Chapter 2
CHAPTER – 2  
QUALITY MANAGEMENT 

Manager of any commercial organisation – whether manufacturing or service – deals with a very critical issue: profitability. Continuous existence of the organisation solely depends upon its profitability. Three important factors, which contribute to the profitability, are productivity, cost of operation, and quality of goods or services produced by the organisation. Out of these three factors, quality is probably the most significant factor in determining the existence and sustenance of the organisation. Quality is globally recognised as an essential ingredient of competitiveness and has out-scored all other factors\(^8\). Quality has even become a focal point for industry-union cooperation. In working with Chrysler Corporation to improve quality, a UAW vice president succinctly stated the importance of quality: No quality, no sales. No sales, no profit. No profit, no jobs\(^9\).

In this chapter, following topics related to various facets of quality have been discussed:


2.1 What is Quality?

The Concise Oxford Dictionary (Ninth Thumb Index Edition) defines quality as “the degree of excellence of a thing (of Good quality, poor in quality).” People define quality in many ways. Some think of quality as superiority or excellence, others view it as a lack of manufacturing or service defects, still other think of quality as related to product features or price\(^{10}\). These are, however, not practical definitions because they do not describe the understandings of quality in business and industry. The “official” definition of quality by the American National Standards Institute (ANSI) and the American Society for Quality Control (ASQC) is “the totality of features and characteristics of a product or service that bears on its ability to satisfy given needs\(^{11}\).” Quality can be defined in many ways, depending on who is defining it, in what context it is being

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defined, to what product or service it is related, and who is the targeted
customer. Even though, the definition given by ANSI/ASQC is
operationally useful, it does not take into consideration the various
perspectives on what quality means to different consumers, different
people in a manufacturing or service organisation, and viewpoints of
customers at different places and time. A product has several quality
dimensions. Garvin discusses the following dimensions of quality
(primarily for manufactured products) a consumer looks for in a
product:

1. Performance: Primary operating characteristics of a product.
2. Features: Extra items added to the basic product.
3. Reliability: The probability of a product’s surviving over an
expected time frame under stated conditions of use.
4. Conformance: The degree to which a product meets pre-
established standards.
5. Durability: The amount of use one gets from a product during
its life span before replacement.
6. Serviceability: The ability to repair a product quickly and
easily.
7. Aesthetics: How a product looks, feels, sounds, smells, or
tastes.
8. Perceived Quality: Subjective assessment of the product on the
basis of image, brand name, advertising etc.

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13 David A. Garvin, "What does 'Product Quality ' really mean?" Sloan Management
Sreenivasan\textsuperscript{14} highlights the role of quality by stating, “from a larger perspective, an enterprise has to ‘thrive on chaos’ and achieve excellence in an environment of impermanence. To accomplish these through quality and service, an enterprise has to strive for and maintain the following:

- Consistent world class quality and service;
- Quickness and responsiveness to market needs through resilience, adaptiveness and flexibility;
- Continuous short-cycle innovation and improvements;
- Creating new markets for new as well as mature products and services.”

Roberta Russell and Bernard Taylor\textsuperscript{15} are of the opinion that “the dimensions of quality for a service differ somewhat from those of a manufactured product. Services quality is more directly related to time, and the interaction between employees and the customer.” Evans and Lindsay\textsuperscript{16} identify the following dimensions of service quality:

1. Time: How much time must a customer wait?
2. Timeliness: Will a package be delivered by the promised time?
3. Completeness: Is everything demanded by the customer provided to him?
4. Courtesy: Employees’ treatment to the customer.

\textsuperscript{15} Op. cit. p. 78
5. Consistency: Is the same level of service provided to each customer each time?

6. Accessibility and convenience: How easy it is to obtain the service?

7. Accuracy: Is the service performed right the first time?

8. Responsiveness: How quickly the company reacts to unexpected problems?

All these product and service characteristics must be taken into account for quality while designing the product/service.

2.2 History of Quality:

During the middle ages, the skilled craft persons were providing goods and services either as individuals or working together in small teams. They were providing goods for individual customers from their own home/work place. Since, they dealt directly with the customers, they carried out both the managerial and quality activities. Every piece was unique hand fitted and made as per requirements of the customer. Considerable individual pride in the workmanship of a craftsperson existed. In view of the low state of technology and limited knowledge of the individual, the actual quality was tolerable. However, a craftsperson was able to understand the needs of his customers because of his direct contact with them and their feedback. The craft persons, therefore, were in a position to fulfil the quality demands of the customers.

At a later stage, the quality function was performed by team efforts like craft guilds. This, of course, required team efforts, unification of efforts
of individuals, training, setting of standards, and stimulating actions. The resulted quality of a product or service was within the limits because the enterprise was small, it had a limited number of persons, and the products were sold to small number of persons in a small area. In their efforts to manage quality, the guilds set standards and also regulated every detail of manufacture, from raw material to finished product. This regulation of manufacturing activities may have been one of their most direct efforts at quality control. An excellent example of quality product can be the ‘malmal’ of Dhaka.

But, with advent of industrialisation and growth of modern factory during the late nineteenth century and also in early twentieth century; the number of workers, complexity of production, and size of the factory increased. This created a need for measures of quality performance and led to the creation of band of people who were not involved in direct production, but were given the responsibility of inspecting the quality of a product. There was usually a team of people carrying out inspection activities to weed out products that would not meet customer requirements. This was the stage of quality control inspection which subsequently followed in to the creation of theories and methods of quality control and assurance.

As Acheson J. Duncan states, “it was not until the 1920s that statistical theory began to be applied effectively to quality control”. Walter A. Shewhart of the Bell Telephone Laboratories was the first to apply statistical methods for controlling the quality in 1924. However, statistical quality control became popular only during World War II.

Various methods like Lot Acceptance Sampling Plans, Control Chart, Test of Hypothesis, Analysis of Variance, Regression and Correlation etc. set pattern for statistical quality control. It was in the early 1950’s that Statistical Quality Control (SQC) techniques were first used in an extensive way in manufacturing industry.

However, quality control in organisations was confined largely to the in-house activities. There were no written quality policies or guidelines. Inspection department was considered the sole custodian of the product quality. A belief was developed in the minds of the workers – who were manufacturing the goods – that the quality was the responsibility of the inspection department only and they need not bother for the production of a quality product. Even, the Research and Development Department, and Engineering Department did not see quality as their direct concern.

As S. M. Sundara Raju¹⁹ says, “For over four decades now, professionals have been promoting quality control in organisations all over the world, but their efforts have met with only a partial success.” He further adds, “The aspect of customer satisfaction was frequently limited to attending to complaints and claims during warranty and the in-house improvements were restricted to rejects, reworks etc. which did not necessarily have large scale implications for the overall objectives of the company.” He also says, “Perhaps the top management in the past did not face enough threats and opportunities to take quality seriously. The emerging global economic environment has now prompted them to implement quality for the very survival and continued success of their business.”

“A new phase in quality control dawned in the 1960s,” says Jerry Banks\textsuperscript{20}, “This was the beginning of an era that Feigenbaum\textsuperscript{21} (1983) described as total quality control. Prior to the 1960s, quality control activities were essentially associated with the shop floor. The decision-making structures of businesses could not utilise effectively the results and recommendations emanating from the statistical techniques being applied. The techniques were not applied to those serious quality control problems in which management was most interested. The framework, for doing so, was lacking. Total quality control advocated the idea that not only the quality control department, but also all other departments had quality control responsibilities. Therefore, each department had some role in guaranteeing good quality. Other concepts, that attempted to involve all employees of the organisation in the quality control function, began to emerge. In the same year that Feigenbaum put forward his concept of total quality control, the concept of zero defects (ZD) was born”.

John Zhuang Yang\textsuperscript{22} in his paper says, “Unlike the traditional approach to quality control that is administered by quality inspectors at the end of the production process, the Japanese approach to quality control focuses on building superior quality in the production process through the development of team-oriented practices.” The paper develops a conceptual model on how Human Resource Management (HRM) functions are integrated into the production system in Japanese firms.


The theoretical discussion is supported by empirical reports of how Japanese plants in the USA use team-oriented HRM policies to control product quality. He has compared Traditional Production and Personnel Model (Table 2.1 given below) with Japanese Production and Personnel Model, (Table 2.2 shown below). To comprehend the contents of these two tables, the first column of Table 2.1 should be compared with the first column of Table 2.2, and similarly Column – 2 of Table 2.1 with Column – 2 of Table 2.2.

**Table – 2.1 Traditional Production and Personnel Models**

<table>
<thead>
<tr>
<th>Mode of Production</th>
<th>Type of human resource policies</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Fordist production model</em></td>
<td><em>Traditional personnel model</em></td>
</tr>
<tr>
<td>Mass Production</td>
<td>Low commitment to employees</td>
</tr>
<tr>
<td>Economies of scale</td>
<td>Hire functional specialists</td>
</tr>
<tr>
<td>Emphasise automation</td>
<td>Mass layoffs when necessary</td>
</tr>
<tr>
<td>Hierarchical structure</td>
<td>Detailed job classifications</td>
</tr>
<tr>
<td>Use inspectors for quality</td>
<td>Limited on-the-job training</td>
</tr>
<tr>
<td>Just-in-case inventories</td>
<td>Individual responsibilities</td>
</tr>
</tbody>
</table>

**Table 2.2 Japanese Production and Personnel Models**

<table>
<thead>
<tr>
<th>Japanese production model</th>
<th>Japanese human resource policies</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>The production model</em></td>
<td><em>The personnel model</em></td>
</tr>
<tr>
<td>Product flexibility</td>
<td>Use lay-offs as the last resort</td>
</tr>
<tr>
<td>Economies of scope</td>
<td>Develop a broad job structure</td>
</tr>
<tr>
<td>Emphasise human control</td>
<td>Emphasise on-the-job training</td>
</tr>
<tr>
<td>Flat organisation structure</td>
<td>Extensive use of work teams</td>
</tr>
<tr>
<td>Total quality control</td>
<td>Total employee participation</td>
</tr>
<tr>
<td>Just-in-time inventories</td>
<td>Job rotation and multi-skills</td>
</tr>
</tbody>
</table>
Joseph A. DeFeo, and Alexander Janssen predict a major role for quality in the business world of the twenty-first century. Their article considers a broad range of developments such as the possible advances in online business, increased coverage of quality issues in higher education, and developments in tools aimed at facilitating the establishment of quality programmes. The article predicts that quality will impact more and more on all aspects of business. Having sprung largely from the manufacturing environment, such quality will spread to all types of organisations and to all facets of business. They conclude that while the twentieth century could be seen as the century of productivity, the twenty-first century will be seen as the century of quality.

Jaideep G Motwani, Essam Mahmoud, and Gillian Rice identify critical factors that must be practised to achieve effective quality management in an organisation based on the synthesis of literature on quality concepts. They had developed a framework to be used by organisations to evaluate their quality practices. A field study was also conducted in seventy-three organisations with more than 500 employees and a total sales volume of over Rs. 251 million to identify the degree to which quality management was being practised in Indian manufacturing organisations and to locate the organisational areas where better management control can make the quality programme more effective. They observed that all requirements for effective quality management could be classified into the following nine major critical factors: ‘top

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management', 'quality policies', 'role of the quality department', 'training', 'product design', 'vendor quality management', 'process design', 'quality data', and 'feedback and employee relations'. They have concluded that all nine factors need not be present to ensure the success of a total quality programme.

Robert Karaszewski, and Wlodzimierz Karaszewski have added one more dimension to quality viz. foreign direct investment, citing an example of companies with foreign capital operating in Poland. They say, "Foreign direct investment in Poland is feared in some political and economic circles, (and) in others it is accepted too enthusiastically. The intention of this paper is not to show which side seems to be right but to attract the attention of Polish economic organisations to the fact that companies with foreign capital give much consideration to quality improvement aspects. Achievements of companies with foreign capital on the Polish market, especially in the field of acquiring competitive advantages, do not result from easy access to cheap credits or tax relief but, probably, first of all, from applied management methods including total quality management."

2.3 Total Quality Management:

Traditional way of doing the business does not help to achieve excellence. An enhancement in the techniques and systems becomes necessary to meet the global competition. A continuous improvement can lead to the changing of the culture of the organisation, which in turn

can lead to the Total Quality Management (TQM). ISO 9000 is perhaps one of the few initial steps for an organisation to move towards TQM. It provides a platform for continuous improvement so that cultural changes take place in the organisation. In this study of ISO 9000 certified companies, almost 90 percent organisations have confirmed that they plan to develop/grow for further improvements in quality aspects like Total Quality Management (TQM) as a sequel to ISO 9000. TQM, therefore, seems to be the final destination of the organisations. In light of these facts, the topic of TQM is discussed here at a considerable length.

Total Quality Management (TQM) can be viewed as an organisation-wide philosophy requiring all employees at every level of an organisation to focus his/her efforts to help improve each business activity of the organization. Everyone is responsible for improving and ensuring quality. Everyone in the organisation is required to make quality a culture in his/her daily life. TQM is a long-term perpetual improvement process requiring significant resources, both financial and human. It is, therefore, imperative that the concept of TQM comes from the top management. It is a dynamic process – not static one. TQM requires continuous efforts and no deadlines or target dates can be fixed. The process can never be considered complete since there is no goal or destination. Hence, TQM has to become a way of life for everyone in the organisation. Past practices focused on quality control, while TQM is looked on as a process-oriented philosophy of enhancing customer satisfaction through the production of higher quality goods and services.

J. R. Evans and W. M. Lindsay\textsuperscript{27} say, "Today, the term Total Quality Management (TQM) is becoming more popular. The principles of TQM are embodied in the following:

1. Business success can only be achieved by understanding and fulfilling the needs of customers.
2. Leadership in quality is the responsibility of top management.
3. Statistical reasoning with factual data is the basis for problem solving and continuous improvement.
4. All functions at all levels of an organisation must focus on continuous improvement to achieve corporate goals.
5. Problem solving, and process improvement are best performed by multifunctional work teams.
6. Continuous learning, training, and education are the responsibility of every one in the organisation."

Dale H. Besterfield\textsuperscript{28} and others state that TQM integrates fundamental management techniques, existing improvement efforts, and technical tools under disciplined approach. They have advocated that TQM requires six basic concepts:

1. A committed and involved management to provide long-term top-to-bottom organisational support.
2. An unwavering focuses on the customer, both internally and externally.
3. Effective involvement and utilisation of the entire work force.
4. Continuous improvement of the business and production process.

5. Treating suppliers as partners.

R.P. Mohanty\textsuperscript{29} in his article has used his experience of the implementation of total quality management (TQM) in a number of companies across a range of industrial sectors. He has suggested the following five steps as guidelines for implementing TQM:

- Step 1. Identify the degree of commitment, key interests and list down the long-term changes required.
- Step 2. Define the objectives of TQM.
- Step 3. Develop an understanding of organisational systems and identify their quality requirements within a customer-centred focus.
- Step 4. Specify top management commitment through quality policies, procedures and processes.
- Step 5 - Create company-wide awareness and participative work environment by emphasizing customer-oriented values and encouraging quality commitment.

In a theoretical article, Hubert Rampersad\textsuperscript{30} discusses various aspects pertaining to the needs of customer satisfaction. He states, “Customer satisfaction is a key issue for all organisations in both the private and public sectors. To survive, you must understand and provide what the customer wants. It is important to understand the entire chain of customers. The needs of each customer must be examined separately.

Not only the external, but also the internal customers should be considered. In fact, if the company does not satisfy the needs of the internal customers, how will it be able to comply with the needs of the external customer? All employees determine the degree of customer satisfaction. As a supplier, you should try to figure out what the customer needs and wants. This article focuses on all these aspects, based on 75 painful questions about your customer satisfaction."

He has explained the requirements of internal and external customers in the following figure:

![Customer-supplier relationship diagram](image-url)

**Fig 2.1 Customer-supplier relationship**

2.3.1 ‘Involvement’, ‘Values’, and ‘Cultural Change’ as pre-requisites for TQM:

Involvement is a topic of long-standing interest to management scholars and practitioners, as evidenced by the proliferation of concepts like job involvement, organisational involvement, employee involvement, and total involvement. Involvement is also of crucial importance to total quality management as a vital means to achieve customer satisfaction, delight and commitment through continuous quality improvement.
Zoe S. Dimitriades\textsuperscript{31} in his article argues, "Involvement in total quality is different from traditional involvement - being a holistic, multi-faceted construct; based on distinctive TQM principles; and aiming at different objectives. Furthermore, a number of team involvement mechanisms (i.e. quality circles, quality improvement teams and/or quality project teams) have been used interchangeably in the TQM literature, indicating that these concepts are theoretically redundant." The analysis undertaken in his paper reveals that, although closely related, these constructs are not identical since they fulfil differentiated functions. He has rendered suggestions for advancing the study of total involvement in quality management.

Table 2.3 given below compares the various elements of the previous state (quality control) with the TQM.

\begin{table}[h]
\centering
\begin{tabular}{|l|l|l|}
\hline
\textbf{Quality Element} & \textbf{Previous State} & \textbf{TQM} \\
\hline
Definition & Product-oriented & Customer-oriented \\
Priorities & Second to service and cost. & First among equals of service and cost. \\
Decisions & Short-term & Long-term \\
Emphasis & Detection & Prevention \\
Errors & Operations & System \\
Responsibility & Quality Control & Everyone \\
Problem Solving & Managers & Teams \\
Procurement & Price & Life-cycle costs, partnership \\
Manager’s Role & Plan, assign, control and enforce & Delegate, coach facilitate, and mentor \\
\hline
\end{tabular}
\caption{New and Old Cultures}
\end{table}


It can be seen from the above table that TQM movement has to recognize that everyone has a part to play in delivering quality, and the entire organisation has to refocus towards its customers. TQM, thus, requires a cultural change. It is not possible for an organisation to achieve such change in a short period of time. Organisations have to put in lot of efforts to accomplish the cultural change.

Carlos Noronha using a sample of total quality management (TQM) companies operating in China, Hong Kong, and Taiwan has tested a structural equation model explaining the influence of Chinese cultural values on TQM. The results indicate that the proposed model demonstrated satisfactory goodness of fit. The underlying Chinese values of abasement, adaptiveness, harmony with people, harmony with the universe, interdependence, and respect for authority were found to have important influences on four quality dimensions, namely climate, processes, methods, and results.

On the other hand, Marina Chan et al. point out in their paper, "Although China has implemented quality management since the 50s, the concept of quality management has been weak and the quality of many manufactured products remains poor. On one hand, the centrally planned economy had a lot to account for, which only required managers to meet quantity and not quality. On the other hand, the Chinese culture and values have also generated unfavourable factors such as too much respect for the authority, face saving attitude,

unquestioned obedience, which have hindered the development of quality management.”

The purpose of the study carried out by Stefan Lagrosen has been to explore and describe the influence of some national cultures on the way quality management is practised. He has carried out case studies in the UK, Germany, France and Italy. Some differences in focus have been found. These are related to cultural theory. Hofstede's dimensions of power distance and uncertainty avoidance are relevant for understanding the variation. The managerial implications of the differences are also discussed, notably with reference to multinational companies. At the end he has proposed some different aspects to consider when quality initiatives are taken in the countries in question.

2.3.2 ‘Employee perceptions’ in TQM:

Perception is a complex process where persons make an interpretation of the situations, which they come across. Perception of employees is very important when a company wants to implement TQM because success of TQM will heavily depend upon as to how the employees view it. A positive perception of TQM will lead to the successful implementation while a negative thinking about it will derail the whole process. A positive perception will lead to the employee involvement, which in turn can improve quality and productivity through better decision making, openness to accept changes, and increased commitment.

Burhan Fatih Yavas\textsuperscript{35} had carried out a survey to measure the employee perceptions of quality. He says, "The main purpose of this article was to explore possible answers to the question: what perceptions do employees at different levels in the organisation have of the dimensions of quality and, where differences exist, how can the perceptions be more closely aligned?"

The sample questionnaire was analysed using factor analysis. Eight factors were delineated. Among the variables, "communications", "managerial involvement", "process improvement", "reward and recognition" and "responsiveness to both external and internal customer demands" were found to be significant. These findings should prove useful to firms aspiring to compete globally, for they can be used as benchmarks.

2.3.3 Quality Circles, Kaizen, and TQM:

Frances M Hill\textsuperscript{36} in his article has explained why companies wishing to make the transition to TQM must address the issue of organisational learning. He has also provided some evidence that quality circles (QC) can facilitate organisational learning in the quality context. He has discussed three theoretical stages of organisational learning, and demonstrated how QCs can assist organisations in progressing through the first two of these. He has explored specific aspects of organisational learning relevant to TQM, which can be effected through the medium of QCs. He has concluded that QCs could prove a useful vehicle for


\footnotesize{\textsuperscript{36} Frances M Hill, "En route to TQM: organizational learning through quality circles," \textit{Training for Quality}, V, 2, (1997), 84 – 87.}
initiating some of the changes and attendant learning which the transition to TQM entails.

Shrinivas Gondhalekar, A. Subash Babu, and N.B. Godrej\textsuperscript{37} carried out a study in Godrej Soaps Limited and they say, “Many developing countries, including India, switched focus to ISO 9000, expecting quality to become world class if they meticulously met the ISO requirements. This belief turned out to be misplaced. ISO 9000 delivered ‘consistency’, which is necessary but not sufficient for quality. Therefore, it was decided to look for alternative ways of achieving a TQM culture in Godrej Soaps Ltd, the company under study. For this, \textit{kaizen} was identified as appropriate and various experiments have been carried out to lead the organisation towards TQM. This article attempts to describe how the dynamics of \textit{kaizen} process helps the company towards this goal. It essentially presents the outcome of an innovative experiment carried out in Godrej Soaps Ltd, a large manufacturing enterprise in India, of initiating TQM through the implementation of \textit{kaizen}, a process for company-wide continuous improvement. The \textit{kaizen} system in progress was studied as a ‘process’ and was subjected to quantitative analysis to understand various forces that govern the dynamics within and outside.” Their conclusions after the research are:

- \textit{Kaizen} does offer the potential to launch a transformation by aligning the employees’ and management’s goals.
- HRD (Human Resource Development) needs to be directed into a new focus altogether, with emphasis on lifelong education, reading, communication, and bolstering of self-image of the

individual by finding creative cadres, and finding millions of ways of offering quick bursts of recognition. Such changes in the HRD thrust would promote successful implementation of TQM.

- *Kaizen*, and more generally the TQM process, cannot be left to itself after launching; it is necessary to keep introducing interventions to sustain it.

- Novel approaches, such as the one illustrated here, can expedite the TQM journey, taking organisations towards more productive cultures.

### 2.3.4 TQM in Small and Medium size Enterprises:

Z.T. Temtime\(^{38}\) is of the opinion that Total quality management (TQM) research has concentrated on large firms. Little has been done on the TQM practices of small and medium-sized enterprises (SMEs), particularly in developing countries. His paper investigates the relationship between TQM, planning behaviour and firm size by reviewing existing literature and collecting primary data from 54 SMEs in the Republic of Botswana. The findings indicated that the majority of SMEs understand the importance of both TQM and planning activities for their survival and growth. However, their approach to both is unsystematic, non-formal and short-term oriented. Both firm size and planning behaviour are found to have statistically significant relationships with TQM practices. As firm size increases from small to medium, and as SMEs move from operational to strategic planning, they attach greater degree of importance to TQM practices. However, the planning behaviour of SMEs is more strongly related to TQM practices

than firm size. The article suggests the promotion of business planning as a prerequisite to the adoption of formalised TQM practices.

R.R. Lakhe, and R.P. Mohanty\(^3\) have come out with an approach in their paper for the developing economies. They say, "In order to adopt the philosophy of TQM, the following approach is suggested:

1. Develop a vision.
2. Promote a policy on quality.
3. Create a total quality-oriented culture.
4. Provide training and education.

The above four steps should lead developing countries into following the TQM approach which would help them compete in the global marketplace."

They, however, have apprehension about the success of the TQM. They say, "One of the major problems faced by developing countries is lack of expertise and inadequate training facilities. Inviting TQM consultants from outside, and sending managers abroad for training, may sound good in the initial stages of implementation. However, in the long run the responsibility for training everyone in the organisation and maintaining a continual effort has to be shouldered by managers. Moreover, small- and medium-scale industries, because of constraints of finance, find it difficult to arrange expert consultants from abroad and thus large-scale organisations have a moral obligation to share their

acquired expertise and experiences with them for the well-being of the country, as the small industrial sector contributes significantly to the economy and to nation-building. TQM efforts, therefore, will not serve its purpose in a true sense if it is restricted to individual organisations. An all-out effort at national level is required so as to bring about a total cultural change in society, leading to improved quality of life.”

Sha'ri M. Yusof and Elaine Aspinwall in their article point out that TQM is a philosophy mainly dominated by large companies. Small businesses are lagging behind larger ones when it comes to introducing and adopting new managerial philosophies and advanced technology. Many small companies have stopped at quality system certification, such as ISO 9000; in their quality journey rather than pursuing further continuous improvement efforts through TQM. Small businesses must understand the need to go beyond the quality system stage and work towards a total approach for quality. Only through this total approach will their quality effort be a success. They further discuss the various issues confronting small businesses when embarking on TQM. First, they have reviewed the subject of TQM and the quality initiatives undertaken by small businesses [which are treated as small- to medium-sized enterprises (SMEs)] such as ISO 9000 and TQM. The small business characteristics are also examined. Secondly, they have presented a case study, which was conducted by them in a small manufacturing company. At the end they have given conclusions drawn from both the review and the case study.

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2.3.5 TQM in various countries:

Abby Ghobadian and Hong Seng Woo⁴¹ state, “The economic success of Japan, in the past 30 years, has drawn the attention of western managers to Japanese management techniques and strategies. Japanese management techniques are keenly studied and employed by western corporations. The fact that Japanese corporations used ‘superior quality’ to capture, hold and build market share has not escaped the attention of western managers. Today, most chief executives in the west recognise that in all markets ‘quality’ is a basic requirement for continuous existence, and in some markets superior quality is an important source of competitive advantage. Japanese goods were considered to be shoddy, unreliable, poorly designed, low tech, and cheap until three decades ago. In a short span of time, however, Japanese corporations improved the quality of their products and with it, the consumers’ perception. Today ‘made in Japan’ is synonymous with high quality and reliability, refined and robust design, and high technology. Many factors have contributed to this remarkable transformation. Among these were the embracement of total quality control (TQC) techniques propagated by Juran and Deming.”

Ozden Bayazit⁴² in his article states, “Total quality management (TQM) is one of the most popular modern management concepts. It refers to a quality emphasis that encompasses the entire organisation, from supplier to customer. In this paper, the TQM practices in the Turkish manufacturing industry are analysed, based on a survey conducted

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among 100 large companies. This paper presents results of a survey of Turkish manufacturing companies. The key finding from the research is that a growing number of companies in Turkey are willing to implement TQM to generate competitive advantage. It was also found that important factors for a successful implementation process are upper management support, employee involvement and commitment, customer focus, quality education and training, teamwork, and use of statistical techniques.

Kifayah Amar, and Zuraidah Mohd Zain\textsuperscript{43} in their study have examined the barriers faced by Indonesian manufacturing organisations in the implementation of TQM. Out of a total sample size of 364 selected organisations identified for a multi-response survey, 78 organisations responded. The analysis identified 11 pertinent factors acting as barriers that were most frequently faced by the local organisations. These were issues related to human resource, management, attitude towards quality, organisational culture, interdepartmental relations, raw materials, machines and equipment, information, method, and training. The authors have also made a qualitative comparison at the end of the article with ISO 9001:2000, which is believed to be close to the TQM concepts discussed.

Ayoob Ahmed Wali, A.D. Gupta, and S.G. Deshmukh\textsuperscript{44} state, “In the present economic context of liberalisation and globalisation, Indian organisations face many challenges. Customer focus is essential, as is a corresponding emphasis on the quality of products, systems, and


procedures. The Indian software industry has been recognised globally for its competitiveness built upon quality attributes such as timeliness and reliability of delivery. This paper is based on a case study carried out in one of the leading software organisations in India involved in developing a range of application software for banks, insurance companies, and financial houses. The case study work involved a survey identifying the critical success factors for TQM, and identifying how the company adopts various principles and techniques of quality management. The paper uses this case study to suggest a model for TQM implementation.”

A paper by T.S. Raghunathan, S. Subba Rao, and Luis E. Solis45 seeks to compare the quality management practices in three different countries: USA, India, and China. For this research various constructs representing quality management practices and quality results were conceptualised. A questionnaire survey instrument was developed, pre-tested and the final version of the questionnaire incorporated the results of pre-testing. The final questionnaire was used to collect data in the USA, India, and China. Analysis of variance (ANOVA) was used to analyse the data. The paper reports the statistical summaries and the results of ANOVA. The ANOVA results point to statistically significant differences among the three countries with respect to quality practices.

In his article R Jagadeesh46 states, “Total quality management (TQM) has spread its wings in every sphere of the global corporate world and Indian companies are no exception.” In his paper, the growth and spread

of TQM in India is traced from its initiation to current status. Further, the paper has tried to identify the causes for poor quality of products and service, and the gaps that exist between the expectations and the outcome after adopting the TQM practices. Later a critical view of the quality scene in India is presented, and finally, based on these observations, suitable guidelines and recommendations are made to bridge this gap. It is concluded that there is still a long way to go for Indian companies to receive the stamp of acceptance for their products at international level.

2.3.6 Cost of Quality:

Any manufacturing or a service organisation always faces a pertinent question as to why it should provide a quality product/service. There had been a traditional belief that providing a better quality in a product would lead to increase in cost i.e. quality and costs were considered conflicting objectives. However, the question is whether the quality and costs are really conflicting with each other? To answer such question and belief, quality costs have served as the basis for evaluating investments in the quality programmes of an organisation. The purpose of understanding quality costs is to make aware the management about the different categories and the principles involved in such costs. Quality costs represent the difference between the actual cost of a product or service and what the reduced cost would be if there were no possibility of sub-standard service, failure of products, or defects in their manufacture.\[47\]. Cost of Quality can be divided into following groups:

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1. Costs of achieving good quality / Costs of quality assurance: The costs incurred to achieve the good quality in a product are known as costs of good quality. There are two parts of these costs:

   a. Prevention costs: All the costs designed to prevent poor quality fall under this category. They are:
      - New product review costs
      - Quality planning costs
      - Product design costs
      - Process costs
      - Quality education and training costs
      - Quality improvement costs and
      - Quality information costs.

   b. Appraisal costs: They are the costs associated with measuring, evaluating, testing, and auditing to ensure that the quality specifications and performance requirements are met. They include:
      - Inspection and testing costs of incoming, in-process, and finished goods
      - Test equipment maintenance, and calibration costs
      - Operator costs (costs of time spent by operator on various activities to achieve specified quality)

2. Costs of poor quality / Costs of non-conformance / Failure costs: The costs resulting from products not conforming to requirements fall under this category. These costs also can be divided into two parts given below:
a. Internal failure costs: Failure costs occurring prior to despatch of goods are known as internal failure costs. They can be further divided as:
   - Scrap costs
   - Re-work costs
   - Re-inspection costs
   - Process failure costs and
   - Process downtime costs

b. External failure costs: Failure costs incurred after receipt of poor quality products at the customer's premises fall under this category. Further division of these costs is:
   - Customer complain processing costs
   - Product return costs
   - Warranty claims costs
   - Product recall costs and
   - Lost sales costs

Earlier, prevention and appraisal costs (Costs of achieving good quality) were assumed to be increasing asymptotically as higher quality was achieved. However, it is being accepted that new technology, automation, improved processes etc. have helped in cost effectiveness. Prevention and appraisal costs, therefore, do increase with the quality level, but not asymptotically. On the other end, cost of poor quality or failure cost reduces drastically as the quality level improves. The total cost, therefore, reduces when there is a rise in quality level as shown in the following figure 2.2:
Mark A. Johnson⁴⁸ had taken up a consulting project on ‘total quality management’ (TQM) for an engineering unit of a large government contractor. His published an article with intention to share the knowledge gained from this project with other engineering units, which may be considering to initiate a cost of quality (COQ) programme. At the end of his article he has given a number of elements of the COQ. These measures of COQ are presented in Annexure - I:

Claude R. Superville, and Sanjay Gupta⁴⁹ in their article argue, “There is consensus that money invested in quality programs provides a high rate of return, but (there is) disagreement on how the optimal level of quality investment can be modelled. It has been postulated that there is no

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correct cost of quality (COQ) model since quality costs are dynamic and
‘firm specific’. Firms tend to move to new quality levels over time as
they increase their prevention activities aimed at detecting and
eliminating cause of variation. Many firms tend to misallocate quality
spending by investing the greatest percentage of quality costs to the
lowest yielding categories and the lowest percentage of quality costs to
the highest yielding categories.”

A paper by Xiande Zhao, Sharad K. Maheshwari, and Jincheng Zhang\textsuperscript{50}
presents results of a quality-management survey conducted among
manufacturing companies in India, China, and Mexico. The results show
that the majority of the manufacturers in the three countries are well
aware of modern quality-management concepts and philosophies. The
comparisons of the survey results among the three countries show that
Mexican companies generally are doing better than Indian and Chinese
companies. Chinese companies show the least understanding of quality-
management principles among the three nations surveyed. In
comparison to the survey results in developed countries such as Japan,
the USA, Canada, and Germany, the responses from India and Mexico
are comparable; the responses from China are somewhat inferior to
those from the other countries.

2.3.7 Quality function deployment (QFD)\textsuperscript{51}:

Quality function deployment (QFD) is a technique, which was
developed in Japan as a strategy for assuring that quality is built into

\textsuperscript{50} Xiande Zhao, Sharad K. Maheshwari, and Jincheng Zhang, “Benchmarking quality
practices in India, China and Mexico,” \textit{Benchmarking for Quality Management &

\textsuperscript{51} Theory of QFD given in this section is mainly based on a paper by Mohamed Zairi, and
Mohamed A. Youssef, “Quality function deployment: A main pillar for successful total
quality management and product development,” \textit{International Journal of Quality &
new products. QFD was first used in 1972 by Kobe Shipyard of Mitsubishi Heavy Industries Ltd and was then referred to as the quality tables. Dr. Mizuno, professor emeritus of the Tokyo Institute of Technology, is considered to be an initiator of QFD system. While the use of QFD in Japan has increased over the years, its extension to the West was, however, very slow. The first examples of using QFD in the USA did not emerge until 1986 when companies such as Ford and Rank Xerox first introduced it. Subsequently other companies started to introduce it, for example: AT&T Bell Labs, Digital Equipment, Procter & Gamble and Hewlett-Packard.

QFD has also been applied in non-manufacturing environments such as construction companies, hotels and airlines.

QFD is an ideal opportunity to move away from “we know best what the customer wants” to a new culture of “let’s hear the voice of the customer”. In a sense it enables the organisation to become very much proactive to quality problems rather than being reactive to them by waiting for customer complaints.

QFD does also enable organisations to compare their product quality standards to those of their competitors, thus helping them establish how a competitive edge can be established. QFD has three major objectives (to identify who the customer is, what the customer wants and how to fulfil the customer’s wants).

QFD in Japan is considered as the best tool which spreads awareness on the need to focus on customer requirements and encourages company-wide responsibility and commitment towards achieving quality
2.3.8 Future of TQM:

Satish Mehra, Joyce M. Hoffman, and Danilo Sirias\(^5^4\) conclude in their paper, "The new operating environment of the future will provide a set of challenges on various levels. A clear focus on defining and managing the customer side, process emphasis, and creating knowledge through innovation will comprise the new business environment. Under this new environment, TQM systems will shift towards a philosophy of quality based strategic management systems. In this new paradigm, this research predicts formation of seamless organisations that will function in a very cohesive manner to deliver goods and services to global markets.

2.4 TQM in Services:

The two surveys of manufacturers and service providers by Nicholas B. Beaumont, Amrik S. Sohal, and Milé Terziovski\(^5^5\) yielded a number of differences and similarities in the use of 'quality management' (QM) practices. They say, "The two samples were comparable except that manufacturers were, on average, smaller than service providers. This difference in size may bias the comparisons because it was found that large manufacturers (but not service providers) used a greater variety of quality management practices. The main statistically significant differences are:


• On average, manufacturers use more quality management practices even when techniques specific to the former are not counted. This may be because manufacturers have had longer experience with QM techniques. This longer experience may be because important product characteristics are more tangible than those of services or because manufacturers have been exposed to more vigorous competition.

• Manufacturers are more likely to use inspection by sample of purchases than service providers. This may be because manufacturers’ purchases are predominantly tangible and regular. The consistency is presumed to arise from a single batch of incoming goods being made with the same materials on the same machines. Service provision may be less automated hence less consistent, implying that 100 per cent inspection is appropriate (i.e. necessary for services).

• Manufacturers are much more likely to recognise external customers. Although this difference was very marked, the reasons for it are not obvious; perhaps it is symptomatic of manufacturers now facing a more competitive and international market. Some kinds of services are exposed to global competition. National borders are being eroded by technology (manifest in ATMs and improved communications) and commercial developments such as franchising which make it easier for successful service firms to replicate their operations in many countries.

• There is a very significant difference in sourcing policies. Manufacturers are more likely to use single sourcing whereas service providers are more likely to use multiple sourcing. This perhaps reflects manufacturing’s longer experience, higher volumes and sophistication. Carmakers especially have
established a system of designated, certified suppliers whose quality record is so good that their goods are not inspected by the purchaser.

- The service sector is more inclined to use consultants, especially for training. This probably reflects a transient lack of experience and internal knowledge of QM techniques.

There was no difference between Australian manufacturers and service providers in several aspects of QM. Some of these are:

- For neither sector is there any correlation between profit growth or attitudes to profits and quality management practices.
- The proportions of respondents using quality missions and the proportions of respondents using individual quality management practices did not differ significantly.
- The period of use of quality management practices did not differ except that service sector respondents had been using Total Quality Control (TQC) for 12.7 years on average (while manufacturers' 4.7 years).
- There is no significant difference in patterns of training in quality practices nor in factors affecting the adoption of quality management practices.”

G.S. Sureshchandar, Chandrasekharan Rajendran, and R.N. Anantharaman⁵⁶ of Indian Institute of Technology Madras, Chennai say, “Total quality service (TQS) is a socio-technical approach for revolutionary and effective management. However, the contemporary

quality management literature is overridingly manufacturing oriented and there seems to be a dearth of comprehensive studies addressing the critical dimensions of TQS that will depict a holistic TQM philosophy in service organizations. The present study is an earnest endeavour to fill this void. Based on a thorough review of the prescriptive, conceptual and empirical literature, the study has identified 12 dimensions as crucial for the inculcation of a TQM ambience in a service set-up. The dimensions that have been identified are as follows:

1. Top management commitment and visionary leadership (TMCL);
2. Human resource management (HRM);
3. Technical system (TS);
4. Information and analysis system (I & A);
5. Benchmarking (BM);
6. Continuous improvement (CI);
7. Customer focus (CF);
8. Employee satisfaction (ES);
9. Union intervention (UI);
10. Social responsibility (SR);
11. Service-scapes (SP); and
12. Service culture (SC)

The criticality of each of these dimensions from a service perspective is corroborated in detail. An instrument for measuring TQS with specific reference to the banking sector has been developed. Data have been collected from executives from banks in a developing economy. The instrument has been empirically tested for uni-dimensionality, reliability and construct validity using a confirmatory factor analysis approach. A model for TQS has also been proposed, illustrating the relationships
between the various dimensions. The present research work offers a systematic framework for the conceptual and empirical understanding of TQS and its critical factors.

2.5 Quality ‘gurus’:

In following paragraphs, details of the persons who have contributed to the total quality management through their work have been given:

2.5.1 Walter A. Shewhart:  

Walter A. Shewhart was born in New Canton, Illinois, USA on 18th March 1891. In 1924, Shewhart framed the problem in terms of "assignable-cause" and "chance-cause" variation and introduced the "control chart" as a tool for distinguishing between the two. Shewhart stressed that bringing a production process into a state of "statistical control", where there is only chance-cause variation, and keeping it in control, is necessary to predict future output and to manage a process economically.

The American Society adopted Shewhart’s charts for Testing Materials (ASTM) in 1933 and advocated to improve production during World War II in American War.

Shewhart received many awards including the Holley Medal of the American Society of Mechanical Engineers and Honorary Fellowship of

57 http://www.sigma-engineering.co.uk/light/shewhartbiog.htm and http://www.asq.org/join/about/history/shewhart.html
the Royal Statistical Society and American Society for Quality. For twenty years, he was editor of Wiley Series in Mathematical Statistics.

Shewhart successfully brought together the disciplines of statistics, engineering, and economics and became known as the father of modern quality control.

During the 1990s, Shewhart’s genius was re-discovered by a third generation of managers, naming it the "Six Sigma" approach.

He died at Troy Hills, New Jersey, USA on 11th March 1967.

2.5.2 J. M. Juran:

J. M. Juran was born in 1904. J. M. Juran's major contribution to the world has been in the field of quality management. Dr. Juran has been called the "father" of quality. Perhaps most important, he is recognised as the person who added the human dimension to quality—broadening it from its statistical origins.

In 1937, Dr. Juran conceptualised the Pareto principle, which millions of managers rely on to help separate the "vital few" from the "useful many" in their activities. This is commonly referred to as the 80-20 principle. Its universal application makes it one of the most useful concepts and tools of modern day management.

In 1979, Dr. Juran founded Juran Institute, an organisation aimed at providing research and pragmatic solutions to enable organisations from any industry to learn the tools and techniques for managing quality.

Juran has been active for the bulk of the century, and influential for nearly half that period. Juran's major contribution to our world has been in the field of management, particularly quality management.

2.5.3 Armand V Feigenbaum:

Dr Armand V Feigenbaum⁵⁹ is the originator of Total Quality Control. The first edition of his book Total Quality Control was completed whilst he was still a doctoral student at MIT. The Japanese discovered his work in the 1950s at about the same time as Juran visited Japan. Feigenbaum argued for a systematic or total approach to quality, requiring the involvement of all functions in the quality process, not just manufacturing. The idea was to build-in quality at an early stage, rather than inspecting and controlling quality after the fact.

He was the founding chairman of the International Academy for Quality and is a past president of the American Society for Quality Control, which presented him with the Edwards Medal and Lancaster Award for his international contribution to quality and productivity. In 1988 he was appointed to the board of overseers of the United States Malcolm Baldrige National Quality Award Programme.

Feigenbaum argues that statistical methods are used in an overall quality control programme whenever and wherever they may be useful. However, such methods are only part of the overall administrative quality control system, they are not the system itself.

Feigenbaum sees modern Quality Control as stimulating and building up operator responsibility and interest in quality. The need for quality-

⁵⁹ http://www.simplesystemsintl.com/quality_gurus/A_V_Feigenbaum.htm
mindedness throughout all levels is emphasised, as is the need to 'sell' the programme to the entire plant organisation and the need for the complete support of top management. Finally, Feigenbaum argues that the programme should be allowed to develop gradually within a given plant or company.

The new 40th Anniversary edition of Dr A V Feigenbaum's book, Total Quality Control, now further defines TQC for the 1990s in the form of ten crucial benchmarks for total quality success. These are:

1. Quality is a company-wide process.
2. Quality is what the customer says it is.
3. Quality and cost are a sum, not a difference.
4. Quality requires both individual and team zealotry.
5. Quality is a way of managing.
6. Quality and innovation are mutually dependent.
7. Quality is an ethic.
8. Quality requires continuous improvement.
9. Quality is the most cost-effective, least capital-intensive route to productivity.
10. Quality is implemented with a total system connected, with customers and suppliers.

These are the ten benchmarks for total quality in the 1990s. They make quality a way of totally focusing the company on the customer - whether it be the end user or the man or woman at the next workstation or next desk. Most importantly, they provide the company with foundation points for successful implementation of its international quality leadership.
2.5.4 Taguchi:

Dr Genichi Taguchi\textsuperscript{60} was born in 1924. He learned much of experimental design techniques and the use of orthogonal arrays from the prize-winning Japanese statistician Matosaburo Masuyama whom he met whilst working at the Ministry of Public Health and Welfare. In 1950 he joined the newly founded Electrical Communications Laboratory of the Nippon Telephone and Telegraph Company. He stayed there for more than 12 years, during which period he began to develop his methods. Japanese companies began applying Taguchi methods extensively from the early 1950s, including Toyota and its subsidiaries. In 1957-58 he published the first version of his two-volume book on Design of Experiments. In the early 1970s, Taguchi developed the concept of the Quality Loss Function. He published two other books in the 1970s and the third edition of Design of Experiments. By the late 1970s Taguchi had an impressive record in Japan having won the Deming application prize in 1960 and Deming awards for literature on quality in 1951 and 1953. In 1984 he again won the Deming award for literature on quality.

P Aravindan, S.R. Devadasan, B V Dharmendra, and V Selladurai\textsuperscript{61} in their article have reviewed the global status of total quality management (TQM). The article emphasises continuous quality improvement as one of the main pillars of TQM. It illustrates a part of the research that was carried out to examine Taguchi’s on-line quality control (TOLQC) methods as the means to effect continuous quality improvement. It

\textsuperscript{60}http://www.dti.gov.uk/mbp/bpht/m9ja00001/m9ja0000111.html
describes a case study that was carried out to study the implementation feasibilities of TOLQC methods. The inferences drawn from this case study assert the need for managerial approach rather than mere technical computations for successful implementation of TQM. The article also insists on intensified training and awareness programmes on the implementation strategies of these methods to attain the ultimate goals of TQM.

P.B.S. Reddy, K. Nishina, and A. Subash Babu, relying on Taguchi’s methodology, conclude in their paper, “The application of robust design methodology to the injection moulding process for manufacturing agitators of washing machines has resulted in variation reduction of product dimensions and achieving target values as shown above. More importantly, the rejection rate reduced significantly from 20 percent to zero percent. This changed situation helps the company in many ways, related to cost, delivery, quality and productivity, which are the dimensions of an organization’s excellence. In brief, the results of the study have given considerable confidence to the company in its ongoing TQM journey. With this success many teams started using various statistical diagnostic tools to improve the quality of products and processes. TQM is becoming a way of life for all company employees.”

2.5.5 W. Edwards Deming:

William Edwards Deming was born in Sioux City, Iowa on 14 October 1900. Trained as a statistician, his expertise was used during World War

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II to assist the United States in its effort to improve the quality of war materials.

Japanese industrial leaders and engineers invited him to Japan at the end of World War II. They wanted his help to shift the perception of the world from the existing paradigm that Japan produced cheap, shoddy imitations to one of producing innovative quality products.

Dr. W. Edwards Deming is, therefore, known as the father of the Japanese post-war industrial revival. He was also regarded, by many, as the leading quality guru in the United States.

Deming's business philosophy is summarised in his famous "14 Points," listed below:

1. Constancy of purpose
2. The new philosophy
3. Cease dependence on mass inspection
4. End lowest tender contracts
5. Improve every process
6. Institute training on the job
7. Institute leadership
8. Drive out fear
9. Break down barriers
10. Eliminate exhortations
11. Eliminate arbitrary numerical targets
12. Permit pride of workmanship
13. Encourage education
14. Top management commitment and action
These points have inspired significant changes among a number of leading US companies striving to compete in the world's increasingly competitive environment.

Terry Finlow-Bates⁶⁴ says, "Deming was quite adamant that any attempt to reward the individual for supposed personal contribution in the workplace was wrong. This flies in the face of the belief that it is right and proper to reward a person for work well done. It is totally counter-intuitive to a boss who is trying to motivate his or her people. Of course we must reward our high achievers. Even Harrington warning that "this is worse than taking the Lord's name in vain", felt that Deming had probably got it wrong. However, Deming, building on the work of Taylor and Shewhart, realised just how little influence most of us have on the final business result. Deming argued that for most people, most of the time, the final result is beyond their control and thus their influence. Rewarding them for success or punishing them for failure is neither fair nor logical. This article examines the basis of Deming's unequivocal views and concludes, painful as it might be, that Deming had it right - at least most (99.75 per cent) of the time."

S.F. Lee, Paul Roberts, W.S. Lau, and Ruth Leung⁶⁵ in their article have outlined the methodologies and bases used in the design of questionnaire for the investigation of quality management philosophies and strategies employed in Hong Kong organisations. The design of the questionnaire of the survey was based on people's thinking and past experiences on quality management, concept and philosophy of some quality standards, and Deming's 14 points on Total Quality Management (TQM). The

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⁶⁴ Terry Finlow-Bates, "Deming was right - 99.75 per cent of the time!" *Measuring Business Excellence, IV, 3*, (2000), pp. 31-34.
amalgamation of these useful thoughts, concepts and philosophies had helped the Hong Kong organisations to develop their quality management and business management strategies that lead to business excellence performance.

Dr. Deming, surrounded by his family, died at his home on 20 December 1993.

2.5.6 Kaoru Ishikawa⁶⁶:

Professor Ishikawa was born in 1915 and graduated in 1939 from the Engineering Department of Tokyo University having majored in applied chemistry. He had studied under Deming, Juran, and Feigenbaum. Whilst, perhaps ironically, the early origins of the now famous Quality Circles can be traced to the United States in the 1950s, Professor Ishikawa is best known as a pioneer of the Quality Circle movement in Japan in the early 1960s, which has now been re-exported to the West.

He has authored texts in Japanese and English languages on Statistical Process Control (SPC). His notion of company-wide quality control called for continued customer service. This meant that a customer would continue receiving service even after receiving the product. This service would extend across the company itself in all levels of management, and even beyond the company to the everyday lives of those involved. According to Ishikawa, quality improvement is a continuous process, and it can always be taken one step further.

With his cause and effect diagram (also called the "Ishikawa" or "fishbone" diagram), this management leader made significant and specific advancements in quality improvement. With the use of this new diagram, the user can see all possible causes of a result, and hopefully find the root of process imperfections. By pinpointing root problems, this diagram provides quality improvement from the "bottom up." Dr. W. Edwards Deming --one of Ishikawa's colleagues -- adopted this diagram and used it to teach Total Quality Control in Japan as early as World War II. Both Ishikawa and Deming used this diagram as one the first tools in the quality management process.

Ishikawa also showed the importance of the seven quality tools: control chart, run chart, histogram, scatter diagram, Pareto chart, run chart and flowchart. Ishikawa believed in the importance of support and leadership from top-level management. He continually urged top-level executives to take quality control courses, knowing that without the support of the management, these programs would ultimately fail.

2.5.7 Philip B. Crosby:\textsuperscript{67}

Philip B. Crosby was born in Wheeling, West Virginia on June 18, 1926.

His book 'Quality is Free' was one of the initial signals of the decade of quality in the 1980's when quality emerged as a viable career and work movement. It sold over 2 million copies. He authored 13 books on quality that have been translated into 17 languages and have sold millions of copies in both hard and soft cover.

\textsuperscript{67} http://www.philipcrosby.com/pca/C.Articles/articles/year.2002/philsbio.htm
For over 35 years, Crosby was both an illustrious philosopher and pragmatic practitioner of quality management. His writings have helped to stimulate international interest in the quality field that was a catalyst for a global awakening and driver for a worldwide movement that matured over the past two decades. His innovative thinking and creative outlook on quality management have been the inspiration for thousands of companies around the world. He argued that 'doing it right the first time' is less expensive than the costs of detecting and correcting nonconformities. He made many significant contributions to the core quality body of quality knowledge and served as an international ambassador extending the influence of quality thinking to the farthest parts of the globe.

In 1984, he wrote a book 'Quality Without Tears' in which he developed pragmatic concepts that are considered foundational elements of the body of quality knowledge, including his Four Absolutes of Quality Management™:

- Quality means conformance to requirements, not goodness.
- Quality is achieved by prevention, not appraisal.
- Quality has a performance standard of Zero Defects, not acceptable quality levels.
- Quality is measured by the Price of Non-conformance™, not indexes.

The most recent evolution of the ISO 9000 standard in year 2000 is far less prescriptive than its predecessors. Rather than mandating a set of quality control practices that must be implemented to achieve compliance, it provides guidance in how to create a culture where customer needs are met every time. In doing so, the 2000 standards have
moved closer to the principles of quality management first written by Philip Crosby in his book, ‘Quality is Free.’

2.6 Quality Awards:

Many quality awards have been introduced to encourage the widespread adoption of quality, particularly total quality management. The broad aims of these awards are to:

- Increase awareness of the importance of the “quality of offerings” and interest in “quality management” because of their important contribution to superior competitiveness;
- Encourage systematic self-assessment against established criteria and market awareness simultaneously;
- Prompt co-operation between organisations on a wide range of non commercially sensitive issues;
- Stimulate sharing and dissemination of information on successfully deployed quality strategies and on benefits derived from implementing these strategies;
- Promote understanding of the requirements for the attainment of “quality excellence” and successful deployment of “quality management”;
- Stimulate organisations to introduce “quality management” improvement process.

Each of the quality awards has its own importance and each is considered to be a major quality award in the continent. An

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organisation, which wins any one of these awards, feels proud because it represents a highest honour it can attain. The award winning companies receive an international recognition for their concern for quality excellence.

A short description of these awards are given in the following paragraphs:

2.6.1 Deming Prize:

To encourage the widespread adoption of Total Quality Control (TQC), a quality award was introduced. The award was called the Deming prize, in recognition of Deming's contribution to the quality revolution in Japan. The Deming prize proved to be an effective instrument for spreading quality methods throughout the Japanese industry.\(^{69}\)

The Deming Prize\(^{70}\) (DP) was the first to be established back in 1951. It was set up by the Union of Japanese Scientists and Engineers to commemorate Dr Deming's contribution to Japanese industry and to promote further the continued development of quality control in Japan. The Deming Prize has a total of five categories, namely: the Deming Prize for Individuals (DPI); the Deming Application Prize (DAP); the Deming Application Prize for Small Companies (DAPSC); the Deming Application Prize for Divisions (DAPD); and the Quality Control Award for Factories (QCAF). Non-Japanese companies have been allowed to apply for and receive the DP since 1984. However, those categories of

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DP, which are open to overseas companies, do not include the DPI and the QCAF. The aim of the examination process is to find out how well a company implements total quality control (TQC) by assessing its quality assurance policies and activities, the implementation of company wide quality control (CWQC) practices, and the results achieved (quality improvement, productivity improvement, cost reduction, expanded sales, increased profits, etc.) through application of statistical techniques and quality circles.

The DP is given to companies that have achieved distinctive performance through the application of company wide quality control. The company’s performance on the application of CWQC is evaluated through two examinations, (1) the document examination, and (2) the on-site examination. The examination results are based on the scores. There are ten examination items. These ten examination items are given below:

1. Policies
2. The organization and its operations
3. Education and dissemination
4. Information gathering, communications and utilization
5. Analysis
6. Standardization
7. Control/management
8. Quality assurance
9. Effects
10. Future plans
Each item is given an equal importance for examining the company’s performance because each item carries ten points.

2.6.2 The Malcolm Baldrige National Quality Award\(^7\):

The Malcolm Baldrige is an annual, national, US quality award established in 1987. Its purpose is to promote quality awareness and understanding of the requirements for quality excellence, to recognise quality achievements of US companies, and to publicise successful quality strategies. The award has three eligibility categories, namely manufacturing and service companies, or their subsidiaries, and small businesses. Up to two awards may be given in each category each year. Winning companies are allowed to publicise and advertise their awards and are expected to share with other organisations information about their successful quality strategies.

The award assessment is based on a set of examination criteria outlined in the written application that each applicant ought to submit and includes information and data on the company’s quality processes and quality improvement results. The seven examination categories are shown below:

1. Leadership
2. Information analysis
3. Strategic planning
4. Human resource development and management
5. Process management

(6) Business results
(7) Customer focus and satisfaction

A total of 1,000 points is allocated to these seven categories. Each category is subdivided into 28 examination items. Each examination item emphasises a major quality system requirement and includes a set of specific areas to address; each area illustrates the type and amount of information the applicant should provide.

Although the point value of each examination category/item is subject to change every year, customer satisfaction has always been the most important category as it is the overall goal of the quality system. It currently carries more than twice the point values of the others and 30 per cent of the total points available.

A paper by Arvinder P.S. Loomba, and Thomas B. Johannessen\textsuperscript{72} focuses on some of the ethical concerns pertinent to the application process of the Malcolm Baldrige National Quality Award programme, and highlights some of the critical problems, which the said programme faces. Based on analysis of these issues, it endeavours to distil an adequate opinion of the inherent value, merit and significance of Baldrige Award. It observes that, while the Baldrige Award programme does raise certain critical concerns - specifically those related to unfairness, superficiality and publicity - the inherent value of the continuously improving award programme far outweighs its limitations. The Baldrige paradigm is not limited exclusively to the world of

business, and can be applied to reinforce quality and enhance productivity in virtually any kind of organisation.

2.6.3 The European Quality Award

The European Foundation for Quality Management (EFQM) was founded by 14 of the leading Western European businesses in 1988 when many of the major companies in Europe had realised that their only way of surviving in business was to pay much greater attention to quality. In recognition of achievement as a feature of the policy of the EFQM, the European Quality Award (EQA) was established in 1991 with the support of the European Organization for Quality (EOQ) and the European Commission (EC). The aim of the EQA is to enhance the position of Western European companies in the world market by accelerating the acceptance of quality as a strategy for global competitive advantage and by stimulating and assisting the development of quality improvement activities.

The European Quality Award has two categories: the European Quality Prize (EQP), which is awarded to companies which demonstrate excellence in the management of quality as their fundamental process for continuous improvement; and the European Quality award (EQA) which is awarded to the most successful exponent of TQM in Western Europe. Most businesses may apply for the award as long as they are eligible Western European companies; non-eligible are all government agencies, not-for-profit organisations, trade associations and professional societies.

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The examination process consists of three main sections namely ‘initial assessment’, ‘site visits’, and ‘final review and decision’. The award assessment criteria have nine categories. These categories are divided into two groups, the results and the enablers. These two groups are given below:

**Enablers:**

1. Leadership
2. Policy and strategy
3. People management
4. Resources
5. Processes

**Results:**

6. Customer satisfaction
7. People satisfaction
8. Impact on society
9. Business results

In other words, the award assesses how the customer and people satisfaction, impact on society, and business results are being achieved through leadership, people management, policy and strategy, resources and processes. A maximum total of up to 1,000 points is allocated to these nine award criteria. Each criterion carries a different number of points in accordance with its relative value within the award. For example, as in Malcolm Baldrige, customer satisfaction is recognised as a major quality objective. Business results, including the company’s
achievement in its financial and non-financial objectives, are vital to the company’s success so it is the next most highly scored criterion.

2.6.4 Deming Cup\textsuperscript{74}:

The Deming Center, an organisation located within the Columbia University Graduate School of Business, has announced the creation of the Deming Cup, an award designed to recognise companies for operational excellence and creating shareholder value through strategic growth. The prize and the center are named for the late quality pioneer W. Edwards Deming.

In order to be considered for the Deming Cup, companies must demonstrate a plan for top-line growth, with significant accomplishments in expansion, including margins, market share, revenue, and future potential. The interests of all stakeholders must guide results, and performance improvement and assessment data must be readily available.

Companies that apply for the Deming Cup are evaluated using the following criteria:

- Does the company show exceptional growth in a challenging market?
- How well do the company's senior executives set strategic directions and build and maintain a leadership system conducive to superior top-line performance through organisational learning?
- Is the company's information culture closely aligned with its strategic directions?

\textsuperscript{74} www.demingcenter.com
• Does the applicant truly understand the needs of customers and the marketplace through real-time access to results and trends analysis?

Companies, or a division of a company, with less than $500 million in annual sales are eligible. Companies can nominate themselves for the prize, or a third party can nominate. The nominated company must have a plan that defines specific and measurable outcomes and must agree to serve as a model that can be replicated or adapted by other organisations.

2.6.5 Rajiv Gandhi National Quality Award75:

The Rajiv Gandhi National Quality Award is considered as India's approach to TQ excellence. The Bureau of Indian Standards instituted Rajiv Gandhi National Quality Award in 1991, with a view to encourage Indian manufacturing and service organisations to strive for excellence and to give special recognition to those who are considered to be the leaders of quality movement in India. This award is intended to generate interest and involvement of Indian Industry in quality programmes, drive Indian products and services to higher levels of quality and equip the Industry to meet the challenges of domestic and International markets.

Rajiv Gandhi National Quality Award would help Indian Industry to improve quality by:

(a) Encouraging Indian Industry to make significant improvements in quality of their products/services for maximising consumer

75 http://www.bis.org.in/other/rgnqa_geninfo.htm
satisfaction and for successfully facing competition in the global market as well;
(b) Recognising the achievements of those organisations which have improved the quality of their products and services and thereby set an example for others;
(c) Establishing guidelines and criteria that can be used by industry in evaluating their own quality improvement efforts; and
(d) Providing specific guidance to other organisations that wish to learn how to achieve excellence in quality, by making available detailed information on the 'Quality Management Approach' adopted by award winning organisations to change their culture and achieve eminence.

The award has been designed in line with similar awards in other developed countries, like Malcolm Baldrige National Quality Award in USA, Deming Prize in Japan, and European Quality Award.

Rajiv Gandhi National Quality Award is an annual feature.

The assessment for large scale organisation is made on the basis of nine parameters, namely, Leadership; Policies, Objectives and strategies; Human resource management; Resources; Processes; Customer focused results; Employees’ satisfaction, Impact on environment and society; and Business results.

The assessment for small-scale organisation is made on the basis of six parameters, namely, Leadership; Human resource management; Processes; Customer focused results; Impact on environment and society; and Business results.
Emphasis is placed on quality achievement and quality improvement as demonstrated through the information provided by applicant organisation.

G.A. Bohoris\textsuperscript{76}, while searching for quantitative tools to monitor the attainment of TQM objectives, reviews the Japanese, European and American quality awards and discusses their significance to business. The procedures, assessment criteria and benefits of the Deming Application Prize (DP), European Quality Award (EQA) and Malcolm Baldrige Quality Awards (MB) are examined in some detail and compared against each other. It has been found that the DP focuses on the dissemination of company wide quality control, continuous improvement and relations with suppliers. Its most important aspect is the thorough application of statistical QC techniques. The MB accepts that quality is customer-driven and therefore focuses on customer satisfaction, benchmarking, competitive comparisons with the industry average, the industry leader, and the principal competitors in the company's key markets. The EQA focuses on the relations with the community, and customers' and employees' satisfaction. Finally, another major difference between the DP and the other two is that certain examination criteria such as human resource management, customer satisfaction, impact on society, and operational results are not included in the former.

A. van der Wiele, A.R.T. Williams et al\textsuperscript{77} argue in their paper, “The Malcolm Baldrige National Quality Awards (MBNQA), and European


Quality Award (EQA) models help organizations to develop and manage their quality improvement activities in a number of ways. For example:

- They provide a definition and description of TQM which gives a better understanding of the concept, improves awareness and generates ownership for TQM among senior managers;
- They enable measurement of the progress to be made, along with its benefits and outcomes;
- The scoring criteria provide an objective measurement and help to pinpoint improvement opportunities;
- Benchmarking and organisational learning are facilitated; and
- Training in TQM is encouraged.

A research by Samir Baidoun\textsuperscript{78} attempted to make the distance between the existing body of literature and approaches of effective TQM. They have identified 19 critical factors. The results of this investigation suggest that addressing these 19 critical quality factors as part of the quality management process increases its chance of success. The discussion of the findings reveals that about 17 out of 19 critical quality factors identified in this investigation share most of the values covered by the key principles espoused by the Malcolm Baldrige National Quality Award (2000) and the European Quality Award (2000) in the following:

- \textit{Top management commitment and responsibility for sustainable quality environment and involvement}. Top management commitment and involvement are demonstrated by providing role

models, developing clear mission and defining quality values (strategic quality planning), developing comprehensive policy and goal setting and planning process, promoting quality awareness, and creating the elements of quality management structure.

- **Employee involvement and empowerment.** Directing active involvement of employees to the vision, values and quality goals of the organization to meet its expectation. Maximizing employee empowerment by training and education, and active roles of middle management.

- **Continuous process improvement.** Using quality tools (systematic approach to problem identification and solving) to create a culture of continuous process improvement emphasizing management by facts.

- **Importance of external customer focus** and understanding the internal customer concept.

- **Selecting reasonably few dependable suppliers** based on evaluation of their capability and commitment to product and service quality.

- **Having systems for measuring key indicators** that impact the way the organization adds value to customers (cost of quality and the use of customer surveys).

2.7 Just in Time:

**Introduction**\(^7^9\):

William J. Stevenson, in *Production/Operations Management*, defines the term just-in-time manufacturing as "a repetitive production system in

which processing and movement of material and goods occurs just as they are needed, usually in small batches" (Stevenson, 1996). However, just in time (JIT) is more than an inventory system. JIT manufacturing is a philosophy by which an organisation seeks continually to improve its products and processes by eliminating waste. Since one purpose of JIT manufacturing is to reduce any waste and inefficiencies that do not add value to a product, it should come as no surprise that the JIT approach was developed in Japan - a country with scarce resources and space limitations. Organisations wanting to use the JIT approach must have several building blocks in place. These building blocks were first established in the early 1950s by T. Ohno, former Executive Vice President of Toyota Motor Company (Ansari and Modarress, 1990). The building blocks include:

- Company-wide commitment;
- Proper materials at the right time;
- Supplier relationships;
- Quality;
- Personnel.

JIT manufacturing is a philosophy by which an organisation seeks continually to improve its products and processes by eliminating waste. It calls for raw materials and components to reach the production operation in the desired quantity when they are needed and not before. The JIT system runs smoothly with no peaks or valleys. The typical inventory system, on the other hand, is fraught with peaks and valleys that represent costs to the organisation in the form of inventory holding costs, back order and stock-out costs, overtime and idle time labour costs, and waste of materials and space.
Peter B. Petersen\textsuperscript{80} discusses a controversial point about origin of just in time production system in his paper, “While JIT methods of production were popularised by the excellent productivity of Japanese industry, this approach had its origin earlier in the USA. Just-in-time (JIT) production methods were popularised by the excellent results achieved by Japanese industry. When it became evident during the 1970s that the Japanese were gaining markets previously dominated by Americans, there was considerable interest in learning how Japanese industry operates. Then, during the early 1980s, Toyota's highly effective JIT production system had a particular appeal to Americans who were trying to understand Japanese production methods. While Taichi Ohno, creator of Toyota's production system, credits Henry Ford as the originator, it is now known that Ernest Kanzler, one of Ford's subordinates, played a major role in developing JIT production methods. Actually, Ernest Kanzler developed an early version of this approach at the Fordson Tractor Plant during the Great War. Then, due to difficult economic conditions during 1920 and 1921, Henry Ford, with the help of Kanzler, employed it on a larger scale throughout the Ford Motor Company. Although these efforts started with the observations and practical work of Kanzler at Fordson Tractor during the Great War, the overall credit for its wide application at the Ford Motor Company during 1920 and 1921 rests with Henry Ford. This article reports Ford and Kanzler's contributions and explores the possible influence that Frederick W. Taylor may have had on the development of this approach at the Ford Motor Company.

The JIT approach attempts to reduce costs and improve workflow by carefully scheduling material to arrive where needed at the proper time. Consequently, costs of inventories can be substantially reduced and the

\textsuperscript{80} Peter B. Petersen, “The misplaced origin of just in time production methods,” Management Decision, XL, 1, (2002), pp. 82-88.
use of space can be conserved. In some cases, this approach can contribute to an improved quality of the product. Today's managers and those interested in efficiency in the workplace would be well advised to review the suggestions of earlier industrialists and their assistants such as Henry Ford and Ernest Kanzler. Many of their ideas are of practical value today."

In another similar controversial article, Göran Svensson\textsuperscript{81} argues that JIT only has cosmetic novelty value. Therefore, it is highly overestimated. He states, "Many widespread managerial concepts are expressed as abbreviations of two or three letters. In addition, they have often been introduced and treated as new-to-the-world by both scholars and practitioners. For example, Just-In-Time (JIT) is a managerial concept that has been heavily promoted in the worldwide automotive industry. Most car manufacturers or car assemblers have implemented its underlying principles for many decades. JIT, as a phenomenon, has been named differently at different times during the last century. Therefore, the newness of JIT and its underlying principles is questioned in the article. The article describes parts of the historic evolution of JIT during the twentieth century in literature. It is concluded that JIT is just a reincarnation of past theory and practice." The theoretical evidence that is brought forward in the paper supports the questioning of the novelty value of JIT. It is argued that JIT is nothing more than a similarity to the reincarnation of past theory and practice!

Kwasi Amoako-Gyampah and Vidyaranya B Gargeya\textsuperscript{82} argue, "Just-in-time (JIT) production has received a great deal of attention worldwide in

the last couple of decades. Most research has examined the effects of the JIT philosophy and practice in developed countries (such as the USA, Canada, and Australia). Barring a couple of studies, not much attention has been paid to the study of the implementation of JIT in less developed countries. Based on a survey of 48 manufacturing firms in Ghana, this paper examines the implementation of JIT production systems in a developing country. The results suggest that Ghanaian manufacturing firms which have invested in JIT production systems are different from firms that have not invested in JIT production in terms of their efforts in employees' training, set-up time reduction, cellular manufacturing, continuous quality improvement, and supplier partnership. At the same time, JIT firms are not significantly different from non-JIT firms with regard to the use of measurement systems.”

Mahmoud M. Yasin, and Marwan A. Wafa\textsuperscript{83} point out, “The effective implementation of just-in-time (JIT) in the US public sector is examined in this empirical study. Specifically, the relationships between organisational modification efforts prior to JIT implementation, problems encountered during implementation, and JIT success are investigated using a sample of 86 public sector organisations. The results of this research seem to support the notion that JIT, as a form of "managerialism", has the potential to increase the operational efficiency, service quality, and organisational effectiveness of public sector organisations. However, for this potential to be achieved, public sector organisations, like their private sector counterparts, must be willing to modify their procedures and operations. The potential benefits of JIT to public sector organisations are not in doubt. However, the art of

designing the right JIT implementation strategy for such organisations is debatable. Therefore, issues related to these concerns are worthy of future research. This study is a modest contribution toward that end.”

S. Chandra, Birla, and Rambabu Kodali discuss justification of Just-in-time principle in Indian organisations in their paper and say, “Just-in-time (JIT) manufacturing systems have attracted the attention of industries all over the world. The perceptible impact of JIT lies in attaining the far-reaching productivity and quality standards. Attempts have been made to examine JIT, its benefits and elements for their feasibility in Indian industries. Despite the profound interest of prospective managers and researchers, the extent of JIT implementation in Indian industries so far is not satisfactory. The real challenge before Indian managers is to establish priorities among potential JIT techniques to achieve best possible advantage of JIT implementation in Indian industries.”

2.8 Benchmarking:

Introduction:

The continuous pursuit of excellence is the underlying and ever present goal of benchmarking practices. Benchmarking is an external focus on internal activities, functions, or operations in order to achieve continuous improvement. The essence of benchmarking is the process of identifying the highest standards of excellence for products, services, or processes, and then making the improvements necessary to reach those

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standards, commonly called "best practices". The justification lies partly in the question: "Why re-invent the wheel if I can learn from someone who has already done it?"

Xerox Corporation began benchmarking in the late 1970s. During this time, Xerox was losing market share and feeling a lot of pressure from its competitors. In an attempt to try and "get back into the game", Xerox decided to compare its operations to those of its competitors.

Benchmarking has been gaining popularity since the beginning of 1990s. Benchmarking is emerging in leading-edge companies as a tool for obtaining the information needed to support continuous improvement and gain competitive advantage. In order to benchmark effectively, there needs to be a strong strategic focus and some flexibility in achieving the goals set forth by management. Perhaps the most important aspects of effective implementation are adequate planning, training, and open interdepartmental communication.

The process of benchmarking is more than just a means of gathering data on how well a company performs against others. Benchmarking can be used in a variety of industries, both services and manufacturing. It is also a method of identifying new ideas and new ways of improving processes and, therefore, being better able to meet the expectations of customers.

A. Gunasekaran\textsuperscript{86} in an editorial write up gives details of Benchmarking as:

"Benchmarking is the process of identifying, sharing, and using knowledge and best practices. It focuses on how to improve any given business process by exploiting best practices rather than simply measuring the best performance. Determining, analysing and implementing best practices provide an opportunity for gaining a strategic, operational, and financial advantage. It reflects continuous improvement efforts that may already exist in an organisation and helps to link continuous improvement and breakthrough improvement into a single change management system. While benchmarking readily integrates with strategic initiatives such as continuous improvement, re-engineering and total quality management, it is also a discrete process that delivers value to the organisation on its own."

Woon Kin Chung\textsuperscript{87} says, "Since the early 1980s, benchmarking has been widely used as a strategy for organisations to make progress in their TQM maturity. Quality award models provide a comprehensive framework for the application and study of benchmarking. However, many of the studies are case-based and anecdotal in nature. This study undertakes a benchmarking exercise among Singapore's productivity leaders, which comprised the pioneer batch of organisations in the Singapore Quality Award programme. The secondary data obtained from these organisations are used for the analysis. The findings cover the best practice levels attained, strengths and weaknesses of the organisations, disparities in maturity of practices, areas with high priority for improvement, and association between TQM maturity and business performance."

2.9 Customer Relationship Management:

Developing close and cooperative relationship with customer is very important. To be successful, firms need to have the practice of developing long-term relationships with all their stakeholders. Customer Relationship Management is defined as:

'A comprehensive strategy and process of acquiring, retaining, and partnering with selective customers to create superior value for the company and customer."

An article by Jing Li, Wing Fok, Lillian Fok, and Sandra Hartman investigates the relationships between organisational adoption and extent of use of two kinds of programmes. It specifically, contends that organisations may vary considerably in QM (Quality Management) maturity. QM maturity refers, in a qualitative sense, to the degree of QM implementation in an organisation. It argues that QM maturity organisations will be characterised by perceptions that the culture is different in ways which are supportive of QM, and that the organisation is performing at higher levels. Moreover, such organisations will be more likely to have moved toward adopting customer relationship management systems to improve their customer services, and have done so in qualitatively better ways. In turn, such adoptions will lead to perceptions by those in the organisations that their customer relationship

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systems are, in fact, providing better services. Exploratory research provides support for these ideas.

2.10 Business Process Reengineering:

Reluctance to change is the human characteristic. However, there is a need for a change in the competitive world. The very survival of many firms depends upon how quick and how well they manage to change to meet the customer needs. Business Process Reengineering provides the platform for change. Business Process Reengineering (BPR) refers to the analysis and redesign of workflows and processes both within and between organisations. This helps in simplifying and streamlining the processes by eliminating all redundant and non-value-adding steps, and speeding up the work flow.

Jeffery N. Lowenthal\textsuperscript{90} has given a working definition of Business Process Reengineering (BPR) as:

"The fundamental rethinking and redesign of operating processes and organisational structure, focused on the organisation’s core competencies, to achieve dramatic improvements in organisational performance."

A paper by J. González-Benito, A.R. Martinez-Lorente, and B.G. Dale\textsuperscript{91} examines two research questions. First, is a re-engineered company a


suitable platform for the subsequent application of TQM principles? Second, is BPR an appropriate means to transform an organisation operating along traditional lines into one, which is managed using TQM principles? It is posited that these questions have been given scant attention by the academic fraternity. The paper considers, for example, characteristics of BPR, which facilitate or hamper TQM and also TQM considerations when reengineering. It is argued that a company can apply TQM and BPR simultaneously, thus yielding more improvements than if only one of them was used on its own. The analysis presented in the paper indicates that the application of BPR can provide the base for the subsequent development of TQM.

A study by Edward W. Gore Jr\(^{\text{92}}\) explores organisational culture by examining the relationship between total quality management (TQM) and culture, and specifically three elements of a culture related to quality improvement: customer focus, employee involvement, and continuous improvement. In their study, Business Process Reengineering is used as an alternative management initiative. They had conducted a survey of 220 mid-level professionals in 123 organisations to determine the extent to which there was a relation between the presence of these cultural elements, and the presence of TQM reengineering. The success of process improvement through either TQM or reengineering was used as a vehicle for examining the importance of these cultural elements. In addition, the importance of organisational culture and the implications for managers are also discussed in the study.

2.11 Six Sigma:


The history of Six Sigma is a well-documented one. Its origin as a quality improvement approach in the 1980s can be traced to the American electronic giant, Motorola, where a goal of improving all products - goods as well as services - by an order of magnitude (e.g. a factor of ten) within five years was established. This provided an important focus on the improvement rate. Six Sigma clearly focused resources at Motorola, including human effort, on reducing variation in \textit{all} processes, that is to say manufacturing processes, administrative processes and \textit{all other} processes. To set a clear measure on the improvement work, the program called Six Sigma was launched in 1987.

The reason for the name was that ‘sigma’ (\(\sigma\)), a Greek symbol, is a statistical measure of dispersion called the standard deviation. It is related to the capability of the process, that is, its ability to produce non-defective products/units/parts. In statistical jargon, sigma is a measure of process variation referred to as the standard deviation. "Six sigma" generally implies occurrence of defects at a rate of 3.4 defects per million opportunities (DPMO) for defects to arise. Signs of significant success at Motorola quickly became apparent. Soon other companies became interested in the program and successively more companies were able to demonstrate good results.
While typically applied consistently within a company, the content of the Six Sigma approach varies from company to company, consultant to consultant, and author to author. Generally, however, Six Sigma programs do have some common features, among which are the following:

- It is a top-down, rather than bottom-up approach.
- It is a highly disciplined approach that typically includes four stages: measure, analyse, improve and control.
- It is a data-oriented approach, making sound and heavy use of various statistical decision tools.

Six sigma programmes are raging through corporations worldwide, with some corporations citing savings in the $US billions resulting from six sigma implementation. Six sigma has both proponents and detractors with some arguing that nothing new is involved and others identifying it as revolutionary. The view espoused herein argues for six sigma as a methodology within the larger framework of total quality management - a blend of old and new in the sense that the tools of six sigma are often familiar ones, but are applied with an eye that is more strategically focused than historic use of those tools ordinarily indicates.

Bob Little in his paper talks about TATA Interactive Systems (TIS), a company based in Mumbai, India, but with its European headquarters in London. It is part of the TATA group, India's largest business house. He says, “TATA Interactive Systems (TIS), which has one of the world's largest teams for the design and development of custom-built e-learning

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solutions, is committed to achieving the most exacting quality standards. Towards the end of last year, TIS became the first company providing custom-built e-learning solutions to be assessed at level 5 on the capability maturity model (CMM) scale. The CMM is the most rigorous quality standard worldwide and encompasses leading companies such as Boeing, Raytheon, IBM, NASA and Motorola. Its prestige and value — well known within the IT world — are beginning to be recognised within the e-learning world too. One key component in TIS's drive for consistent high quality is its application of 'six sigma' techniques to its development and production processes. This is explored in the article, first by describing an 'outside-in' approach, then key concepts, project stages, changing business processes, a three-step cycle and criteria or secrets for project success.”

The 'shloka' given in the beginning of the chapter is about the concept of 'entirety'. The concept given in this 'shloka' not only encompasses the 'totality' (being discussed in 'total quality management') but also goes beyond it. If the ancient wisdom of the Indian culture is pooled with the modern management principles, it can create wonders.