in the available literature related to 'Factors Favouring QMP'.

10.3.4.2 Availability of Required Data

The responsibility for compiling and consolidating various data related to QMP was assigned only to coordinators in OA, OC and OD whereas it was assigned to several employees in OB. Various data were made available at predefined period in OB. It seemed that there was no practice of consolidation of quality objective in OC as data regarding past performance on various operational parameters were not available. Availability of latest IT infrastructure was useful in obtaining and making the data available for further analysis. Access to various data also helped in documenting progress related for QMP.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.32: Summary of Attributes Exhibited under Practice of Data Analysis and Presentation – Availability of Required Data

ATTRIBUTES	OA	OB	OC	OD
Data for QMP are collected regularly	Yes	Yes	Yes	Yes
Data related to QMP are compiled and consolidated regularly	Yes	Yes	No	Yes
Data required related to QMP are readily available	No	Yes	No	No

No direct reference of practice of availability of required data was found in the available literature related to 'Factors Favouring QMP'.

10.3.4.3 Analysis and Presentation

The data related to QMPs were presented in various forms in all the four organisations. Presentation of data was done mainly in review meetings by respective coordinators in OA, OC and OD. The analysed data with target were displayed in the shop floor in OB and OC. In OB, application of QC tools and SPC was seen and data were displayed in a standardized format and updated regularly.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.33: Summary of Attributes Exhibited under Practice of Data Analysis and Presentation – Data Analysis and Presentation

ATTRIBUTES	OA	OB	OC	OD
Analysed data were used for presentation in the quality review meeting	Yes	Yes	Yes	Yes
Analysed data were displayed on the shop floor for communication	No	Yes	Yes	No
Data presentation in standardized format	No	Yes	No	No
Application of statistical tools used in data analysis	No	Yes	Yes	Yes
Target shown in each data presentation	No	Yes	No	No

The reference of data analysis and presentation identified in this study complies with the available literature related to 'Factors Favouring QMP' by Ahire (1996), Shin and Kalinowski (1998) and Ishikawa (cited in Broka, 1992).

10.3.4.4 Summary

While analysing various elements of 'Practice of data analysis and presentation' thirteen attributes/characteristics were identified and exhibited. Summary can be tabulated below:

Table 10.34: Summary of Thirteen Attributes Exhibited under 'Practice of Data Analysis and Presentation' in Four Organisations

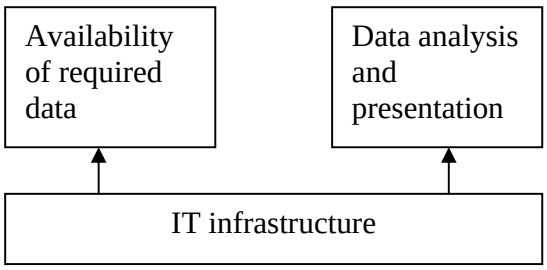
	TOTAL ATTRIBUTES	OA	OB	OC	OD	HIGHEST
IT Infrastructure	5	0	5	1	1	OB
Availability of required data	3	2	3	1	2	OB
Data analysis and presentation	5	1	4	2	2	OB
Total	13	3	12	4	5	OB

OB demonstrated the maximum attributes related to 'Practice of data analysis and presentation as compared to the other three organisations.

In OB, the latest IT infrastructure was used which made required data easily available due to which various employees were involved in data collection and presentation in standard way throughout the organisation.

Based on the implementation steps, the following relationship has emerged.

Figure 10.10: Relationships Among Various Elements of 'Practice of Data Analysis and Presentation'



10.3.5. Practice of Communication

Communication is a channel of information - the imparting, conveying or exchange of ideas, knowledge, information or attitudes (Johannsen & Roberson, 1968). Through communication, the organisations and their members can exchange information, form

understanding, coordinate activities, exercise influence, socialize, and generate and maintain systems of beliefs, symbols and values (Encyclopedia of Management, 1998).

10.3.5.1 Communicating Policy and Targets

The practice of communicating vision, policy and targets to all employees by regular displays and through training sessions was observed in OB. Vision and mission were displayed in OA and OC whereas quality policy was displayed in OA, OC and OD. Targets and plans were formally communicated by the top management in OB and OC. Each QMP organisation was communicated in OB. Additionally process of communication also was communicated to all employees. OA, OB and OC also communicated their products through displays.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.35: Summary of Attributes Exhibited under Practice of Communication – Communicating Policy and Targets

ATTRIBUTES	OA	OB	OC	OD
Communication of policy, vision and values done in English and local language	Yes	Yes	Yes	Yes
Targets and plans were communicated formally at regular frequency by the top management	No	Yes	Yes	No
QMP organisation communicated to all concerned	No	Yes	No	No
Departmental targets communicated regularly	No	Yes	Yes	No
Communication process documented	No	Yes	No	No
Communication of company products done through displays	Yes	Yes	Yes	No

The reference of communicating policy and target identified in this study complies with the available literature related to 'Factors Favouring QMP' by Ahire (1996), Ramirez & Lonely (cited in Thiagarajan and Zairi, 1997), Jha (1997), Juran (cited in Broka, 1992), Wali et.al (2000) and Raju and Balasubramanian (2002).

10.3.5.2 Communicating Plans and Progress

Targets and progress related to business and QMP were not displayed in OA, and OD. These were displayed in OC, though they were not regularly updated. A detailed communication policy was documented and its practice was ensured in OB which also conducted shop-floor meetings. The top management formally communicated the progress regularly to all employees in OB and OC whereas such practice was absent in OA. In OD, there was a direct informal interaction of the MD with employees. This was possible due to its small size of the organisation. The practice of updating employees about activities of the organisation was observed better in OB as compared to other three organisations.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.36: Summary of Attributes Exhibited under Practice of Communication – Communicating Plans and Progress

ATTRIBUTES	OA	OB	OC	OD
Progress of QMP regularly updated	No	Yes	No	No
Requirements of QMP communicated in a standard way	No	Yes	No	No
Daily plans and progress conveyed in daily meetings	No	Yes	Yes	No
Customer problems communicated for corrective actions	Yes	Yes	Yes	Yes
Formal mechanism/facility for employee communication established	Yes	Yes	Yes	No

The reference of communicating policy and target identified in this study complies with the available literature related to 'Factors Favouring QMP' by Black and Porter (cited in Dayton, 2003), Wali et.al (2000) and Raju and Balasubramanian (2002).

10.3.5.3 In-house Publication

In OA, the internal communication was done through various meetings, circulation of memos and display on notice boards. The group of OA also published one internal magazine named as 'Aaj Ka Khabar' from its corporate office. The internal communication in OB was carried out through emails, notice boards, meetings, display

boards, Kaizen room as well as through an internal publication named as 'Baat Cheet'. The internal communication in OC was done through emails, notice boards, meetings and display boards. There was no in-house magazine. In OD, the internal communication was mainly through meetings, memos and personal interaction of the top management with employees. There was no in-house publication.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.37: Summary of Attributes Exhibited under Practice of Communication – In-house Magazine

ATTRIBUTES	OA	OB	OC	OD
In-house magazine published	Yes	Yes	No	No

No direct reference of practice of communication-in house magazine- found in available literature related to 'Factors Favouring QMP'.

10.3.5.4. Summary

While analysing various elements of 'Practice of communication' twelve attributes/characteristics were identified and exhibited. Summary can be tabulated below:

Table 10.38: Summary of Twelve Attributes Exhibited under 'Practice of Communication' in Four Organisations

	TOTAL ATTRIBUTES	OA	OB	OC	OD	HIGHEST
Communicating policy and targets	6	2	6	4	1	OB
Communicating plans and progress	5	2	5	3	1	OB
In house magazine	1	1	1	0	0	OA, OB
Total	12	5	12	7	2	OB

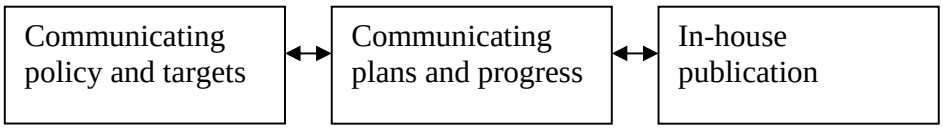
OB has demonstrated maximum attributes related to practice of communication as compared to the other three organisations. This demonstrates the high priority given by the management on communication practice. The demonstration of this practice was lowest in OD which was mainly due to its small size of organisation where more of informal communication takes place with top management.

While analyzing data, relationship among attributes of OB was found distinctly different. High emphasis was given in OB for communicating vision, mission and various policies. Progress of QMPs was communicated through various boards and was updated regularly. Policy for communication was developed and ensured by the top management. Regular communication on targets and past achievements was ensured at department level through daily standing meetings. The MD also addressed all employees together periodically. The top management conveyed progress requirements related to QMP and others during in several QMP inaugurations and celebrations.

Regular communication practice helped in conveying the proper meaning of all three types (‘abstract’, ‘supplier’ and ‘customer’) of definitions employed in the organisations. Such practice, if regularly followed helped in creating a common understanding of various ‘abstract’ requirements of vision, mission and policy statements.

Further, based on the analysis of the implementation steps, following relationship has emerged.

Figure 10.11: Relationships Among Various Elements of ‘Practice of Communication’



10.3.6. Practice of Involving Customers and Suppliers

It is a practice deployed by organization regarding involving customers and suppliers on regular basis.

10.3.6.1 Involving Customers

As a normal practice all four organizations were involved by their customers for developing new products. However in OB, this practice was extended by inviting customer organization to visit OB every year on regular basis. Every year, OB celebrated anniversary of cell development wherein customer of each production line was invited. It provided good opportunity for each employee of cell to interact directly with customer. By this practice, each employee got opportunity to understand first hand information about their product´s performance in the market, and also, it provided confidence to the customer organization about the kind of improvement done by their suppliers.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.39: Summary of Attributes Exhibited under Practice of Involving Customers and Suppliers –Involvement of Customers

ATTRIBUTES	OA	OB	OC	OD
Involvement of customers in new product development	Yes	Yes	Yes	Yes
Involvement of customers in QMP	No	Yes	No	No
Interaction among employees and customers	No	Yes	No	No

Reference of this sub-element complies with available literature related to 'factor favouring QMP' identified by Flynn., et.al (1994).

10.3.6.2 Involving Suppliers

In OA, the involvement of suppliers in QMP – QS9000 was mainly related to the minimum requirement of the standards. In OB, the SBU head had communicated the 'vision 2007' to all suppliers. Regular interaction with suppliers was organized bi-annually through suppliers meet. They were encouraged for implementing ISO9001 system requirements and reduced their supplier base also. Several improvement measures

were handled jointly with suppliers. The supplier training schedule also was maintained in purchase department of the company. The suppliers involvement in QMP at OC was encouraged mainly to meet the minimum requirements of the QS9000 standards. OD encouraged its suppliers to implement ISO9001 system standards in their organisations. They were invited to attend bimonthly management review meetings chaired by the MD. Non attendance was made punishable monetarily.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.40: Summary of Attributes Exhibited under Practice of Involving Customers and Suppliers –Involvement of Suppliers

ATTRIBUTES	OA	OB	OC	OD
Suppliers directly involved in QMP	No	No	No	No
Regular communication with suppliers on policy, targets and progress	No	Yes	No	No
Supplier satisfaction surveys conducted	No	Yes	No	No
Involvement of suppliers in new product development	No	Yes	No	No

The reference of involving suppliers identified in this study complies with available literature related to 'Factors Favouring QMP' by Ahire (1996), Black & Porter (cited in Dayton, 2003), Ramirez & Lonely (cited in Thiagarajan and Zairi, 1997), Shin and Kalinowski (1998), and Deming (cited in Broka, 1992).

10.3.6.3. Summary

While analysing various elements of 'Practice of involving customers and suppliers' seven attributes/characteristics were identified and exhibited by the four organisations. Summary can be tabulated below:

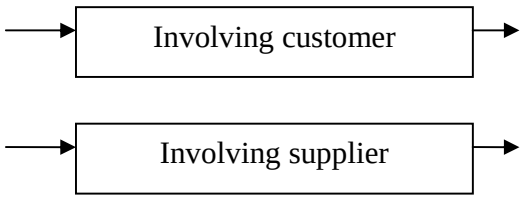
Table 10.41: Summary of Seven Attributes Exhibited under 'Practice of Involving Customers and Suppliers' in Four Organisations

	TOTAL ATTRIBUTES	OA	OB	OC	OD	HIGHEST
Involvement of customer	3	1	3	1	1	OB
Involvement of suppliers	4	0	3	0	0	OB
Total	7	1	6	1	1	OB

OB demonstrated maximum attributes related to practice of involving customer and suppliers as compared to the other three organisations. Involvement of suppliers and customers was higher in OB as compared to OA, OC and OD.

Based on the implementation steps, the following relationship has emerged.

Figure 10.12: Relationships Among Various Elements of 'Practice Involving Customers and Suppliers'



10.3.7. Practice for Encouraging Employee Involvement

It is a practice deployed by organization for increasing involvement of their employees in QMP implementation.

10.3.7.1 Cross Functional Team (CFT)

Achievement of the desired goals through teamwork depends on the organisations' policy on employee-involvement. OA implemented QMPs without creating CFTs within the organisation. However, in QS9000, due to the initial delay in its progress, CFT was formed by the MD for its total implementation. In OB, CFT was practiced widely for all

QMPs. Employees from various departments were involved in QMP implementation through participation in CFTs. In OC, TPM and QS9000 implementation was done with CFT working. In OD, the practice of CFT working was demonstrated in Continuous Improvement projects. However, there was no special reward for encouraging teamwork.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.42: Summary of Attributes Exhibited under Practice of Encouraging Employee Involvement – Cross Functional Team (CFT)

ATTRIBUTES	OA	OB	OC	OD
CFT is a common approach for each QMP	No	Yes	Yes	No
CFT is assessed for QMP implementation	No	Yes	No	No

The reference of cross functional team working identified in this study complies with available literature related to 'Factors Favouring QMP' by Raju and Balasubramanian (2002), Black & Porter (cited in Dayton, 2003), Broka & Broka (1992).

10.3.7.2 Education and Training

In order to increase the involvement of employees, certain basic awareness training is essential. Basic awareness on QMP was imparted to all employees in OA and OB whereas expert training on QMP was imparted only in OB and OD. Awareness on organisation's vision, mission was created through trained facilitators in OB. Additionally detailed training was imparted to all employees before changing over to new production systems e.g. Single piece flow. HR department was involved mainly in coordinating education and training in all organisations except OD where the same was assigned to one QMP coordinator.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.43: Summary of Attributes Exhibited under Practice of Encouraging Employee Involvement – Education and Training

ATTRIBUTES	OA	OB	OC	OD
Awareness on QMP provided to all concerned	Yes	Yes	No	No
Expert/special training imparted to all members involved in QMP	No	Yes	No	Yes
Training on vision, mission, values and targets provided on regular basis to all employees	No	Yes	No	No
Training for 'change' imparted	No	Yes	No	No
Involvement of HR in education and training	Yes	Yes	Yes	No

The reference of education and training identified in this study complies with available literature related to 'Factors Favouring QMP' by Ahire (1996), Jha (1997), Raju and Balasubramanian (2002), Ramirez & Lonely (cited in Thiagarajan and Zairi, 1997), Crosby (cited in Broka, 1992), Wali et. al (2000), Juran (cited in Broka, 1992), and Gurus like Deming, Juran, Crosby, Ishikawa (cited in Broka, 1992).

10.3.7.3 Interaction with Top Management

In a small-size organisation like OD, the top management was able to maintain regular contacts with employees while in large organisations like OA, OB and OC, such contacts were not possible. However in OB, the chief of the organisation actively participated in QMP in his capacity as chairperson or steering committee chief. This generated many new ideas for improvements and also provided opportunity of understanding obstacles faced by the operatives. Decision of inviting customer at the annual anniversary of cells was taken by the management based on input received through operators. In OC, the chief was not the chairperson for QMPs like QS9000 and TPM. Through such interaction the top management also received feedback about the extent to which quality requirements defined in 'abstract' way was understood by the employees.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.44: Summary of Attributes Exhibited under Practice of Encouraging Employee Involvement – Interaction with Top Management

ATTRIBUTES	OA	OB	OC	OD
Top management members regularly interact with employees	No	Yes	No	Yes
Good suggestions of employees are welcomed and implemented	No	Yes	Yes	Yes

The reference of interaction with top management identified in this study complies with available literature related to 'Factors Favouring QMP' by Remirez and lonely (cited in Thiagarajan and Zairi, 1997), Crosby (cited in Broka, 1992).

10.3.7.4 Practice of Rewarding Best Contributors

To encourage employees in implementation of QMPs, both monetary and non-monetary rewards were given by the organisations. The practice was regularly followed in OB due to higher management commitment. In OA, such system was discontinued due to lack of management interest. In OD, minor punishment system was practiced in case of non fulfilment of major work, this generates pressure for compliance rather than encouragement for higher performance. In OC the reward and recognition was initiated after labour problems in 2003.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.45: Summary of Attributes Exhibited under Practice of Encouraging Employee Involvement – Practice of Rewarding Best Contributors

ATTRIBUTES	OA	OB	OC	OD
Formal practice of rewarding best contributors of QMP established	No	Yes	No	No
Monetary benefits given to best employees	No	Yes	Yes	No
Recognition of best employees in open forum	No	Yes	Yes	No
Display of photographs of best contributors/winners	No	Yes	Yes	No
Special scheme to recognise unique contribution	No	Yes	Yes	Yes

Reference of reward and recognition identified in this study complies with available literature related to 'Factors Favouring QMP' by Ramirez & Lonely (cited in Thiagarajan and Zairi, 1997), Jha (1997), Coleman (1994), Juran (cited in Broka, 1992), Crosbey (cited in Broka, 1992).

10.3.7.5 Practice of Celebrating Special Events

All QMP related events and achievements were celebrated in OB. Such investment of money and time by the top management reflected their policy for creating a change within the organisation and their high commitment. It was observed that such practice of celebrating various events relating to QMPs did encourage the employees for better participation. However, celebrating such events without involving those who had contributed created unpleasant feelings among the employees as observed in OA.

The attributes exhibited by these four organisations under this element can be summarized in following table. 'Yes' indicates its presence and 'No indicates its absence.

Table 10.46: Summary of Attributes exhibited under Practice of Encouraging Employee Involvement – Practice of Celebrating Special Events

ATTRIBUTES	OA	OB	OC	OD
Celebrate achievements of QMP	No	Yes	No	No
Invite all levels of employees in celebrations	No	Yes	No	No

There was no direct reference of this element found in the available literature on Factors Favouring QMP. This was a new sub-element identified through this research.

10.3.7.6 Summary

While analysing various elements of 'Practice of encouraging employees involvement' sixteen attributes/characteristics were identified and exhibited by the four organisations and were reported in 'Yes' or 'No'. Summary can be tabulated below:

Table 10.47: Summary of Sixteen Attributes Exhibited under 'Practice of Involving Customers and Suppliers' in Four Organisations

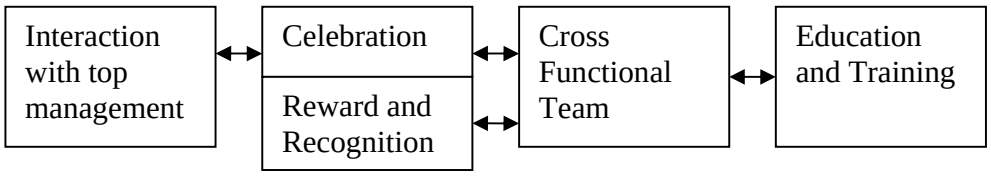
	TOTAL ATTRIBUTES	OA	OB	OC	OD	HIGHEST
Cross Functional Team	2	0	2	1	0	OB
Education and Training	5	2	5	1	1	OB
Interaction with Top management	2	0	2	1	2	OB
Practice of rewarding best contributors	5	0	5	4	1	OB
Celebration	2	0	2	0	0	OB
Total	16	2	16	7	4	OB

OB demonstrated maximum attributes related to practice of encouraging employee involvement as compared to the other three organisations.

The attributes observed in OB were distinctly different from those of other three organisations. In OB, all QMPs were practiced with Cross Functional Team approach; basic awareness was given to all employees; regular interaction with the top management was practiced regularly; individuals and teams were assessed regularly for their performance and all QMPs were inaugurated in presence of top management and the achievements were celebrated. These were mainly because the management of OB viewed QMPs as an integrated approach of change management to achieve the overall objective – World Class Manufacturing.

Based on the implementation steps, the following relationship has emerged.

Figure 10.13: Relationships Among Various Elements of 'Practice of Encouraging Employee Involvement'



10.3.8 Summary of Practice

While analysing various elements of 'Practice' as many as ninety-six attributes/characteristics were identified and exhibited by the four organisations and were reported in 'Yes' or 'No'. Summary can be tabulated below:

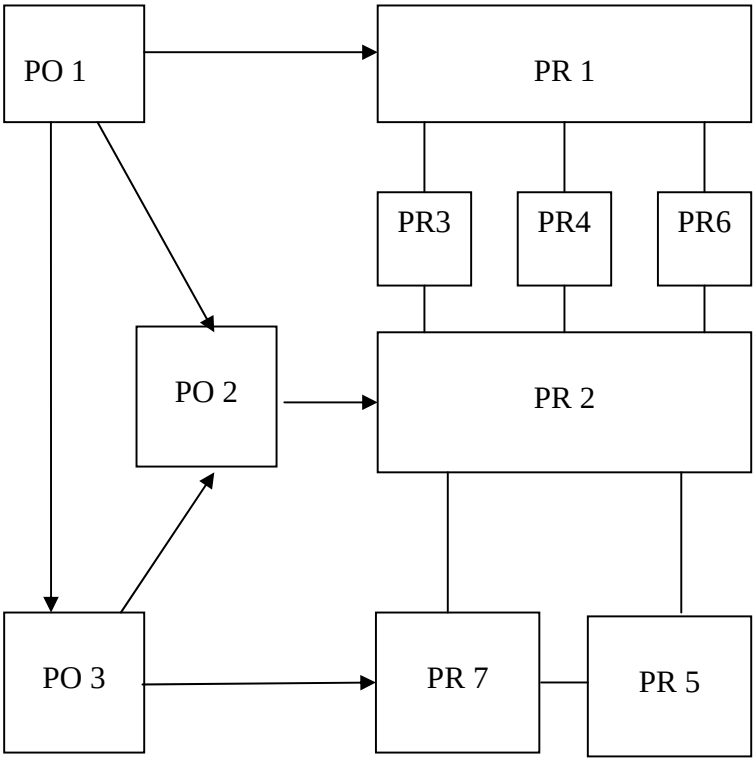
Table 10.48: Summary of Ninety-Six Attributes Exhibited under 'Practice' in Four Organisations

	TOTAL ATTRIBUTES	OA	OB	OC	OD	HIGHEST
Production, verification and assurance system	27	4	26	17	13	OB
Practice of coordinating QMP in the organisation	16	6	15	8	9	OB
Practice of Documentation	5	0	5	0	2	OB
Practice of Data analysis and presentation	13	3	12	4	5	OB
Practice of Communication	12	5	12	7	2	OB
Practice of Involving customers and suppliers	7	1	6	1	1	OB
Practice of encouraging employee involvement	16	2	16	7	4	OB
Total	96	21	92	44	36	OB

From the analysis it appeared that the management of OB had attempted to develop best policy and deploy best tools, techniques and practices to achieve their vision requirements. OB demonstrated maximum attributes related to ‘Practice’ as compared to the other three organisations. Further, while comparing elements it can be stated that this distinction was demonstrated in all seven elements. Thus it can be concluded that OB had planned its QMP as distinctly different from the other three organisations.

Based on data collected, macro level relationship among various Policy and Practice elements can be developed as shown in figure 10.14.

Figure 10.14: Macro Relationship Among Policy and Practice Elements



10.4 Elements of QMP – Outcome

The outcome of QMP implementation can be explained as - Qualitative Outcome and Quantitative Outcome.

10.4.1 Qualitative Outcome

This is a new element identified in this research. It is related to outcome of QMP implementation which is expressed qualitatively. It is also includes to the changes observed in the organisation while implementing QMP. Such outcomes in respect of the four organisations are explained here.

In all, fifteen QMPs were implemented in four organisations, four in OA - QS9000, PIP (Productivity Improvement Program), Suggestion Scheme, and Kaizen; five in OB - Kaizen, TS16949, Business Excellence Model, 5 S, and Total Productive Maintenance (TPM); four in OC - QS9000, QCDGP (Quality, Cost, Delivery, Growth and Productivity Improvement program), TPM, and Six Sigma and two in OD- QS9000 and Continuous Improvements.

10.4.1.1. On Time Completion of QMP

On Time Completion of QMP means whether or not the QMP was implemented in planned time.

Generally, the primary purpose of implementing QMP is to improve quality of product and services of organisation. This implementation involves individuals in diverse functions and various levels in the organisation. Generally programs are mission driven (Brnson, R.K., 1996) and represents fairly large investment in terms of resources, mainly in terms of time and energy of people in the organization. Therefore, it is important for organisations to complete them in planned time.

From the data, it was clear that in OB, all QMPs were implemented to achieve mission of the organisation and all their QMPs were implemented in planned time. QMPs at OA:

QS9000 was completed nine months later than the original plan whereas data related to completion of PIP, Kaizen and Suggestion scheme were not available. At OC, QS9000 implementation was delayed which was mainly due to frequent change of the coordinator. QCDGP program was implemented systematically on time and monitored by the corporate every month. TPM was launched in January 2004 and was under its pilot implementation. However, against the target of pilot project, the progress of TPM was slow. Six Sigma was initiated in 2002. Two employees were sent to the Six Sigma Black belt training; one of the two left the organisation immediately thereafter and the other completed two projects. At OD, QS9000 implementation was delayed by four months. Continuous Improvement projects were planned for every year and implemented in time. During document review, it was revealed that management had also decided to implement TS16949, Kaizen and ISO14001, but they were not initiated.

The reasons for OB´s success in completing QMPs in time were many. The top management had perceived QMP as a means to achieve their vision. QMP targets were included in their business goals. In order to make QMP successful, the management took active part in defining various policies and practices to achieve planned target of QMP. Additionally, for better review and control practices like coordination, documentation and communication were also carried out with active involvement of the top management.

The reasons for not completing many QMPs in time by other organisations were also many. QMPs were not considered as part of business goals. As a result, active involvement of the top management was not observed in OA and OC. For example, organisation of QMP was not directly reporting to the Head of the organization in OC; policies of HR were not linked with those of QMP in OA and OC; involvement of customer and suppliers was not high in OA and OC.

10.4.1.2 Meeting Objectives

It is the extent to which planned objectives of QMP are achieved in the organization.

In OA, the objective of initiating QS9000 was to get certificate of accreditation, which was achieved. The department heads and the MD mentioned that their employees had become quality conscious due to QS9000. However, there was no formal survey or test conducted to measure the same. Annual quality targets set in the Management Review meetings were not known to many of the section heads. Their achievement of QS9000 certificate was considered as an achievement of the objective. PIP had twenty projects for implementation. Its implementation received a mixed response. The plan and achievement reports of PIP were not available. Kaizen and Suggestion scheme were also not in practice in OA. Like PIP, these programs were not effective though the management had not announced their closure. OA had targeted 0.2 suggestions per employee in the year 2004-05. However, not a single suggestion was received since 2000. There appeared to be confusion among department heads in understanding the concept of Suggestion scheme and Kaizen.

At OB, the various objectives planned through the QMPs were achieved. The trend of employee-involvement in Kaizen (percentage of total employee contributed in Kaizen) increased from 10 percent to 80 percent between March 2000 and 2004. The saving due to these Kaizen was about 2 Million INR. OB became the first Engine bearing company to establish quality management system in line with TS16949 requirements. 5 S created proper orderliness in its five Pilot areas resulting in high discipline, orderliness and standardized way of communication were achieved. RKQP Business Excellence model helped in developing proper approach and deployment of every element mentioned in the model. The progress of the same was compiled every year and assessed by trained assessors. OB scored progressively higher in these criteria. TPM was introduced in January 2004 and the initial system of cleaning of machine was being developed in the organisation at the time of case-study. Thus, adherences to planned requirements, and periodic reviews by project leaders and senior management enabled these QMPs to achieve their objectives.

At OC, the objective of QCDGP program was achieved. This was mainly due to the planned efforts by the management, frequent reviews of QMPs and assigning the responsibility of its implementation to the plant head - the President. The main objective of QS9000 was to get certification. The department heads who were interviewed mentioned that the requirements of QS9000 were not adhered to and there were lapses in its implementation as low priority was given to it. TPM objectives were not measured as it was only in its pilot stage; and its progress against the plan was not achieved. Six Sigma could not achieve its planned objective in OC.

The main objective of QS9000 in OD was to receive certificate and improve customer-satisfaction by reduction in rejections and supply of defect-free products to them. The achievement of reduction in rejections was due to the management agreement. The customer satisfaction survey was conducted internally but no consolidation of the past results was available with the marketing department. OD had also planned implementation of TS16949, Kaizen and ISO14001, but they were not successfully implemented for lack of initiative and knowledge about the QMPs. The MD had suggested to initiate small improvements in all possible areas but no structured efforts were subsequently made.

In all organisations, many QMPs achieved their planned objectives, however, it was observed that the ways of defining the objectives were different in all four organisations. For example, QS 9000/TS16949 was one of the common QMP in all four organisations and the main objective defined by OA and OC was to obtain the certificate, whereas in OB the aim was to achieve it as an intermediate milestone for its vision statement, and in OD, it was aimed to achieve customer satisfaction. As a result, in OA and OC, achievement of certification became the only goal and it appeared like `quick fix´ goal set by the management. This resulted in less involvement of the top management in planning and reviewing this progress and many department heads perceived the work for QMP implementation as additional burden.

In OB, QMP was considered a part of their business goals (annual targets), and execution of the same was assigned to a senior employee as a part of his annual performance targets. Objective and milestones were planned, documented and monitored as well as practice of documenting progress of QMP was strictly adhered. This resulted in developing clarity on `meeting objective´, which was not evident in other three organisations.

This also leads to linkage with some of the important practices that OB demonstrated and others did not. For example, in OB it was a policy decision to document all requirements and progress due to which every single achievement was documented, whereas in other organisations it was not regular practice due to which achievements were not recorded and consolidated. As achievement of QMP objectives was important for OB to achieve its vision requirement, all practices were linked, executed and monitored by the top management.

10.4.1.3 Some additional attributes

Interestingly, additional four attributes observed which were consequent to QMP implementation. The first attribute is 'benefit of QMP implementation perceived by marketing department'. Responsible marketing persons felt that implementation of QMP had helped their department in two ways. Firstly, as defined earlier, by getting certification of compliance for QMPs like QS9000 or TS16949, a mandatory requirement for supplying to all automotive customers, is met. This helped directly in approaching new customers and retaining the existing one. Additionally, due to reduction observed in customer complaints, the efforts in customer complaint handling had reduced.

The second attribute is 'clarity on need of QMP at department level'. It was observed that need of QMP as well as its understanding was uniformly high at the level of the department heads in OB, where as it varied within other three organisations. Uniformly high level of understanding at the level of department heads is likely to increase participation in QMP by suggesting better ways of QMP implementation.

The third attribute was related to ‘QMP perceived as ongoing part of improvement’. It was in OB where QMPs were considered as ongoing requirements to meet mission of the organisation, which was also true for QCDGP program in OC. Perception that QMP is a part of ongoing improvement reinforces the employee’s belief that there is culture of continuous improvement in the organisation.

The forth attribute was related to ‘increase in operator’s perceived awareness of quality’. Though it was perceived by many department heads that their operator’s awareness of quality has increased, there was no structured measurement e.g. survey conducted in the organisation to confirm their perception.

All these four attributes are primarily in the domain of human processes. It was difficult for the researcher to collect further data (e.g. administration of an established instrument) in order to claim the validity of the attribute beyond face validity.. However, it is felt that such attributes can be considered as planned objectives of QMP implementation.

10.4.1.4 Summary

´Qualitative outcome´ is a new element identified in this research which is related to outcome of QMP implementation expressed qualitatively.

All the four organisations have used various attributes for measuring their QMP performance. However due to its non quantitative nature, the same is not formally documented by all of them. There were six main attributes identified under this element which were exhibited by these organisations, summary of which is presented in Table 10.49.

Table 10.49: Summary of Attributes Exhibited under 'Outcome' – Qualitative Outcome

	OA	OB	OC	OD
All planned QMPs are implemented in time	No	Yes	No	No
QMPs delivered its planned results	No	Yes	No	No
Benefit of QMP implementation perceived by Marketing department	Yes	Yes	No	Yes
Clarity on need for QMP at department heads level	No	Yes	Yes	Yes
QMP perceived as ongoing part of improvement	No	Yes	Yes	No
Increase in operator's perceived awareness on quality	Yes	Yes	Yes	Yes
Total 'Yes'	2	6	3	3

No direct reference was available in literature about Qualitative outcome.

While comparing various qualitative attributes, it was observed that attributes of OB were distinctly different from those of OA, OC and OD. In OB all QMPs could deliver desired results in their pilot project phase or companywide implementation and were continued in practice at the time of data collection. During data collection there was no deviation observed in Policy and Practice related to QMPs. None of the QMPs was perceived as an 'additional burden' by any of the department heads interviewed. All department heads interviewed were clear about objectives of various QMPs and perceived them as an ongoing part of improvement journey to meet vision requirements. Benefits of all QMPs were quantified and communicated to all through displays.

As compared to OB, QMPs at other organisations could not result in improvement in all attributes. All QMPs planned by OA, OC and OD could not be implemented in totality; some of them were implemented but were not sustained (e.g. PIP, Kaizen, Suggestion

scheme in OA, Six Sigma in OC) whereas some others could not be initiated inspite of plan (e.g. TS16949, Kaizen and ISO14001 in OD). Some of the QMPs of these organisations were neither completed in planned time nor could deliver desired result. QMP implementations in these organisations were considered as 'additional burden' for many of the functional heads. Results achieved through various QMPs were not quantified. Actual practice of QMP was not observed in line with defined policy in OA and OC. QMP requirements and objectives were not made clear to some department heads in OA and OD. In both these organisations QMPs were not perceived as an ongoing part of improvements.

QMPs like QCDGP and CI were successful in OC and OD due to their cost reduction projects. This had inspired top management commitment to continue them company wide. The other QMPs like PIP, Suggestion Scheme, Kaizen, TPM, Six Sigma, TS16949 and ISO14001 in OA, OC and OD did not receive high priority. As a result, specific objectives for each QMP were not made clear to the employees. Additionally, the management of these organisations had not defined various QMPs to meet their overall vision statements.

The table mentioned below summarizes perception of employees expressed during various interviews about reasons for success or failure of QMPs in respective organisations.

Table 10.50: Summary of Perceived Reasons for Success or Failure of QMPs in OA, OB, OC and OD

QMP	OA	O B	OC	OD
Reason for failure of QMP- perceptions	Poor top management commitment, Less priority by management QS9000 seen for certification only, less involvement of department heads No regular reviews	For 5's' only: Too many initiatives started which created confusion among employees.	Top management commitment Coordinator for QS/TPM changed more than twice Coordinator not directly related with production/quality Wrong selection of coordinator QS seen as certificate only Less involvement of department head No regular reviews Lack of awareness on expected benifits Lack of training Qmp Lack of adherence to policy/planning related to Qmp.	Failure of ISO14001, TS16949 and Kaizen were: Lack of top management priority on the program; lack of priority demonstrated by functional head; no full time coordinator appointed as all coordinators were doing the same alongwith their normal duty as production/Engg head;
Reason for success of QMP - perceptions	For QS 9000 : Strong coordinator Involvement of coordinator	All QMPs: Top management support Demonstration by top/seniors in Qmp implementation Frequent review by top Involvement of worker 'Change' managemnt training Transparant communication to all Training Rewards and recognition	For QCDGP : Periodic review by top Linking project target with annual appraisal Review in every business meetings	Top management 's direct involvement , small team

10.4.2 Quantitative Outcome

Quantitative output includes those parameters which were measured by the organisations. These parameters are dealt with in the following paragraphs.

10.4.2.1 Customer Complaint

In OA, technical complaints received from customers were measured as percentage of total invoice which was reduced from 0.22 % in 1999-00 to 0.07 % in 2003-04, however bearing returned with respect to supplies as measured in PPM (parts per million) had increased from 260 to 5898. This was mainly due to the systematic attempt of problem-solving and the root-cause analysis approach of the organisation on every such complaint. The QA team of OA had focused attention on such analysis in a systematic way.

Customer rejections in OB were reduced from 2530 ppm and 4600 ppm in 2000-01 to 429 ppm and 1581 ppm in 2003-04 for Original Equipment market and Replacement market respectively. Similarly, the average customer complaint per month was reduced from 3 to 1 during the same period. Customer returns from market due to the fault of the organisation were reduced from 2054 ppm in 2001-02, to 840 ppm in 2003-04.

In OC, no record was available on quality performance during previous years (prior to 2003-04). The Customer rejections in OD were reduced from 27 in 1999-00 to 13 in 2004-05.

Thus, number of customer complaints and returns had come down in OB and OD whereas it had increased in OA. No record was available for this parameter in OC.

10.4.2.2 Rework and Rejections

In OA, there was no reduction in rejection and rework. On the contrary, rejection and rework increased from respectively 3.8 % and 3.89% in 1999 to 3.96% and 4.03 % in 2003-04. The percentage lot 'not passed' at the first stage also increased from 8.03% to 8.95% during the same period. This was contrary to the opinion expressed by the Quality chief and other executives that their rejection had been reduced due to QS9000.

In OB, rework and rejection were reduced respectively from 69468 ppm and 31005 ppm in 2001-02 to 48831 ppm and 29198 ppm in 2003-04.

In OC, data on total rejection were available for only two consecutive years. These were 4.63% in 2002-03 and 4.21 % in 2003-04. In OD, internal rejection was reduced from 1.5% in 2000-01 to 0.98% in 2004-05. This was possible due to the systematic approach of problem-solving and corrective analysis followed by all concerned.

Thus, rejections had comedown in OB and OD and rework in OB. However, both had increased in OA. Data for OC were insufficient.

10.4.2.3 Breakdown of Machines

The mechanical breakdown in OA was reduced from 2.9% in 1999 to 2.3% in 2003-04 whereas the electrical breakdown had increased from 1.4 % to 2.3 % during the same period. The year 2002-03 recorded the highest breakdown of 5.8% and 4.7 % in mechanical and electrical sector. The utilisation time of machines as percentage of total available hours was reduced drastically from 71% in 1999 to 34% in 2003-04, due to material and financial problems.

In OB, the machine uptime had increased from 91% to 95 % whereas machine line efficiency from 82 % to 93.6% between 2001-02 and 2003-04.

In OC and OD, these data were not made available.

Thus OB had shown improvement in uptime of machine and line efficiency whereas in OA, mechanical breakdown had come down but electrical breakdown had increased. Data from OC was not recorded, and that of OD was not made available.

10.4.2.4 On Time Delivery

In OA, the percentage of 'On-Time Delivery' had fallen from 80 % in 2000- 2001 to 76 % in 2002-03. This was mainly due to higher 'batch size' requirement of production and abnormal breakdown and rejections.

In OB, the order fulfillment increased from 90.44%, in 2001-02 to 96.7 %in 2003-04. In OC, the data were not made available.

Data of On Time Delivery in OD were not consolidated yearly; however from the data recorded in Management Review meetings for the past three years, it could be concluded that the average percentage delivery on time every month was more than 95%.

Thus, OB and OD had demonstrated improvement in On Time Delivery whereas it had deteriorated in OA. Data in OC were not recorded for this parameter.

10.4.2.5 New Product Development Time

The average product development time had come down in OA from 165 days in 2000-01 to 130 days in 2002-03. This was because of the increasing demand from customers.
In OB it was reduced from 11 weeks in 1999-00 to 8 weeks in 2003-04 with almost double the number of new products were introduced. This was mainly due to the higher demand from customers.

In OC, relevant data were not available whereas in OD, the data were not tracked periodically.

Thus, the average time for new product development had come down in OA and OB, whereas such data were not recorded in OC and OD.

10.4.2.6 Customer Satisfaction Survey

The customer satisfaction survey was conducted in OB and OD. In OB, the method of survey was changed in 2003-04. Prior to that, it recorded improvement in index, which was 101 in 99-00 and 104.77 in 2002-03. Based on the new method, the overall customer satisfaction index for replacement market was 5.05 in 2002-03 and 5.39 in 2003-04.
In OD, such survey was conducted on predefined parameters. The survey conducted in 2004 revealed the need to reduce new product development time. This parameter was not regularly consolidated annually.

10.4.2.7 Savings

In OB, about 2 Million INR were saved due to Kaizen since its initiation in 1999-2000. In OD, savings due to CI was 4.2 Million INR. The cost of poor quality in OD as percentage of sales value was reduced from 1.73 % in 2001-02 to 1.29% in 2004-05. OC also had saved substantial amount through QCDGP project, however its data were not made available.

Table 10.51: Summary of Outcome - Quantitative Outcome of QMPs in Four Organisations

	OA	OB	OC	OD
Reduction of customer complaints/returns	No	Yes	Not available	Yes
Reduction in rejection	No	Yes	Yes	Yes
Reduction in breakdown time	No	Not available	Not available	Not available
Increased in machine utilization	No	Yes	Not available	Not available
On Time Delivery performance improved	No	Yes	Not available	Yes
Average time for New Product Development reduced	Yes	Yes	Not available	Not available
Increase in customer satisfaction	No survey	Yes	Not available	No consolidation
Savings in INR due to QMP	Not available	Yes	Yes	Yes
Total 'Yes'	1	7	2	4

This complies with literature on Factors favouring QMP where in direct reference of some of the quantitative parameters like customer satisfaction, customer complaint are available.

10.4.3 Summary

While analysing various elements of 'Outcome' fourteen attributes/characteristics were identified and exhibited by the four organisations were reported in 'Yes' or 'No'. Summary can be tabulated below.

Table 10.52: Summary of Fourteen Attributes Exhibited under 'Outcome' in Four Organisations

	TOTAL ATTRIBUTES	OA	OB	OC	OD	HIGHEST
Qualitative outcome	6	2	6	3	3	OB
Quantitative outcome	8	1	7	2	4	OB
Total	14	3	13	5	7	OB

It can be stated that OB had demonstrated improvements in both qualitative and quantifiable parameters.

There was an all round improvement monitored by OB. The management of OB had a vision of achieving 'World class manufacturing' status, which was later on formalized through 'Vision 2007' document in 2002. In order to achieve this 'abstract' quality, the requirement was subdivided in measurable parameters through 'supplier' quality and 'customer' quality. To achieve operational targets, various QMPs were also identified and included in their business goals. Various HR policies and practices were implemented to encourage employees in improvement activities. Due to active involvement of the top management in developing policies and ensuring practices related to QMP the overall improvements in all parameters were recorded.

10.5 Summary of Analysis

While analyzing the data collected from the four organisations, process described in the section 4.3.2 (Process followed) was followed. Following is the summary of analysis:

10.5.1 Elements of QMP Implementation

Based on the study of QMP implementation in four organisations it can be summarized that: Implementation of Quality Management Program (QMP) is done through defining various policies, deploying several practices, and is generally measured through qualitative and quantitative outcomes. Each of the Policies, practices and outcomes

exhibited various sub-elements. The Policy includes three elements and eleven sub-elements; the Practice includes seven elements and twenty two sub-elements whereas Outcome includes two main elements and nine sub-elements. These are narrated in Figure 10.1 and Table 10.1. In comparison to available literature on Factors favouring QMP and Factors inhibiting QMP, new two elements and nineteen sub elements were identified.

10.5.2 Analysis of Attributes Exhibited in QMP Implementation

While QMP implementation exhibited a total of 11 elements and 42 sub-elements, there were total 159 'attributes' identified which can be summarized as below:

Table 10.53: Summary of Total Attributes Identified under Policy, Practice and Outcome of QMP

	TOTAL ATTRIBUTES IDENTIFIED	ATTRIBUTES EXHIBITED (RECORDED AS 'YES')			
		OA	OB	OC	OD
Policy	49 30.8 %	17 34.7 %	43 87.8 %	21 42.9 %	15 30.6 %
Practice	96 60.4 %	21 21.9 %	92 95.8 %	44 45.8 %	36 37.5 %
Outcome	14 8.8 %	3 21.4 %	13 92.9 %	5 35.7 %	7 50 %
Total	159	41 25.8%	148 93.1 %	70 44 %	58 36.5 %

While analyzing the attributes further, there was some pattern observed in the same.

In OA, overall presence of attributes related to Policy, Practice and Outcome were below 50%. However among them higher presence of attributes was demonstrated on 'Policy' (34.7%) than that in 'Practice' (21.9%) and 'Outcome' (21.4%). In OC, overall presence of attributes related to Policy, Practice and Outcome were below 50%. However among them higher presence of attributes was demonstrated on 'Practice' (45.8%) than that in 'Policy' (42.9%) and 'Outcome' (35.7%). In OD, overall presence of attributes related to Policy, Practice and Outcome were equal or below than 50%. However among them higher presence of attributes was demonstrated on 'Outcome'(50%) than that in 'Policy'

(30.6%) and ‘Practice’ (37.5%). In OB, presence of Policy, Practice and Outcome elements are highest (above 85%) among all organisations studied.

It can be stated that the management of OB has explored maximum elements related to Policy while initiating QMP; has deployed various practices from the same and thus gained maximum output. Exhibition of various elements, sub-elements and attributes in OB were distinctly different (and significantly more) than that of the other three organisations. While colleting the data it was found that OB was the market leader in Engine Bearing industry. It can be stated that, being the market leader OB ‘proactively’ initiated various QMPs to retain its market leadership. OB can be labelled as ‘Proactive’ organisation. Its ‘abstract’ definition of quality in vision and mission was well deployed at operational level. Vision and mission statements were deployed to long and short-range plans and QMPs were identified as a solution to meet the overall objectives. They are generally addressed through specifying clear quantifiable targets with milestones and by identifying the QMPs. These are also planned with specific sequence. Concerned employees (i.e. coordinators and department heads) are communicated clearly about the objective of each QMP to be implemented. Because of this clarity established by the management, it was easy for this ‘Proactive’ organisation to measure specific objective during or at the end of the implementation. Every QMP could achieve its defined objectives. This can be concluded from (i) the high employee involvement demonstrated in Kaizen, (ii) a successful completion of 1S and 2S requirements in identified pilot areas for 5S, and (iii) the distinction earned by the company of becoming the first Engine bearing organisation in India to get TS16949 certification.

Other three organisations are not market leaders and have demonstrated less than 50% presence in various attributes related to policy, Practice and Outcome and can be labelled as ‘Reactive’ organisations. In OA- ‘reactive organisation’ the ‘abstract’ type of quality requirement was well-defined in its vision and mission statement through ‘citizen’s charter’ document. (e.g. achieving ‘World class excellence’). Despite that, no subsequent efforts were made by the management to deploy it to operational level. For example, concepts like ‘strong international competitiveness’, ‘ensuring customer satisfaction’,

‘highest standard of service’, ‘striving to attend international standard’ etc. were mentioned in its citizen’s charter but no significant efforts were made to make them more operational. This created a gap in understanding for the employees. While the management aimed for achievement of the vision, its employees were not able to relate it to their operational level.

OC can also be labelled as a ‘Reactive organisation’ organisation. The vision, mission and philosophy defined by the top management were not deployed to operational level as a result of which the objectives were not actually realized. The management of OC did not logically sequence QMPs for implementation. The decision of Six Sigma implementation prior to TPM proved wrong for the organisation. TPM lays emphasis on basic system establishment, which includes machines and processes. As against this, Six Sigma emphasises on break-through improvements with the assumption that basic systems are already in place in the organisation. Moreover, adherence to the basic quality management system was poor. The choice of implementing TPM prior to Six Sigma would have probably proved successful. A manager who was trained in both the QMPs supported this inference. It can be concluded that the overall objectives of QMPs were not achieved in OC.

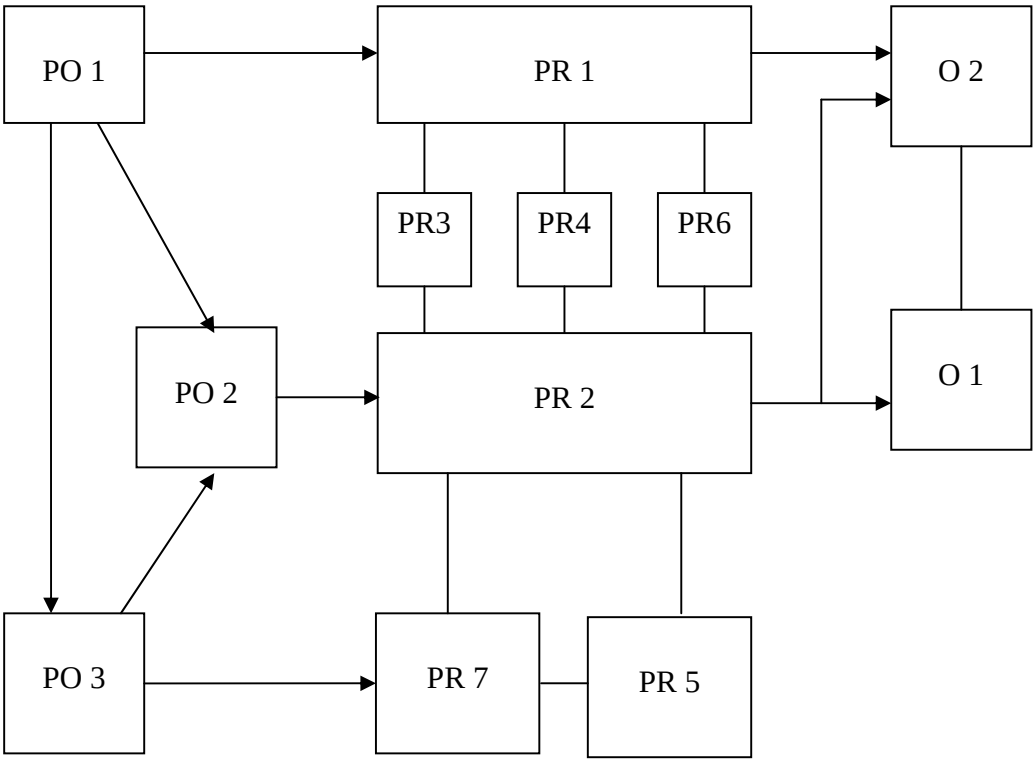
OD can similarly be labelled as a ‘Reactive organisation’. The vision and mission requirements of abstract type were not deployed at operational level. Every QMP was responded to meet individual requirement of the customer or the management. The management had coupled their requirement of reducing rejection with that of certification which was demanded by the customers. As a result of this, dual requirements of customer and management were achieved. However, other QMPs like TS16949 and ISO14001 were not initiated even after their initial plans. This was due to the absence of pressure from customers for their implementation. Reactive organisations normally initiate their QMPs mainly in response to customer requirements. Though QS9000 and Continuous Improvement were successful in meeting their objectives, other QMPs were not implemented even after their announcement. Moreover, some of the QMPs announced by

the organisations were not practiced. Overall, it can be concluded that QMPs did not achieve their desired objectives in OD.

10.5.3 Macro Level Model of QMP Implementation

Based on data collected, and presented through various figures in this chapter, a macro level relationships among various Policy and Practice and Outcome elements was developed as mentioned in below figure. At this juncture, the causal nature of relationship are indicative and not fully established.

Figure 10.15: Macro Relationship Among Policy and Practice and Outcome



10.5.4 Micro Level Model of QMP Implementation

Additionally based on data collected, as well as documented earlier in this chapter following micro level relationship among various Policy and Practice and Outcome elements can be developed. This is presented in Figure 10.16

CHAPTER 11. CONCLUSIONS AND AREAS FOR FURTHER RESEARCH

In this chapter, the findings of this study (already described in chapter 10), are summarised. Implication for managers and limitation of this study alongwith implications for further research in the area are also stated.

11.1 Conclusions

This thesis attempted to identify the elements of the QMP through case study of such programs undertaken by a set of organisations operating in the auto-component industry. Following conclusions are arrived at.

11.1.1 Elements of QMP Implementation

This thesis focuses on identification of various elements for QMP implementation through literature. Based on literature, various elements were identified which were grouped and labelled under three broad elements namely, Policy, Practice and Outcome. The identified elements were further grouped under ten elements.

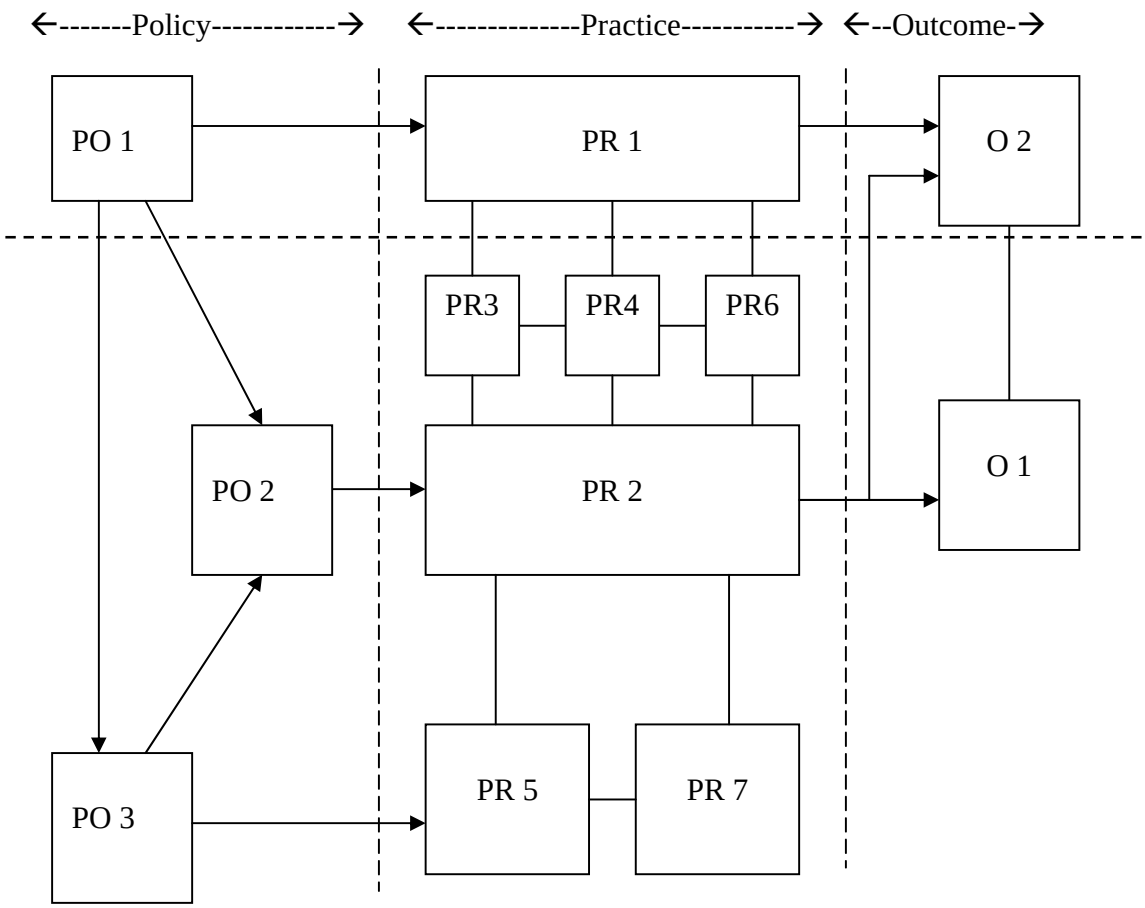
Through case study method of QMP implementation in the Indian Engine bearing and Ball bearing industry it was attempted to put the identified elements into an integrative framework. This thesis has identified two additional elements namely, Practice of Documentation of QMP as well as Qualitative Outcome, which earlier researchers have not focused on. In integrative framework of QMP implementation, additional twelve sub-elements were also identified which were not directly identified in the available literature on QMP implementation.

Thus, this integrative model consists of a total of 12 main elements, 42 sub-elements and 159 attributes/characteristics related to Policy, Practice, and Outcome of Quality Management Program.

11.1.2 Model of QMP Implementation

In this research, based on sequence of implementation of various elements and sub-elements, an integrative framework of QMP implementation is proposed. This framework provides sequence of various sub-elements in QMP implementation, thereby introducing linkage between these elements. Model of QMP implementation can thus be presented as shown in following figure. Causal relationship, however, would now have to be established through further research.

Figure 11.1: QMP Implementation Model



Micro level relationship among QMP implementation can be presented as per Figure 10.16 of Chapter 10.

11.1.3 ‘Proactive’ and ‘Reactive’ Organisations

Based on the limited study of QMP in the organisations, two contrasting patterns were observed in the preparation of elements of QMP. It can be said that overall stance of the organisations implementing QMP may be playing a significant role in successful implementation of QMP.

1) *‘Proactive’* organisations. In such type of organisations, the top management anticipates the future requirements and plans various QMPs to meet them. Such anticipated requirements are deployed at various levels within organisations.
2) *‘Reactive’* organisations. In these organisations, the top management reacts to the requirement or need raised by the customer. So the QMPs are initiated to meet the specific need of the customer or of the management itself.

‘Proactive’ organisations anticipate future requirements and articulate them into their vision and mission statements. Various QMPs, each with specific objectives are emerged, which brings incremental change within the organisation. The top management of such organisation ensures presence of various Policy related to QMP, deploys them into practices which results into achievement of planned outcome. In ‘Reactive’ organisations, as stated earlier, QMPs are generally initiated in response to meet the needs of customers or management and are not interlinked to meet the overall long term vision. In such organisations, various Policy related to QMP are not defined, and its deployment to practices are not ensured which results into lower achievement as compared to ‘Proactive organisations.

11.1.4 Quality

The word ‘Quality’ has been defined in numerous ways addressing its various facets. These definitions are categorized based on supplier – customer model which can be re-classified under the following three broad categories:

1. Supplier-based quality, which can be measured by the suppliers before delivering their products to customers.
2. Customer-based quality, which can be measured only when the product reaches the customer and/or its usage has started.
3. Abstract quality, which addresses an abstract concept and environmental aspect of the organisation that cannot be measured directly.

Quality in the policy elements is often expressed in 'abstract' terms. However, its implementation and monitoring requires customer and supplier type. In order to achieve the overall objectives expressed in its vision or mission statements, it is essential for the top management to translate the 'abstract' type definition into operational level by translating it into 'supplier' or 'customer' type quality definitions. The top management of the organisation which failed to meet this requirement could not achieve significant overall improvement. It was found that the top management of 'Proactive organisation' developed this important linkage, and achieved maximum benefit for their organisation.

11.2 Implications for Managers

This study has documented various elements and the attributes/characteristics of QMP implementation in the Indian Engine bearing and Ball bearing Industry. A total of twelve main elements, and forty-two sub elements related to Policy Practice and Outcome of Quality Management Program were identified.

Further this study has also developed one hundred and fifty-nine attributes related to forty- two sub-elements of QMP implementation.

This study has also documented model-macro and micro level- of QMP implementation based on sequence of implementation of various elements.

This study can be useful to the practicing managers in several ways:

1) The management of organisation can understand various elements of Policy, Practice and Outcome in order to decide a plan for effective implementation of QMP.
2) The practicing managers can plan and schedule various elements related to Policy, Practice and Outcome while initiating QMP implementation.
3) The managers can conduct assessment of presence of various attributes related to Policy, Practice and Outcome in their respective organisations.
4) The management can understand that ‘abstract’ definition expressed in vision and mission needs to be converted into operational definition.
5) The management can understand the requirements of ‘Proactive’ or ‘Reactive’ organisation before initiating QMPs

11. 3 Limitations and Implications for Future Research

This study was conducted in a set of organisations from engine-bearing and ball-bearing and thus there is need to study QMP implementation in other industries in order to generalize the findings across the industries.

Moreover, this study data was limited to various elements involved in QMP implementation. Data related to the actual improvement in product quality level were not readily available. Additionally, there was varying age and types of QMP in all four organisations. Action research in an organisation attempting for QMP implementation is called for. This study did not attempt to develop causal relation among various elements and sub-elements.

Future research in this field can be attempted in the following directions.

1) It is necessary to study the extent to which this thesis can be generalized to other industry. Similar study can be conducted in other industries to make elements of Policy, Practice, and Outcome more comprehensive.
2) There is also a need to identify causal relationship between elements. This can be done by a large-scale survey based on various attributes identified through this study.
3) Large-scale survey can be conducted to identify how various ‘abstract’ definitions of vision and mission are deployed to operational level.
4) A quantitative model can be developed with various attributes related to Policy and Practice for justifying better approach among ‘Proactive’ and ‘Reactive’ organisations.

ANNEXURES

ANNEXURE A
CLASSIFICATION OF VARIOUS DEFINITIONS OF QUALITY

The following table classifies the three categories of quality definitions explained in Chapter 2 Literature review.

Table A.1: Classification of Quality Definitions

SR	DEFINITION AND CONTRIBUTOR	CATEGORY AS PER GARVIN	CATEGORY AS PER HOYER & HOYER	PROPOSED CATEGORY AS MENTIONED ABOVE
1	"Quality is neither mind nor matter but independent of two….even though quality cannot be defined, you know what it is" (Pirsing, cited in Garvin 1984) "…a condition of excellence implying fine quality as distinct from poor quality"	Transcendent	Other	Abstract
	"…Quality is achieving or reaching for the highest standard as against being satisfied with the sloppy or fraudulent" (Tuchman, cited in Garvin, 1984).		Other	Abstract
	" Quality is invisible when it is good, impossible to ignore when it is bad" (Grower, 1994).		Other	Abstract

2	"Differences in quality amount to differences in the quantity of some desired ingredient or attribute" (Abbott, cited in Garvin, 1984).	Product-based	Level 1	Supplier
	" Quality refers to the amount of the unpriced attributes contained in each unit of the priced attribute." (Leffler, cited in Garvin, 1984).		Level 1	Customer
	"Product quality encompasses those characteristics which the product must possess if it is to be used in the intended manner" (Mizuno, 1988).		Level 1	Supplier
3	" Quality consists of the capacity to satisfy wants…" (Edwards, cited in Garvin, 1984).	User based	Level 2	Customer
	" Quality is the degree to which a specific product satisfies the want of a specific consumer" (Gilmore, cited in Garvin, 1984).		Level 2	Customer
	" Quality is any aspect of a product, including the services included in the contract of sales which influences the demand curve" (Dorfman & Steiner, cited in Garvin, 1984).		Level 2	Customer
	" In the final analysis of the marketplace, the quality of a product depends on how well it fits patterns of consumer preferences" (Kuenn & Day, cited in Garvin, 1984).		Level 2	Customer
	" Quality consists of the extent to which a		Level 1	Customer

	specimen [a product brand/model-seller combination] possesses the service characteristics you desire" (Mayness, cited in Garvin, 1984)			
	"Quality is fitness for use" (Juran, cited in Garvin, 1984).		Level 2	Customer
	"Only customers judge quality, all other judgements are essentially irrelevant" (Zeithaml et al., cited in Reeves & Bednar, 1994).		Level 2	Customer
	" Quality should be aimed at the needs of the consumer, present and future" (Deming, 1986).		Level 2	Customer
	"The total composite product and service characteristic of marketing, engineering, manufacturing, and maintenance through which the product and service in use will meet the expectations of the customer" (Feigenbaum, 1983).		Level 2	Customer
	"Consumer's needs and requirements change. Therefore, the definition of quality is ever changing. Broadly interpreted, quality means quality of work, quality of service, quality of information, quality of process, quality of division, quality of people, including workers, engineers, managers and executives, quality of system, quality of company, quality of objectives, etc." (Ishikawa, cited in Hoyer & Hoyer, 2001).		Level 2	Customer
	"Quality is: Giving the customer what he			

	wants today at a price he is pleased to pay at cost he can contain again and again and again" (Grower, 1994). " Quality is the degree of congruence between expectation and realization" (Grower Handbook of Quality Management, 1994) "Quality of meeting the customer requirement" (Oakland, 1993). "Quality means meeting customer's (agreed) requirements, formal and informal, at lowest cost, first time, every time" (Flood, cited in Beckford, 2002).		Level 2 Level 2 Level 2 Level 2	Customer Customer Customer Customer
4	"Quality means conformance to requirements" (Crosby, cited in Garvin, 1984). "Quality is the degree to which a specific product conforms to a design or specification" (Gilmore, cited in Garvin, 1984). "Quality is physical or non-physical characteristics that constitute the basic nature of the thing or is one of its distinguishing feature" (Webster New World Dictionary). "Quality is defined as defects in a process" (Shingo, cited in Beckford, 1998).	Manufacturing-based	Level 1 Level 1 Level 1 Level 1	Supplier Supplier Supplier Supplier

5	"Quality is the degree of excellence at an acceptable price and the control of variability at an acceptable cost" (Broh, cited in Garvin, 1984).	Value based	Level 2	Customer
	"Quality means best for certain customer conditions. These conditions are (a) the actual use and (b) the selling price of the product" (Feigenbaum, cited in Garvin, 1984).		Level 2	Customer
	"There are two common aspects of quality, one of these has to do with the consideration of the quality of a thing as an objective reality independent of the existence of man. The other has to do with what we think, feel, or sense as a result of the subjective reality – this subjective side of quality is closely linked to value" (Shewhart, 1931).		Level 2	Supplier

ANNEXURE B

TABLE B.1 TABLE OF COMPARISON OF VARIOUS ELEMENTS OF OA, OB, OC AND OD

	Comparision of QMP elements of OA, OB, OC and OD				
General	**OA**	**OB**	**OC**	**OD**	**Data source**
Type of Organization	Public Sector	Private	Private	Private	Internet, company bulletin, annual report and interview
Auto ansciliories	Auto ancilliary	Auto ancilliary	Auto ancilliary	Auto ancilliary	
Established in (age on 2004)	1970(34 years)	1957 (48 years)	1978 (26 years)	1993 (12 years)	
Turnover 2003 - 04	29 crors		28 crore	19.37 Cr ; 2004-05 (26.65 Cr)	
Market position in EB	NA	1st	3rd	3rd / 4th	
Market segment served		Automobile OEM and After sales Market	Automobile OEM and After sales Market	Automobile OEM and After sales Market	
Total employees	376	325	350	193	
Average age of employee	48	42	42	35	
Present collaboration Past collaboration	No Yes (Japaneese)	No Yes (Europeen)	Yes	Yes, Isreal (1993-98)	
Strength of QA dept	30	25	23	9	Interview
Hight qualification in QA dept	ME / MTECH	BE	BE	BE	Interview
Position of chief of organanisation under study	MD	AVP/EVP	President	Vice Chairmand and Managing Director	Interview, company document, internet, Quality manual
Top management includes	MD, Dept heads	Directors, AVP/EVP + Dept heads	President + dept heads	VC&MD, JMD and ED	Interview
Nature of business review	MIS monthly to HO	MIS monthly to SBU head - corporate	MIS monthly to HO	Monthly reviews against Business plan	Interview, document review
Nature of decision	Ministery of heavy industry + CEO	MD, Chairman	MD, 9 Chairman	MD, JMD and ED	
Speed of decision	Slow	Fast	fast	Fast	Interview
Union	Two - for workmen and for staff	for workmen and staff	one for workmen	Internal for workmen	Interview
Major IR peoblem in last 3 years due to which plant shoud down	No	No	Yes in 2003	No	Interview
QMP implemented in Organisation	QS9000; Productivity Improvement Program(PIP); Suggestion scheme and Kaizen	Kaizen, 5S, RKQP, TS16949	QS9000, Six Sigma, TPM, QCDGP, Suggestion scheme and Housekeeping	QS9000, Continual Improvement	Interview, internet, company document, document review, Quality manual

POLICY	Comparision of QMP elements of OA, OB, OC and OD				
Policy for long and short term planning	**OA**	**OB**	**OC**	**OD**	**Data source**
Vision and mission statement				Vsion and mission of group available	
Corporate vision statement	available	available	available	Prepared but only in Internet	web source, quality manual
Chief of organization participated in developing the same	Not known	Participated (13 days invested)	No	No	interview, quality manual, other manual
Displayed in organisations	Reception MD's office Yes	yes	yes	Not at any place	shop floor visit
Based on group vision - organization vision developed?	Yes ('citizen's charter')	Yes	No	No	interview, quality manual, other manual
Formal long range and short range plan derived based on vision statement?	No	Yes	No	Derived but not linked with Vision and mission	company document, quality manual, other manual
Formal communication of vision to all employees planned & done?	No	Yes in English and in locate language , communicaqted through trained facilitators	No	No	interview, quality manual, other manual
Main points addressed in vision	World class excellence, total performance leadership, International competitiveness	Total capital employed above industry average, continuously drive down cost generate substantial revenue from expert, make brand internationally recognised and respected, make ourselves prefered choice for customer, be professionaly managed, process to be recognised best in industry, to have intelligent & well trained customer focused employees.	Develop corporate competence to act globaling, aspire and dare to be innovative, attain leadership in technology, achieve excellence through enterprenuorship, bridge the gap between percept and practice.	Group vision: create an environment where employee experience the joy for learning creativity and growth; create org through initiatives alongwith development of employees; continuously pursue improvements in technology, management practice and employee commitment to quality and productivity and; encourage and support employmenet representing diverse background	web source, company document

	Comparision of QMP elements of OA, OB, OC and OD				
	OA	**OB**	**OC**	**OD**	**Data source**
Other points documented	mission, objectives, goals, organisation's commitment to customer, reason for existance in business	values, OB's vision statement	Group philosophy (World class in manufacturing, growth ahead of market, people orientation, ROI, continuous Improvement)	Mission, Corporate Quality Plicy	web source, company document
Benchmarking of various element documented and communicated to all department heads?	No	Yes	NO	Done in some areas like Finance. Not known to other dept heads	company document, quality manual, other manual
Vision mission linked to various department of organisation?	No	Yes	No	No	interview, company document, quality manual, other manual
Corporate q. policy	available	-	-	available	web source, quality manual
Org.q. policy	available	available	available	available	web source, quality manual, shopfloor visit
last updated	2003	2003	1992	1994	shop floor visit, quality manual
Main elements corporate q.policy	Q. leadership of products and services, Total customer satisfaction, commitment to management of quality, culture of Total q. concept and Total performance leadership	No separate group/SBU policy	Not developed	Customer satisfaction, produce product which meets requirement of quality price and delivery; courteous employees; strive to establish prime institutions in its field of	web source, quality manual
Main elements organisation Q. Policy	Customer delight, continuous improvement, product & service of Int standards, Exceed in strategies and operations satisfy expectations of stakeholders	Main points: Cost effective research, engineering, development, mfg, sales, service and product of technologies; fullest satisfaction of customer at lowest cost; continuously improving effectiveness of QMS	See objectives	conformance to requirement by way of product performance, cost , delivery and service,; commited to meet or exceed these requirements to give consistent cust satisfaction	websource, quality manual

	Comparision of QMP elements of OA, OB, OC and OD				
	OA	**OB**	**OC**	**OD**	**Data source**
Q. Policy displayed at important places?	Yes	Yes	Yes	Yes	shop floor visit
Q. objectives identified	Six objectives [No defect should be produced, defect free supply to customer, cust satisfaction, Availability of resources, Emp. Involvement, Improving reliability of suppliers	Objectives developed at department level in line with quality policy	4 obectives Customer satisfaction, employee development, continuous improvement, housekeeping	To achieve improvement in areas of quality systems, employee involvement and work practice; to upgrade technologies and mfg capabilities to meet challenges; periodically monitor oun performance and stive to achieve higher goals	quality manual
Formall actionplan prepared to achieve Q policy?	No	No	No	No	interview, quality manual
Benchmarking done on q. objectives?	No	Yes Marketing, safety, Environment, HR, Purchase, Travel developed	No	No, Quality objective not quantified	interview, company document, quality manual, other manual

	Comparision of QMP elements of OA, OB, OC and OD				
Annual goals	**OA**	**OB**	**OC**	**OD**	**Data source**
Annual business plan includes quality goals.	no	yes	yes	yes	Interview, company document, quality manual, other manual
Inputs taken while developing yearly plans	own assessment of market requirement, derectives from Government and corporate	own assessment of previous year, external business senario, previous performance on RKQP, Employee satisfaction, customer satisfaction, supplier satisfaction etc	past performance and market expectations	Competitive products, benchmarking inside and outside automobile industry, previous year achievement	interview, quality manual, other manual, company document
Annual goals displayed till which grade employee?	Displayed fill department heads	Displayed till department heads and managers	Displayed till department heads executives	Only company goals are made, no specific department goals developed.	interview, other manual
Annual goals applicaqble till which grade	Department heads	Upto Managers	Managers	Department head	interview, other manual
Quality goals are prepared based on:	Quality policy, objectives, customer requirement, company's own requirement and need identified by consultant	past performance, benchmakrs, QMP progress, customer satisfaction	past performance, Benchmark, long term targets	Past performance, long term plan, benchmark figures	interview, quality manual
Salary of executives linked with achievement of annual goals?	No	yes	yes	Salary of operators and staff members are linked with achievement of production and sales respectively.	interview, other manual, company document
Q. goals defined based on q.objectives	yes	yes	yes	No linkage established between objectives and goals.	interview, quality manual, company document
Target for QMP	not defined in annual goals	defined in annual goals	Not planned	Planned for QS9000, ISO14001 and Kaizen also	interview, quality manual, company document, document review
QS 9000/TS16949	certification	system transfer to TS16949	TO get certificate	Certification and reduction in rejections	Interview, shop floor visit, company document, document review,
Kaizen	To implement small improvement system in organisation	To develop continuous improvement culture in organization	As part of TPM	Considered as Continuous improvement projects	
Suggestion scheme	To get more workmen involved in improvement and bysuggestions		To involve employee for improvement	NA	
TPM			To improve OEE	OEE improvement	

	Comparision of QMP elements of OA, OB, OC and OD				
	OA	**OB**	**OC**	**OD**	**Data source**
Six sigma			To reduce process variation and breakthrough improvements	NA	Interview, shop floor visit, company document, document review,
Housekeeping (5S)		To implement 3 S requirements in entire organisation	For effective workplace management	NA	
TPS		Charge of production system from batch to single piece		NA	
Alignment of individual targer department target- company target done with that of vision mission of organisation?	No	Yes	No	No	Interview, document review, Quality manual, other manual
Benchmarking data available	No	Yes	Yes	No	Interview, other manual, document review, company document
	Annual goals are treated as max. permissible allowances in case of rej, rework, waitage		Pareto analysis mentioned as parameter which is monitored monthly - wrong concept. Clarity on parameter of tool missing	kaizen are consider same as CI projects; OEE measurement considered as TPM; shop floor cleanliness and orderliness considered as housekeeping which doesnot cover office.	

	Comparision of QMP elements of OA, OB, OC and OD				
Ensuring top management commitment	**OA**	**OB**	**OC**	**OD**	**Data source**
Vision, QP, signed by the chief	Yes	Yes	Yes	Yes	shop floor visit, quality manual
Need for QMP communicated by the chief of all employees	No, only documented in Quality manual	Yes	No	No, only to dept heads and dept union representatives	interview, quality manual, other manual, company document
Planned reviews conducted? By the chief?	No	Yes	Not regularly, attends if he is available	Yes	interview, document review
The chief address entire workforce	No	Yes	Yes, monthly	No	interview, document review, quality manual, other manual
Sp events on QMP inaugurated by the chief?	No	Yes	No	No	interview, document review, other manual
Perceived support of top available?	No	Yes	No	Yes	Interview

Policy for QMP	Comparision of QMP elements of OA, OB, OC and OD				
Initiation	OA	OB	OC	OD	Data source
Name of QMP	QS 9000 PIP Suggestion Scheme Kaizen	TPM TS16949 55 Kaizen RKQP	QS 9000 QCDGP TPM Six Sigma	QS9000	Interview, quality manual, other manuals, company document, document review
Year of initiation	99 95 90 88	04 04 03 99 99	99 2000 04 02	2000	Interview, shop floor visit, document review, company document
Coordinater - head of	QA DGM IE DGM IE IE	Prod. Head GM QA Srmgr AVP QA Sr.Mgr QA sr.mgr.DGM	QS -Tech. Manager QCDGP -Sr. mgr Maint ; TPM- Sr. mgr Tech; Six sigma - sr. mgr maint	MR	interview, quality manual, other manual, company document
Present status	Active Active partialy active Not active	active	Six sigma not active	Active	Interview, shop floor visit
Need	cust corporate	Internal requirements by management	Customer corporate / top management	Customer	Interview, other manual, company document
		Top management / corporate			
QMP aligned or in isolation	Isolation	Aligned	Isolation	Isolation	Interview,
Overall goal for all QMP	No overall objective defined	To achieve world status - clearly defined	overall objectively of all QMPs not defined	No overallgoal planned	Interview, quality manual, other manual, document review, company document
Managers / operators/ corporater Person sent out to see QMP working at other companies	No	Yes	No	Not required as the group company was the first in India to get the same implemented	Interview, other manual, document review
Contribution of HR department for change management?		Yes	No-only for training	No	Interview, document review
Pilot project	No	Yes - in TPM, Kaizen	Yes in TPM	No	Interview, document review
Inauguration for QMP done	No	Yes	No	No	Interview, document review
Speech for MD, guest during inaugration?	No	Yes	No	No	Interview, document review

	Comparision of QMP elements of OA, OB, OC and OD				
Initiation	**OA**	**OB**	**OC**	**OD**	**Data source**
QMP decided at Board level?	No	Yes	No	Yes	Interview, company document, other manual
QMP first demonstrated by manager?	No	Yes	No	No	Interview, document review
Are Prod + QA managers made 'champions' for specific QMPs?	No	Yes	No	No	Interview, document review
Any QMP reintroduced based on need?	No	Yes - 5's'	No	No	Interview

Comparision of QMP elements of OA, OB, OC and OD

Appointment of coordinator	OA	OB	OC	OD	Data source
Coordinator for each QMP	Yes	Yes	Yes	Yes	Interview, quality manual, other manual, document review
Coordinator full time?	No	No	NO	Not in initial 4 years subsequrntly full time MR appointed	Interview, quality manual, other manual, document review
Selection criteria	Seniority in organization knowledge on subject	Seniority in organization knowledge on subject	To utilise manager's time in better way	Technical competence and seniority	Interview
Designation of coordinator	QS 9000 - DGM QA PIP, Kaizen, sugg sch - DGM IE	QS 9000 - Sr QA Mgr TPM - Plant head RKQP - Sr QA mgr/ DGM QA 5's' - Sr Prod Mgr Kaizen - Sr off QA mgr	QS 9000 - QA - Tech support Group - QA TPM - Maint. Head - Tech support Group OCDGP - Maint. Head	Suprintendent level(middle management)	Interview, document review, quality manual, other manual
For QMP reporting to	MD	EVP - SBU Head	Six Sigma - coordinator	ED	Inerview, quality manual, other manual, document review
			QS 9000 & TPM - Tech Head not president QC DGP - president -		
Expertise demonstrated by production & Q heads in QMP	No	Yes, (AVP 5S Champion)	No	Yes	Interview
Nature of work for coordinator		Planning for QMP, technical guidance, periodic review of progress against plan, periodic updates to management, liasion with consultnt and external agancies etc)	Planning the Qmp, reviewing prg. Through planned meetings, guide team in implementation prepare necessary documents, update management on time to time basis.	Planning, guiding on technical matters, reviews, feedback to top mgmt, liasion with texternal parties, coordinating for training, documentation	Interview
Single coordinator throughout QMP ?	Yes	Yes	No	No , three coordinators changed	Interview
Effectiveness of coordination & how it is exhibited?	QS 9000 - High Restall - Low	High	QS 9000 -low QC DGP - High TPM - Medium Six Sigma - low		Interview, document review
				Coordinator appointed for ISO14001 but implemention did not start	

	Comparision of QMP elements of OA, OB, OC and OD				
Appointment of consultant	**OA**	**OB**	**OC**	**OD**	**Data source**
Was consultant appointed for QMP implementation?	QS 9000 - Yes PIP, kaizen - No Kaizen - No	TS 16949, TPM, 5s - yes RKQP - No -managed internally	Separate university - of group Dean was main consultant	Yes	Interview, document review
QMP suggested by consultant?	Kaizen , Consultant PIP suggestion Sugg.scheme in early 1990 s	No	University suggests new developments and recommends	No	Interview, document review
Nature of involvement of consultant in Qmp	Tech guidence, Training, Guide in manual Preparation	Tech guidence Training Planning the project Necessary documentation	Tech guidence Training Reviews	Training, documentation preparation, technical guidance	Interview, document review
Other points		Different - Consultant hired for separate QMPs. Overall direction decided by top management			

	Comparision of QMP elements of OA, OB, OC and OD				
Creating organisation for QMP	**OA**	**OB**	**OC**	**OD**	**Data source**
Organization for QMP declared initially?	No	Yes	No	No	Interview, document review
Org. created for QMP	No	Yes	Yes	No	Interview, document review, quality manual, other manual
CFT for QMP developed	No, but for QS9000 it was developed later on.	Developed	Developed	NO	Interview, document review, quality manual, other manual
Rules developed for QMP?	No	Yes	No	No	Interview, document review, shopfloor visit
Responsibility of members of CFT defined?	Yes	Yes	No	No	Interview, document review
Documented?	No	No	No	No	Document review, quality and other manual
Other	In QS 9000 manual, QA has defined all activities of QC and QA as responsibility.	In developing rules related to Qmp, they were consulted with EVP and HR department before release. Saparate kaizen office	Coordinators did not report to the chiefs of the OD. Also coordinators changed frequently		
Process clarity of total implementation	Low	High	Medium	High	Interview, shop floor visit
Linkage with annual perform appraisal?	No	Yes	Yes	No	Interview, quality manual, other manual, document review
Reason for developing CFT sp. For QS 9000	Progress was slow	-	Progress was slow	NA	Interview, document review, quality manual, other manual

Policy for linking HR practices with QMP	Comparision of QMP elements of OA, OB, OC and OD				
Reward and Recognition	**OA**	**OB**	**OC**	**OD**	**Data source**
Schemes for Rewarding employees in QMP?	Kaizen Trophy Monetory reward for suggestion	Kaizen - monitory benefit Best Kaizen of month Highest no of Kaizen/ year gets foreign trip Highest monthly kaizen - gets lunch with MD in canteen 5s - every step achievement rewarded; Best cell assesment based on Score card method	Best operator award Best housekeeping Best suggestion	No. Rather punishment policy adopted for non fulfilment of requirements.	Interview, shop floor visit, quality manual,, other manual, document reiew, company document
Presently active?	No	Yes	Yes	Yes	Interview, shop floor visit
How employees are rewarded?	No reward presently	Rewarded in presence of all employees; Through photograph in Kaizen Room	Under various recognitions chemes, on monthly basis	Main motivation is due to incentives given, sometimes best contributor rewarded but not regular practice	Interview, quality manual,, other manual, document reiew, company document
Meonetery reward given?	Yes in the past, but not active presently	Yes, for Kaizen	Yes for suggestion scheme. Operating Engineer scheme wherein selected operator is uppgraded to Diploma level through structured training.	No	

	Comparision of QMP elements of OA, OB, OC and OD				
Performance appraisal system	**OA**	**OB**	**OC**	**OD**	**Data source**
Formal appraisal system Present in organization	Yes, for all levels	Yes	Yes	No	Interview, quality manual, other manual, document review
QMP implementation taken as annual quality goal?	Yes	Yes	Yes for coordinators and CFT members	No	Interview, quality manual, other manual, document review
Implementation of QMP mentioned in coordinaters annual goals?	Yes	Yes	Yes	No	Interview, quality manual, other manual, document review
Role played by team members linked / mentioned as a part of annual goals?	No	No	No	No	Interview, quality manual, other manual, document review
Pay is linked with annual appraisal?	No	Yes	Yes	Pay is linked with production and sales for workment and staff respectively.	Interview, document review, company document, shop floor visit

	Comparision of QMP elements of OA, OB, OC and OD				
Creating environment for change	**OA**	**OB**	**OC**	**OD**	**Data source**
Union leaders brifed before QMP	Yes	Yes	Yes	No need felt by mgmt to brief before initiating QMP	Interview
Need of QMP communicated by chief to all?	No, to only department heads level	Yes	Yes	Yes, to all dept heads and dept union leaders	Interview
Training sessions conducted before initiating Qmp?	No	Yes	No	Not before, but training imparted after initiating QMP	Interview, document review
HR department involved in creating change?	Partially only for training	fully	partially, only for training	No separate HR dept, only P& A dept in the company.	Interview, document review
Policy for lateral appointment at senior level	No	No	No	Yes	Interview
Policy for develop internal leaders/champions	No	Yes	No	No formal policy	Interview, document review
Customer's direct involvement in QMP	No	Yes in annual cell anniversary customers regularly visit to see improvements.	No	No	Interview, document review, quality manual, other manual
Formal system for evaluating team working in QMP	Not present	No	No	No	interview, document review
Involvement of HR department in counselling while QMP implementation planned?	Not planned	Yes	No	No	Interview
QMP seen by management as change management program?	No	Yes	No	No	Interview
Implementation of QMP seen as	Additional work' by department heads	Integrated efforts to achieve ultimate goal - worls class manufacturing	Technical requirement		Interview

PRACTICE	Comparision of QMP elements of OA, OB, OC and OD				
Practice of production, verification and assurance system	**OA**	**OB**	**OC**	**OD**	**Data source**
Production					
Production system	Batch production	Batch & single piece production	Batch production + 2 Automated lines	Batch production	Interview, shop floor visit, quality manual, other manial
Basic data (Runchart etc) entered by production?	No	Yes	Yes	Yes	Interview, shop floor visit
Cell concept present?	No	Yes	Yes, but separate QC employees for inspection	No	Interview, shop floor visit
Involvement of Production managers, superviser, operators in QMP	Low	High	Medium	Medium	Interview
Bottleneck operation identified of close monitoring done on the same?	No	Yes (face & chemphering)	No	No	Interview, shop floor visit

Comparision of QMP elements of OA, OB, OC and OD

Verification	OA	OB	OC	OD	Data source
Inspection	Mainly inspection done at all levels. Reliance on self inspection absent	Main reliance on self inspection,inspection is also done on random base	Multi stage inspection done at several stages.	Self inspection, Final inspection, Visual inspection	Interview, Shop floor visit, quality manual
Concept of self inspection	absent	present	absent	present	Interview, shop floor visit, quality manual
Main role of QC/QA	inspection, checking, plotting required data	Verification on sample basis	inspection, checking	Verification and assurance	Interview, quality manual
monitoring of critical parameters	done through incorporation of 100% inspection	done through self inspection and monitoring	done through 100% and random inspection	Done by operators and qc inspectors	Shop floor visit, quality manual
Inspection criteria defined on each critical paaramer/mode	Yes	Yes	Yes	Yes	Shop floor visit, quality manual
Random sampling done by QC / QA every predefined frequency	Every hour by QC	Yes	Every 45 minutes by QA	Yes, by audit engineer	Quality manual,
Visual inspection	100%	Present, 100%	100%	Present 100%	Interview, Shop floor visit, quality manual
Availability of reference standard for visual inspection	Not available, done based on experience.	Referance std available	Yes	Yes	Shop floor visit
Usage of statistical tools	Yes-Mainly Xbar-R chart	Yes	Yes	Yes	shop floor visit, quality manual
Various verification methods	100% inspection, sampling inspection, visual inspection, control charts, verification measurement (cp/cpk), stage inspection	Self inspection, plotting on run charts, x bar charts, 100% inspection, visual checks, cp/cpk measurement	100% inspection, sampling inspection, visual, control charts, cp/cpk measurement	Self inspection for dimensional parts, sampling by audit engineer, sampling check by QA inspector, 100 % visual inspection and other audits	shop floor visit, quality manual
Employee, opinion about adhence of verification system	High	High	Low	High	interview
Facility for inprocess inspcetion	Inspection table provided in the shopfloor	Available in the line	Yes, in production line	Available	interview, shop floor visit
Who detects abnormalities/problems	QC inspection	Operator / qc person	QA person	Production and QA	interview, quality manual
What action are taken once abnormalities identified?	Production stops when QC, issues Nc, unless connected and reported in writing by production, QC does not	Any person/operator can stop the line Line starts only after correct actions taken	QA person stops production if abnormalities observed	Corrective actions are taken, if problem is serious salary deduction decided by ED	interview, quality manual

	Comparision of QMP elements of OA, OB, OC and OD				
Verification	**OA**	**OB**	**OC**	**OD**	**Data source**
Incoming inspection	Raw material checked for chemicalproperties in lab, verifies inspection test certificate of supplier	Done on sample basis	On sample basis, however not adhered	Predispatch inspection report from suppliers, only sampling verification done in many parts	quality manual
Final product inspection	100% before transferred to packing.	Done	100% based on ontrol plan	100% based on Control plan	quality manual
Critical parameter		Control height taper	Identified	Identified in Control Plan	interview, quality manual
Reference std. For visual inspection available?	No	Yes	Yes	Yes one set among three inspectors.	shop floor visit
1st piece inspection practice present	Yes	Yes	Yes	Yes	interview, qualty manual
Process capacity measured for critical parameter	Yes	Yes	Yes	Yes	interview, quality manual
Practice of preparing detailed action plan to achieve quality target evident on shopfloor	No	Present, action plan displayed on notice board		No	Interview, quality manual, other manual, document

Comparision of QMP elements of OA, OB, OC and OD

Assurance system	OA	OB	OC	OD	Data source
QA dept conducts Audits?	Yes	Yes	Yes	Yes	Interview, quality manual, document review
Process and machine capability of critical machines and processes monitored?	Yes	Yes	Yes	Yes	inteview, quality manual, document review
Instruments used are calibrated?	Yes	Yes	Yes	Yes	interview
QC Tools used	Process control charts, pareto, matrix, checksheet, histrogram, trend chart	Pareto, matrix, check sheet, histogram, process control chart	pareto analysis, matrix diagram, run chart, cp/cpk, 8D problem solving etc	SPC, Pareto, Run chart, cause and effect diagram, cp/cpk analysis, Matrix diagram, Cause and Effect, etc	interview, quality manual, shop floor visit, document review, company document
Application of advance q tools	FMEA, MSA, CP, PPAP, APQP	FMEA, APQP, PPAP, SPC, 8D, MSA	FMEA, APQP, MSA, PPAP, SPC, DOE, TOC	FMEA, APQM, PPAP, DOE	interview, quality manual, shop floor visit, document review, company document
COPQ measured	No	Yes	No	Yes	Interview, quality manual, document review
Customer satisf survey by independent agency?	No	Yes	No	Yes but by Marketing dept only	interview, quality manual, document review,
Perceived level of assurance system	High	High	Low	High	Interview
Customer problems linked to operations? C A on the same taken & communicated?	No	Yes	Yes, not updated regularly	salary/incentive deducted. Communicated through dept head and dept union leaders	Interview, shop floor visit, quality manual
Monitoring parameter to generate assurance defined? And displayed?	No	Yes	Yes	Not displayed	interview, shop floor visit, quality manual
8D method/7 step for problem solving evident on shopfloor?	No	Yes	Yes, not effective	No 8D format / 7 Step format used; Corrective Action report format used.	interview, shop floor visit, quality manual
Other		Audit done at three levels: first level inprocess checking; second level - by QA inspector at predefined interval and the thirrd level by managers based on customer complaints received.	main workforce of QA department include ladies.	No ladies members,	

	Comparision of QMP elements of OA, OB, OC and OD				
Work place management	**OA**	**OB**	**OC**	**OD**	**Data source**
Housekeeping	Separate cleaning team, unidentified material at several places, no defined place for trolley, walls, windows were dirty, Poor yellow line discipline	High importance on housekeeping. Cleanliness maintainede High discipline on yellow line.	High importance given cleanliness maintained High discipline on yellow line floor - white colored	Clenliness and organised shopfloor, the same is not with offices	interview, shop floor visit,, quality manual
Safety	Safety plugs and guardsnot observed	of medicine available on shopfloor.	Given priority first aid availlable on shop.	Given priority, some plugs found open.	shop floor visit, quality manual
Material storage on store	Material status not identified for all types of material,	Material stored very systematically No pilled up near walls	Systematic Material storage	Material stored systematically, no pille up near pillars,	shop floor visit, quality manual
M/C cleanliness	M/C dirty, not regularly cleaned. Average age of m/c high >20 type of maintenance system mainly breakdown and preventive maintenance, Oil leakage in may m/c	machine cleanliness maintained ; man type of maintenance: breakdown, preventive and TPM; operator maintains cleanliness	m/c cleared QC m/c of white color	Machines cleaned, cleanliness not of high order	shop floor visit
Visual display	Targets related to quality Production, delivery, rejection status not displayed	Very high level Production relatede manpower related, performance, improvement of all kind of info displayed and updated regularly, personal information and information related to QMP also displayed	Moderate level Targets were displayed but actual achievement not updated regularly.	Absent	shop floor visit, quality manual, other manual
Display of QMP	PIP boards prepared in 95 were only info displayed related to PIP Kaizen slogan at various places in plant + office	Separate boards assignment for each QMP. Pending poijnts and progress with target also displayed, Reward of information updated regularly	TPM square' for TPM info related to TPM displayed but not updated regularly Other Qmps were not displayed seperately	Absent	shop floor visit
Shop discipline	Uniform only for operator Operator (some) not in dress and shoes	High order discipline Dress code for operators and staff members	Shop discipline maintained Dress code for all employees individually ladies.	Discipline maintained, uniform for operator and also safety shoose	shop floor visit

Practice of coordinating QMP	Comparision of QMP elements of OA, OB, OC and OD				
Planning for QMP	**OA**	**OB**	**OC**	**OD**	**Data source**
QMP planning done by	Coordinator	coordinator	Coordinator	Coordinator	Interview, document review
Detail planning for QMP done and approved by top management	No	Yes	Yes	Yes	Interview, document review
Modified planning once implementation started. Incorporated CFT after initiating implementation?	Yes	No CFT planned since beginning	Yes	No, only time limit modified	Interview, document review
Role of top management in planning QMP	Low	High	Low	Medium	Interview, document review
Planning included activities related to		Project plan, defining responsibility, providing org. structure, defining necessary rules, providing and planning for education deployment of plot project			Interview, document review
QMP planning - target fixing done in line with vision?	No	Yes	No	No	Inteview, docment review, quality manual, other manual
Sequence of various QMPs in organisation planned?	No	Yes	No		Interview, document review, quality manual, other manual
Planning to involve HR department done?	Yes for training	Yes for charge management	Yes for training	No	Interview, document review
Planning for communication	No	Yes	Yes	No	interview, document review
Planning for Reward and Recognisation for QMP	No	Yes	Yes, but not related to QMP	No	Interview, document review

	Comparision of QMP elements of OA, OB, OC and OD				
Coordination for QMP	**OA**	**OB**	**OC**	**OD**	**Data source**
Coordination of QMP done by	Assigned coordinators	Assigned coordinator	Assigned coordinator	Assgned coordinator	Interview, quality manual, other manual, document review
Activites included in coordination	providing guidance on technical matters, interacting with various team members, review progress, coordination with concerned agencies, provide timely feedback to management etc.	planning for QMP, planning and conducting various reviews, helping in actual implementation, resolving issues related to implementation, preparing relevant guideline/rules with the help of HR and top management, liasion with consultant and external agencies, periodic feedback to the top management, documenting progress, consolidating results etc	planning the program, assigning responsibility, define objectives based on management requirements, communicate related to QMP, guide in implementation, documenting the requirements and progress, liasion with various internal and external agencies, monitor progress, take counteractions when required, review progress etc		Interview, quality manual, other manual, document review
Interaction with HR department for necessary training	Yes	Yes	Yes	Yes, subsequently respo for training given to MR	Interview, document review
Tech guidance on QMP provided	Yes	Yes	Yes	Yes	Interview
Regular interaction with team members done by coordinators	No	Yes	Yes	Yes every 15 days review done	Interview, document review
Interaction with the chief done regularly for QMP?	No	Yes	No	Yes in bimonthly MRMs	Interview, document review
The coordinator demonstrated personal involvement in actual implementation	Not in all QMP	Yes	No	Yes as MRs were from Production departments with additional responsibility	Interview
Involved HR department for emplooyee involvement?	No	Yes	No	No	Interview, document review
Sp. Celebration for QMP related events done?	No	Yes	No	No	Interview, document review
Organized speech by the chief of organization in any occasion? Specially related to QMP?	No	Yes	No	No	Interview, document review
Involved customer for suggestion	No	Yes	No	No	Interview, document review

	Comparision of QMP elements of OA, OB, OC and OD				
Reviewing the progress	**OA**	**OB**	**OC**	**OD**	**Data source**
Regular review by coordinatior	Yes	Yes	Yes	Yes	Interview, document review
Regular plan of review prepared?	No	Yes	No	Yes	Interview, document review
Regular review by the chief	Not for all	Yes	No	Yes	Interview, document review
Resource requirements identified and provided?	Yes	Yes	Yes	Yes	Interview, document review
Reviews helped in completing QMP in time?	No	Yes	No	No	Interview
Consultant involved in regualr reviews?	No	Yes	Yes	No	Interview, document review
Coordinator's review detected problem related to QMP?	No	Yes	Yes	Yes	Interview, document review
Review attended by all required positions regularly?	No	Yes	No	Yes, if not attended, salary gets cut	Interview, document review
Adherance issues were discussed and resolved?	Yes	Yes		Yes	Interview, document review
Team performance and individual contribution reviewed in reviews	No	NO, only done during performance appraisal	Yes	No	Interview

Practice of documentation	Comparision of QMP elements of OA, OB, OC and OD				
Document requirement of QMP	OA	OB	OC	OD	Data source
Quality manual available	Yes	Yes	Yes	Yes	Interview, quality manual
Responsibility of preparing the same	CFT	Coordinatior	Coordinator	Coordinator	Quality manual
Manual for other QMPs prepared?	No	Yes-RKQP Business Excellence; requirements related to QMPS displayed on dedicated boards	No	No	Interview, other manual
Archieve of reference documents/standards maintained?	Yes	Yes	Yes	Yes	Interview
Rules & regulation defined related to QMP documented?	No	Yes	No	No	Interview, document review, company document, shop floor visit
Other things specifically documented for QMP	forms, formats, procedures	Kaizen oath Forms, Formats, Procedures	No	No	Interview, document review, company document, shop floor visit

Documenting the progress of QMP	OA	OB	OC	OD	Data source
Progress of QMP recorded?	No	Yes, on dedicated boards	Yes,MOM	Yes, MOM	Interview, document review
Record of review meetings	Yes	Yes, also MOM displayed on dedicated boards	Yes	Yes, MOM	Interview, document review
Milestone achieved in quality were recorded and available with coordinator?	Not recorded	Yes	No	No	Interview, other manual, document review, company document
Consolidated progress on QMP recorded	No	Yes	No	No	Interview, other manual, document review, company document, other manual
Modification/charge in practice of QMP updated in manuals? Displays?	Q-Policy modified but not in manual No issue date mentioned in Q.Policy, citizen's charter	Yes Regularly	No	No	Shop floor visit, Quality manual, other manual
Progress documented on display boards?	No	Yes at every possible place	Yes for TPM	No	Interview, shop floor visit
The same updated regularly?	No	Yes, responsibility for updation also defined covering all department employees.	No	No	Interview, shop floor visit
Which places the progress are displayed	Notice board on main entrance	Every possible places and also in Kaizen room	Main entrance, Reception, near department heads chain	No display	Interview, shop floor visit
Photograph of winners diaplayed		Yes regularly displayed	Yes	No such schemes	Interview, shop floor visit

Practice of data analysis and presentation	Comparision of QMP elements of OA, OB, OC and OD				
IT infrastructure	**OA**	**OB**	**OC**	**OD**	**Data source**
Main platform	ORACLE7.1, COBOL	Oracle basis system	Not known	FoxPro	Interview
main use of IT	generator reports related to production planning, material management, Finance accounting, Payroll accounting, marketing, HRM	All operational transactions were computerised	M S Office used extensively All transaction, not computerised	MS office, software for various modules, SPC software and MS office	Interview
Compatibility with other software	COBOL -ORACLE 7.1 No compatibility	High	No	No	Interview
How it was useful	Data entered by departments, IT generates reports on predefined frequency and submit	Any person seeking information related to production, rejection and its related information can directly get from systems	High level of duplication for data entry and analysis	Data created by dept, predefined reports gets generated by resp dept.	Interview
Information related to quality can be assessed by users directly from software?	No	Yes	No	Yes only for predefined reports, new requirements have to be programmed by IT	Interview
Dependability on IT person to generate reports/information from software	High	Least	High	Less as various persons authorised to access data	
Email Id generated for all executives	No	Yes	Yes	No, only for comon department id generated	Interview
Usage of Intranet	No Intranet	High	Yes	No	Interview, shop floor visit
Web suppliers - Electronic transactions with suppliers?	No	Yes	No	No	Interview

	Comparision of QMP elements of OA, OB, OC and OD				
Availability of required data	**OA**	**OB**	**OC**	**OD**	**Data source**
Necessary data related to QMP is maintained by	Coordinator	Team members, coordinator, QMP office member	coordinator Team member	Coordinator, QA and other dept heads	Interview, quality manual,document review, shop floor visit
Usage of IT in generating necessary data on QMP	Low	High	Low	For manufacturing related data eg, prodction, rejection etc.	Interview
Availability of consolidated data related to QMP	Not available with departments	Yes, displayed at various places	Not available	Not available	Interview, document review
Responsibility to generate necessary data defined?	No	Yes, it is assigned to various employees covering all department	Coordinator	No	Interview, shop floor visit, document review
Data related to QMP readily available?	No	Yes, at dedicated display board	No	No	Interview, document review, shop floor visit

	Comparision of QMP elements of OA, OB, OC and OD				
Analysis and presentation	**OA**	**OB**	**OC**	**OD**	**Data source**
Data analysis done on QMP mainly by	Coordinator	Coordinator Team leader Team members	Coordinator	MR, QA and other dept heads	Document review, interview, shop floor visit, quality manual
Analysis done manually?	Yes	No, with the help of pc	No	Through SPC software, computer system and test mannually	
Analysis presented in meetings by	QA personnel	various process owners/users	Coordinator	Respective coordinators	
Application of statistical tools in analysis	Yes	Yes Application of problem solving, benchmarking, TOC not seen	Yes	Yes	
Dependency on IT department for doing specific analysis	High	least	Medium	Medium	
Data presentation	Done by QA	Every possible data are displayed on dedicated boards in the panned manner and updated regularly	Presented but not in standardised manner	Poor	
Target shown in each data presented?	No	Yes, every data sheet displayes target	No	No	
Data presentation on yearly consolidation	No	Yes	No	No	
Data presentation done in	Monthly quality meeting quarterly QS9000-management review meeting	Display boards on shop Periodic review on Qmp Monthly business review meeting		Monthly quality rejection review, bimonthly MRMs	
Responsibility of data analysis and presentation assigned?	No	Yes	No	Yes, dept heads	
Data presentation standardised?	No	Yes, forn size also standardised	No	No	

Practice of communication	Comparision of QMP elements of OA, OB, OC and OD				
Communicating policy and targets	**OA**	**OB**	**OC**	**OD**	**Data source**
Communication of vision, Q policy	By display at various places	By display; by conducting training classes by trained facilitators	By display	No display of vision	interview, shop floor visit, quality manual, other manual
Q.Policy translation locate language?	Yes	Yes, pocket card prepared for vision and policy	No	Yes	Interview , shop floor visit
Slogans communicated?	Yes, on Kaizen, Save Energy	Yes	Yes	Yes , few	Shop floor visit
Targets communicated?	No	Yes, also by the top management annually	No	Yes through meetings with dept heads	Interview, shop floor visit
Other policy, values communicated?	No	Yes, Actual tree prepared on values, All other policies eg HR policy displayed near respective departments	Yes	No	Interview, shop floor visit
Communication of manager's annual targets done?	No	Yes, at each manager's desk/display board	No	No	Interview, shop floor visit
Communication thru intranet done	No	Yes, all rules, policies etc	No	No	Interview
Target, achievement, vision etc are communicated by the chief to all employees?	No	Yes, regularly	Yes	No	Interview, quality manual, other manual
Documentation of communication process	Not available	Communication policy documented		No	Interview, other manual
Product display	Yes	Yes	Yes	No	Shop floor visit
Usage of National language in official work	Yes as defined by Government	No	No	No	Interview, shop floor visit

	Comparision of QMP elements of OA, OB, OC and OD				
Communicating plans and progress	**OA**	**OB**	**OC**	**OD**	**Data source**
Daily meetings conducted by each department /cell/function on shopfloor?	No	Yes	No	No	Interview, shop floor visit
Basic information related to production provided thrugh	WI, CP, FMEA, SPC, checksheet etc			WI, CP etc as well regular meetings	Interview, shop floor visit
Requirements of QMPs informed	Yes	Yes	yes	Yes	Interview, shop floor visit, quality manual
Clarity of communication ensured on QMP?	Yes No - In Housekeeping both 5s as well as 5 levels of Housekeeping were communicated at two different notice board leading to confusion	Yes	Yes	Yes	Interview, shop floor visit
Communication on progress done by:	Strictly through hirarchy	through teams as well as thru hirarchy, company progress shared by top management regularly	By teams and hirarcy both	Through hirarchy an informally	Interview, shop floor visit, document review,
Dedicated boards provied for communicating progress of QMP?	No	Yes for all Qmps	Yes - TPM not for others	No	Shop floor visit
Communication process/means standardised?	No	Yes	No	No	Shop floor visit
Responsibility for communication assigned?	No	Yes	Coordinator	No	Interview, shop floor visit
Progress against target communicated?	No	Yes	Yes, not updated regularly	Not displayed, discussed in meetings only	Interview, shop floor visit
Customer, specific problem communicated to all concerned?	Yes by meeting	Yes, by meetings of display boards	Yes, by meetings and display boards	Yes	Interview, shop floor visit
Quality problems and issues communicated	through hirarchy only	Yes, regularly in daily meeting and through displays	Yes, through photographs at relevant places	Yes	Interview, shop floor visit
Inhouse publication	Yes corporate publication. No separate plant's publication	Yes, BU's publication	No in-house publication	No	Interview, company document

Practice of involving customer and suppliers	Comparision of QMP elements of OA, OB, OC and OD				
Involving customer	**OA**	**OB**	**OC**	**OD**	**Data source**
Customers involved in New product development?	Yes	Yes	Yes	Yes	Interview, quality manual, document review
Involving/inviting customers for special occasion related to QMP?	No	Yes, every year on anniversary of each cells	No	No	Interview, quality manual, other manual, document review
Interaction with customers by operators	No	Yes	No	No	Interview, quality manual, other manual

	Comparision of QMP elements of OA, OB, OC and OD				
Involving suppliers	**OA**	**OB**	**OC**	**OD**	**Data source**
Suppliers involved in QMP?	No	Yes	No	Yes	Interview, quality manual
Criteria for suppliers selection	Price	Quality,price,capability		Quality and price	Interview, quality manual
Supplier meet organised?	No	Yes	No	No	Interview, quality manual
SBU/ the chief addressed all suppliers	No	Yes	No	No	Interview
Regular interaction with suppliers?	No, only when rejection comes	Yes	No, started recently due to quality issues	Yes, called in MRM based on the need	Interview
Vision, mission of long term requirements communicated to suppliers?	No	Yes	No	Yes communicated	Interview, document review
Supplier satisfaction survey done?	No	Yes	No	No	Interview, document review, quality manual, other manual
Suppliers involved in new developments	No	Yes	Yes	Not required	Interview, quality manual
Supplier audits conducted	Yes	Yes	yes	Yes	Interview, quality manual
Training for suppliers planned		Planned and coordinated by Purchase department		Yes	Interview, document review

Practice of encouraging employee involvement	Comparision of QMP elements of OA, OB, OC and OD				
Cross Functional Team	**OA**	**OB**	**OC**	**OD**	**Data source**
CFT planned before initiating QMP?	No	Yes	No	No	Interview, document review
CFT introduced during QMP or based on the need felt subsequantly?	Yes	Yes	Yes	NO	Interview, document review
CFT was a normal practive for any improvement in organization?	No	Yes	Not always	NO	Interview, quality manual, other manual, document review
CFT spreaded across the organisation	No	Yes	No	No	Interview, document review, shop floor visit
Performance of teams evaluated periodically?	No	Yes	No	No	Interview, shop floor visit,quality manual, other manual, document review

	Comparision of QMP elements of OA, OB, OC and OD				
Education and Training	**OA**	**OB**	**OC**	**OD**	**Data source**
Awareness program while intiating QMP?	Yes	Yes	No	No	Interview, document review
Specified skill training to CFT members?	No	Yes	Yes	No	Interview, document review
Cost constraints for attending external training?	Yes	No	No	No	Interview, document review
Training on vision, policy, values done?	No	Yes, by trained facilitator across OB	No	No	Interview, document review
Training for 'change' before QMP?	No	Yes, with the help of HR department	No	No	Interview, document review
Employees sent out to see similar QMPs at other companies?	No	Yes	No	Yes to group company	Interview, document review
Consultant's involvement in training	Yes	Yes	Yes	Yes	Interview
Involvement of senior managers in training operators	Low	High	Low	Yes	Interview, document review
Systematic upgradation of operators to supervisor/executive level?	No	No	Yes-'Operating Engineer'	No	Interview, document review, quality manual, other manual
Separate training faculties in company?	No	No	Group university	No	Interview

	Comparision of QMP elements of OA, OB, OC and OD				
Interaction with top management	**OA**	**OB**	**OC**	**OD**	**Data source**
Practice of periodic interaction of employees with the chief	No	Yes 'Speak out' sassion	No	No	Interview, document review
Employee gets direct opportunity to communicate with the chief (top management)	No	Yes	No	Yes during the shop floor visit	Interview, document review

	Comparision of QMP elements of OA, OB, OC and OD				
Practice of rewarding best contributors	**OA**	**OB**	**OC**	**OD**	**Data cource**
Practice of rewarding best contribution in QMP	In past Yes Not in present	Yes	No Only for production and housekeeping	No	Interview, quality manual, other manual
Appriciation letter-scheme signed by top for any achievement?	No	Yes	No	No	Interview, document review, quality manual, other manual
Monitory benefit for all contributors	No	Yes	Yes- suggestion scheme	Yes only for production and sales incentive	Interview, document review
Monthly rewards announced?	No	Yes	Yes	No	Interview, shop floor visit, document review
Photographs of winners displayed?	No	Yes	Yes	No	Interview, shop floor visit
Special reward for QMP?	No	Yes, foreign trip for >1000 Kaizenee	No	No	Interview, document review
Dinner/Lunch with top management (MD, VP etc)	No	Yes	No	No	Interview, document review
Awards distributed in presence of all?	No	Yes	Yes	No	Interview, document review
Aligning various HR practices	No	Yes	No	No	Interview, document review

	Comparision of QMP elements of OA, OB, OC and OD				
Celebration	**OA**	**OB**	**OC**	**OD**	**Data source**
Celebration of QS/TS done? All employees invited?	Yes No, only department heads were invited	No	No	No	Interview, document review
Initiation of QMP celebrated Speech by Guest & CEO/Chief	No	Yes	No	No	Interview, document review, other manual
Other regular events celebrated related to Qmp?	No	Yes-Kaizen Mela	No	Annual get to gather done	Interview, document review, other manual

OUTCOME	Comparision of QMP elements of OA, OB, OC and OD				
QMP	OA	OB	OC	OD	Data source
Did Qmp delivers desired result? - perception of coordinator of functional heads	QS 9000 - Yes PIP - No Kaizen - No Suggestion scheme - No	TS 16949 - Yes Kaizen - Yes 5S - Yes TPM - Cant'say - Just started RKQP - yes	QS - 9000 - Yes QCDGP - Yes TPM - Just started Six Sigma - No	QS9000 Yes	Interview
Was QMP completed in time with its plan date?	QS 9000 - No 9 month delay For PIP, Kaizen and Suggestion scheme No Schedule of its total implementation available	TS 16949 - Yes Kaizen, 5S, TPM, RKQM All are still continuing	QS - 9000 - Yes QCDGP Both are TPM in practice Six Sigma - No	No	Interview, document review
QMP progress consolidation done for each QMP?	No	Yes	No	No	Interview, document review
All QMPs implemented are still in practice	No	Yes	No(Six Sigma not)	No, TS, ISo14001, ISO14001 were not implemented even they were planned	Interview, shop flootr visit, document review
Reasons for QMP not in practice - learning from failure/ closure done	No	Yes - 5's' Reintroduced	No	No	Interview
Variation in policy and its actual practice evident in organisation?	Yes	No	Yes	No	Interview, shop floor visit, document review, company document quality manual, other manual
Clarity of various QMP observed at function heads?	No - Difference between kaizen and suggestion scheme not clear	Yes	Yes	No, Housekeeping, Kaizen and TS and ISO14001 were not clear to dept heads	Interview
Need for QMP/improvement realised by functional heads?	No- Dept head - personally not happy for extra work	Yes	Yes	Yes	Interview
QMP implementation was seen as additional burdon by production executives / head?	Yes	No	Yes	Yes to the externt of high documentation requirements	Interview

OUTCOME	Comparision of QMP elements of OA, OB, OC and OD				
QMP	OA	OB	OC	OD	Data source
Benefit of QMP perceived by marketing executive/head?	Yes	Yes	No	Yes	Interview, document review
Do senior managers perceived / felt that Qmps are no longer required as they have got QS/TS certification?	Yes	No	No	No	Interview
QMP (other than QS / TS) was evident in practice in finance/marketing?	No	Not as regirous as in the plant	No	Only CI projects, concept like Housekeeping and Kaizen not practiced.	Interview, shop floor visit, document review
Benefits of QMP quantified?	No	Yes	Only in QCDGP	Yes, CI projects were converted into savings.	Interview, shop floor visit, document review,

	Comparision of QMP elements of OA, OB, OC and OD				
QMP	**OA**	**OB**	**OC**	**OD**	**Data source**
QMPs percieved as an ongoing part of improvement?	No	Yes	Yes	No	Interview, document review
Percieved awareness of operators have improved - coordinator's & department head's views	Yes	Yes	Yes	Yes, they have become more system oriented.	Interview
Basic Housekeeping	Bad	Well practiced and monitored	Better	Better in shop , bad in offices	shop floor visit
Reason for failure of QMP-perceptions	Poor top management commitment, Less priority by management QS9000 seen for certification only, less involvement of department heads No regular reviews	For 5's' only: Too many initiatives started which created confusion among employees.	Top management commitment Coordinator for QS/TPM changed more than twice Coordinator not directly related with production/quality Wrong selection of coordinator QS seen as certificate only Less involvement of department head No regular reviews Lack of awareness on expected benifits Lack of training Qmp Lack of adherence to policy/planning related to Qmp.	Failure of ISO14001, TS16949 and Kaizen were: Lack of top management priority on the program; lack of priority demonstrated by functional head; no full time coordinator appointed as all coordinators were doing the same alongwith their normal duty as production/Engg head;	Interview
Reason for success of QMP - perceptions	For QS 9000 : Strong coordinator Involvement of coordinator	All QMPs: Top management support Demonstration by top/seniors in Qmp implementation Frequent review by top Involvement of worker 'Change' managemnt training Transparant communication to all Training Rewards and recognition	For QCDGP : Periodic review by top Linking project target with annual appraisal Review in every business meetings	Top management 's direct involvement , small team	Interview

Operational measures	OA (1999-2004)	OB	OD	OE	Data source
Customer complaints	% Technical complaints reduced; Bearing returns wrt to supplies increased, value of bearing returned wrt turnover increased	Reduced both for OEM and After market segment	No record available	Reduced	Interview, shopp floor visit, document review, company document, quality manual, other manual
On Time Delivery	Reduced	Increased	No record available	Increased	
Utilisation	Production hours as % of total available hours reduced	Increased	No record available		
Rework	Increased	Reduced	reduced from 2002/03 to 2003/04	Reduced	
Rejections	Increased	Reduced	Increased from 2002/03 to 2003/04	Reduced for material and process both	
Breakdown	Mechanical downtime reduced; electrical downtime increased	Line efficiency increased	No record available	Data not provided	
New product development time	Reduced from from 165 days to 130 days	Reduced from 11 weeks to 8 weeks	No record available	No consolidation, customers not happy with high NPD time	
Losses	No material loss increased; No operator loss reduced		No record available		
Product audit results	% lots not passed in 1st stage increased; total bearing withheld increased		No record available		
Customer satisfaction survey	Not conducted	Done, measurement changed	No record available	Done internally	
% suggestions per employee	Reduced		No record available		
No of Kaizen implemented	No record available	Increased	No record available	CI projects increased, saving in Lacs also increased	
COPQ		Reduced		Reduced	

ANNEXURE C

Table C.1: List of Organisations approached for request for Data Collection

Sr	Company Name	District	PinCode	Address1	Address2
1	A B C Bearings Ltd.	Mumbai	400018	402-B, Poonam Chambers,	Dr. Annie Besant Road, Worli, Mumbai
2	Anand	Delhi	110016	1, Sri Aurobindo Marg	New Delhi
3	Asian Bearing Ltd.	Chennai	600014	14, Peters Road,	Royapettah, Chenai 600014
4	Austin Engineering Co. Ltd.	Junagadh	362030	Village: Patla,	Taluka: Bhesan, Dist Junagadh
5	Triman Industries Pvt Ltd	Mumbai	400004	Suit No 507, Hotel Imperial Palace,	45, Telly Park Road, Andheri(E), Mumbai -69
6	Baynee Industries	Kolkata	700071	Flat No 3 & 4, 5th Floor	Chatterjee International Center, 33A, Chowringhee Road, Kolkata
7	Benera Bearings & Piston Ltd.	Agra	282007	Bharatpur Road, Bodla	Agra
8	Benara Udyog Ltd	Agra	282007	Bharatpur Road,	Bodla, Agra
9	Beta Industrial Products	Delhi	110033	B-17, G T Karnal Road, Industrial Area	Delhi 110033
10	Bimetal Bearings Ltd	Coimbatorw	641018	18, Race Course Road	Coimbatore
11	Deccan Bearings Ltd.	Mumbai	400001	315/321, Prospect Chambers,	2nd Floor, Dr. D N Road, Fort, Mumbai
12	F A G Bearings India Ltd.	Mumbai	400021	Nariman Bhavan, 8th Floor, 227,	Backbay Reclamation, Nariman Point,
				Maneja, Vadodara 390013	
13	Gabriel India Limited	Delhi	110016	No 1, Sri Aurobindo Marg	New Delhi
				Plot No. 5, Sector,	Parwanoo Himachalpradesh
14	G K N Sinter Metals Ltd.	Mumbai	400039	Gateway Building,	Appollo Bunder,
15	Galaxy Bearings Ltd.	Ahmadabad	380009	T-18, Vikram Chambers,	Ashram Road,
				Dwarkadhish Mill Compound,	Tagore Road, Rajkot 360002
16	Gleitlager (India) Ltd.	Aurangabad (MAH)	431210	GMH House, Plot No.H-6,	MIDC Indl. Area, Chikalthana,
17	Harsha Engineers Ltd	Ahmedabad		Sarkhej Bavla Road -213,	Changodar Ahmedabad
18	H M T Bearings Ltd.	Hyderabad	500040	Moula-Ali,	Hydrabad
				59, Bellary Road, Bangalore 560032	
		Bangalore	560032	59, Bellari Road, Bangalore	
19	Indo Nikko Bearings Ltd	Mumbai	400004	Nikko House, 399 V P Road,	Mumbai
20	Indo Schotte Auto Parts Pvt Ltd	Pune		C/o.Office Club, Swaroop Complex	3rd. Floor, 41/14 Karve Road, Pune 411004
21	K C Bearings Pvt Ltd	Mumbai		204 Sterling Chambers	56 Mogra Village Lane, Andheri (East), Mumbai 69

Sr	Company Name	District	PinCode	Address1	Address2
22	Kirloskar Oil Enginees Ltd	Pune		Laxmanrao Kirloskar Road,	Kirkee, Pune - 411003
23	M&M Engg (I) Ltd	Chennai	600001	No 50, Armenian St.	
24	MNR Bearings Ltd	Mumbai	400004	377 Mayur Building Ground Flrro	Vithalbhai Patel Road, Mumbai 69
25	Mahindra Sintered Products Ltd	Pune	411018	146, Mumbai Pune Road	Pimpri
26	Mipco Seamless Rings (Gujarat	Bharuch	392015	Plot No. 109,	GIDC Industrial Estate,
27	N R B Bearings Ltd.	Mumbai	400001	Dhannur,	15, Sir P M Road, Fort,
28	National Engineering Inds. Ltd.				
	(NBC Bearings)	Jaipur	302006	onal Engineering Industries, Khatipura F	Jipur - 302006
29	Patel Brass works	Rajkot	360002	2, Bhaktinagar , Station Plot	Rajkot
30	Ring Plus Aqua Ltd	Mumbai	400064	605, Jagdamba Comm Complex	Link Road, Malad, Mumbai
31	Shriram Bearings Ltd	Delhi	110008	02, 1203 Vikrant Tower, 4 Rajendra Pala	New Delhi NCT of Delhi
32	S B L Industries Ltd.	Delhi	110008	1202-1203,12th Flr.,Vikrant Tower 4,	Rajendra Place, Pusa Road,
33	S K F Bearings India Ltd.	Mumbai	400002	Mahatma Gandhi Memorial Building,	Netaji Subhash Road, Marine Drive,
34	S N L Bearings Ltd.	Mumbai	400001	Dhannur,	15, Sir P.M. Road, Fort,
35	Security Company Ltd.	Kolkata	700001	9, Brabourne Road,	7th Floor,
36	Tata Iron and Steel Co Ltd (Ring	Jamshedpur	831001	CE&DD Main Building,	2nd Floor, Jamshedpur, Jharkhand
		Kolkata	700071	Tata Centre, 43 Jawaharlal Nehru Rd	Kolkata
37	Texspin Bearings Ltd	Mumbai	400013	31A/32 Ideal Industrial Estate	MATHURDAS Mill Compound, Opp Empire Dyeing , Senapati Bapat Marg, Lower Parel, Mumbai
38	Timken India Ltd.	P.O. Agrico, Jamsh	831009	Bara,	P O Agrico, Jamshedpur
39	Union Bearings (India) Ltd.	Ahmadabad	380009	123/24, 1st Floor,	Mangal Moorty, Ashram Road,
40	Vajra Bearings Ltd.	Vadodara	391440	P.No.1454, Padra Jambusar Highway,	P.O. Dhabhasa, Tal.- Padra,
41	Mennon Bearings Ltd	Kolhapur	416234	MIDC, Gokul Shirgon, Kolhapur	
42	Bimetal Bearing ltd	Hosur	635109	Bimetal Bearings Ltd; Perandapalli	HOSUR