

EXECUTION OF TQM FACILITATOR & IT RESOURCES IN INDIAN INDUSTRY

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By

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CHAPTER – I

INTRODUCTION

1.1. INTRODUCTION TO THE CURRENT STUDY

Various studies have been done in the manufacturing and service industry (ICT industry, education sector, banking sector, health sector) but later expand in only ICT industry.

The ICT sector is one of the significant parts of service sector that is growing fast. There are following reason for narrowing on ICT industry in the present study:

- Keep the business from being washed away in the technology tidal wave.
- Stay competitive in a thriving marketplace.
- Exchange of information is as much a part of trade as the movement of goods.
- Reducing risk in new e-business technologies.
- Educate employees on trends and developments of technology.
- ICT has moved from back office accounting to strategic assets.
- ICT influence direction and priorities of standards development by providing business requirements.

1.2. TOTAL QUALITY MANAGEMENT

TQM is a managerial approach which is focused upon the work procedure and people with the intention of satisfying customers and improving industrial performance. In different words, it has been indicated as a new way of managing an industry.

Also, TQM has been indicated as a new way of managing an industry. TQM builds on the following concepts; continuous improvement, quality priority, customer satisfaction and workforce involvement. Also, TQM attempts to combine all industrial functions to focus on meeting and outstanding customer's requirements and industrial objectives.

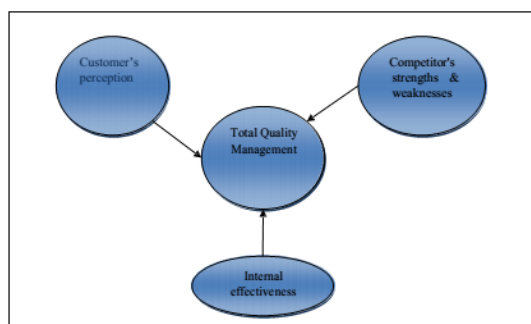


Figure 1.1. The idea of Total Quality Management

Figure 1.1. Shows that the concept of TQM philosophy is trying to fulfil the customer perception which increases the competitor's strength or decrease the weakness and enhance the internal effectiveness of market.

1.3. INFORMATION TECHNOLOGY & TOTAL QUALITY MANAGEMENT

IT has emerged as the signal of growth in the development goals. With the support of IT, industry can collaborate with each other finding the best way to adapt to different customer's

demand based changes in design, time and quantity while caring for cost. The impact of IT on industry systems can be separated into various categories:

- a) Speeding up activities
- b) Providing autonomous and intelligent decision making process
- c) Enabling distributed operations and collaboration along communication networks.

1.3.1. IT RESOURCES

In present, the IT is a base of development for countries and a benchmark practices for leading and successful organization. The effect of IT on an industry is increasing the importance and its effects on global markets. It is often used as the most significant factor in reducing costs and enhancing productivity. When IT is linked its complementarity with other organizational resource or practices developing IT resources. IT resources provide robust solutions to supervised business analytical skills and give the ability to deeply understand the organizations.

1.3.2. TQM FACILITATORS

Most of the industry recognize TQM and TQM facilitators for better business performance in order to improve their position in a global market.

There are various studies has been done on various sets of TQM facilitators by different authors. According to Tsang and Antony named 6 TQM facilitators considered this study, top management commitment, customer focus and support, teamwork, training and development, supplier partnership, continuous improvement, and culture change.

Singh & Sushil construct 14 TQM facilitators to improving airlines performance these are top management commitment, communication, benchmarking, employee involvement, training & education, employee empowerment, teamwork, continuous improvement and continuous quality culture, customer involvement, improved service quality, process improvement, on-time performance, increased load factor and customer satisfaction.

1.4. PROBLEM STATEMENT

In this research, the aim is to propose a solutions to a few problems. Quality has a different meaning in different references depending on their specific perspective. In order to compute customer expectation, quality is defined as meeting customer fulfilment. With the help of quality management customers are becoming more aware of quality and services so that knowledge makes a customer more brand savvy and selective. Quality has been applied by different industry according to their objectives and needs that TQM philosophy and practice produce visible and positive signs of productivity.

IT plays a crucial role in the TQM initiative through the strategic human resource and technology area. Also, IT act as advanced communication and computational tools and information system are the critical success of TQM. This chapter tries to successfully execute TQM facilitators and IT resources in the ICT industry of India. The problem statement, research purpose, research motivation, aim of the research has been carried out to identify the current study.

This study focuses on TQM and IT in the ICT industry. ICT industry is an internal aspect of a process that communicates the information to the customer from the industry. In this study, customers are the users of the ICT industry in India. The customers utilize and depend directly or indirectly on the ICT in the order of getting information on the daily basis. Therefore, ICT

industry should execute and maintain TQM consistently. This study addresses contemporary issues and challenges of a customer base in ICT industries in India which can be resolved with the use of TQM and IT. This study approached development and execution of quality of products and services in the ICT industries of India.

1.5 PURPOSE OF THE RESEARCH

- The purpose of this research is to execute TQM facilitators and IT resources in the ICT industry of India. Some studies on TQM and IT propose that together they successfully fulfil the customer requirements. Many industry recognize that TQM philosophy improves quality achievement. Also by introducing IT with TQM impact of industrial performance has been increased.
- It is naming the TQM facilitators along with IT resources and establish the contextual relationship between among them and also will to understand the TQM facilitators and IT resources in terms of their independence and driving power.
- It distinguished the hierarchy of facilitators and resources and identified which action should be taken for the successful execution of the ICT industry.
- It also estimates the effects of successful quality programs and resource execution on financial development of ICT companies. This study accomplishes by qualitative and quantitative methodological approach the execution of TQM and IT. Simultaneously, it documents knowledge regarding small and big industry towards TQM and IT.
- The importance of quality and information technology has increased the competitive advantage in the world markets as ICT sector is considered as one of the major contributors to the Indian economy. This analytical study determines the degree to which Indian ICT companies adopt TQM and IT and execute them for a satisfied customer.

1.6. MOTIVATION OF THE RESEARCH

There is an extensive research scope for TQM and IT in the ICT industry as recognised by the number of gaps with the support of exhaustive review of literature. The following facts come out from the review of literature:

- Many International Journals regularly report the ongoing research in the area of TQM and IT. These journals provide a framework and guideline to researchers with explicit discussions and the research approach. There are various kinds of reported research i.e. literature review, empirical, case studies are good source of motivation. Many of them point out International Journal such as Journal of Technology Management, Total Quality Management, Quality and Reliability Management, Industrial Management and Data system, Quality in Maintenance Engineering, Measure Business Excellence, Production Planning and Control, Journal of Computer Information System, Global Competitiveness, Production Economics Operations, European Management, TQM Magazine, Physical Distribution and Logistics Management, Technovation, Management Research News, Asian Journal of Quality, European Business Review, American Journal of Applied Science, World Journal of Science and Technology extra.
- Many digital libraries, which link articles with full text like ProQuest, EBSCO Business Source Premier, Science Direct, Emerald, Taylor and Francis, SpringerLink revealed many research publications on TQM and IT.

- The literature survey was carried out using the keywords such as “TQM and IT”, “TQM and Software Development”, “TQM and telecommunication”, “TQM and BPO”, “TQM and Mobile Service Provider”, “TQM and ICT”, “TQM Facilitators”, & “IT Resources” in the ICT industry of India.
- There was no model or instrument that has been developed to establish the level of TQM execution with the support of IT for ICT companies. This research shows how to evaluate the TQM facilitators and IT resources in the companies of India.
- The managerial implications of this study address the gaps of production and customer satisfaction that have not been addressed in Indian companies. Customer interaction, reduced response time and cost of identifying market requirements are to be focused upon.
- This study specifically being conducted in the ICT industry of India has a vibrant rationale because the Indian customer becomes more brand savvy.
- The review of literature suggests that no study has been done on the interaction between TQM facilitators and IT resources which have been investigated by ISM (Interpretive Structural Modelling).
- The Quality consciousness has made most producers of goods and services to change their products to meet the customer satisfaction.
- Further, a self-administered and structured instrument was designed to know the status of execution of TQM facilitators and IT resources and performance of ICT industries of India.
- This study used structural equation modelling to test the relationship between named the TQM facilitators, IT resources and customer satisfaction.

1.7. OBJECTIVES OF THE RESEARCH

The main aim of this research is to highlight the research entitled Execution of TQM Facilitator & IT Resources in Indian Industry. It will focus on the customer satisfaction by executing the TQM for IT and also by measuring the same as per objectives:

- To name the TQM facilitators and IT resources in ICT industry of India.
- To grade and categorize the TQM facilitators and IT resources for ICT industry and develop contextual relationships between them.
- To understand the awareness of TQM and IT program in ICT industry of India.
- To examine the degree to which TQM facilitators and IT resources are executed in the ICT industry of India.
- To examine the relationship among the named TQM facilitators and IT resources in the ICT industry of India.

1.8 METHODS OF RESEARCH

Many steps were undertaken to reach the ultimate draft of this research. An outline of the method adopted to collect data from respondents in ICT industry is given in this section.

- A questionnaire based methodology has been adopted to gain the insight to TQM facilitator and IT resources in the ICT industry of India. Drawing from the existing parameter in literature review, a questionnaire survey was conducted with reference to their Indian context. The questionnaire has been conducted survey to name and execute the TQM facilitator and IT resources in the ICT industry of India. The quantitative method implies the use of the questionnaire to collect data about the proposed model in the present research. Detailed questionnaire is developed into four sections. The First section deals with the company demographics including respondent's information and company profile. The second section named & grade the TQM facilitators and IT resources in ICT industry. The third section investigates the awareness of IT resources and TQM program in the context of India. Finally, the fourth section tests the relationship between IT resources and TQM facilitators and customer focus as perceived by manager's perspective in the industry of India.
- Two statistical techniques were used in the data analysis. The primary data was analyzed with the SPSS version 22 which gives the descriptive statistical analysis research samples such as mean, standard deviation, Kurtosis, Skewness.
- In the process of analyzing data using factor analysis first was used EFA to develop a scale and identify measured set of variables. Further, measurement model was tested by the SEM using CFA.

CHAPTER – II

REVIEW OF LITERATURE

2.1. INTRODUCTION

IT for TQM has been importantly executed on most industry. Many industries are giving better products and services with the support of introducing IT in TQM.

IT and quality management are complementary resources and owing to this IT has a positive effect on the quality program. It is anticipated that IT application in quality management will extend the operational tasks of quality management and hence rise of quality output. Service industries are investing steadily in technology, especially IT, to extend productivity, but with apparently very limited services. The application of IT in quality improvement through the following:

- Increasing quality awareness
- Online information regarding the level of quality
- Reducing quality costs

2.1.1. EMERGENCE OF TQM

TQM can be found to early 1920s when theory of statistics was first applied to product quality control. This idea was developed in Japan during 40s led by Americans, like Juran, Deming and Feigenbaum. The focus broaden from quality of products to issues relating to quality within an organisation – the start of TQM.

TQM includes customer focus, continuous improvement, the involvement of all employees and the integration of quality management into the total organisation.

TQM became in the early 1980's when Hewlett Packard(HP) criticized US chip manufacturers for quality of product when compared with their Japanese competitors. It is ironic that W. Edward Deming first introduced TQM, Japanese acquired the philosophy but the USA rejected the principle. Higher quality points to greater productivity through reduced rework, wastes and rejects leading to lower costs and customer complaints and ultimately improved market share.

Hendricks et al., and Flynn et al., agreed, TQM, with its emphasis on the organizational and socio-behavioral matter of quality improvement, can add to previous research on systems quality management. TQM is an integrated management philosophy that has been found to strongly effect performance of organization.

Terziovski et al., say that TQM is an information intensive management practice. Information plays an important role as all quality improvement activities are based on informed decision-making. Wiele et al., analyzed the idea of TQM using the “fad, fashion, and fit theory” for examining whether TQM can survive and become fit. It has been argued that if TQM is to move from being a fad to fashion or a fit, it must “be clearly defined and measurable” and must “have no direct link to short term major losses”.

2.1.2. TQM & IT

The objective of Total Quality Management in the information technology design is to assure the quality of information. Information technology play a vital role in companies which is used to re-engineer established business process and to redesign business market for today's information intensive environment [90]. This is done by verifying, ensuring and maintaining software integrity through a proper methodology. It constituted appropriate procedures with checks and controls in all the processes of information systems development. It ensures the choice of the design architecture, scope and the objective of the system and the development methodology.

Review of Literature for this research can be widely classified into various categories:

- 1) Methodology of the research
- 2) Focus and objective of the study
- 3) Tools and techniques
- 4) Research type
- 5) Region (Countries)

Apart from other discussed categories, gaps related to TQM & IT were identified by researchers along with in-depth literature review that has been elaborated upon in this section on the gap identification. Table 2.2. shows different Studies on TQM & IT.

2.2 TQM AND IT IN INDIA

TQM has a strong record in improving productivity, competitiveness and profitability by reducing rework dramatically. While TQM gains huge success it is helped potentially by IT. Tweedie examines the potential use of TQM in the information technology sector and found that IT is improving the influence of TQM in other sectors of organizational behavior. The concept of TQM has spread in every sphere of the global corporate world and Indian companies are no exception, while TQM & IT together in ICT companies based study are limited. The new customer demand policy have entered in Indian markets and companies in global market are treating brand savvy customers by using TQM and IT.

A few studies have been done on TQM & IT in ICT companies in the last two decades as shown by data. Some selected studies of TQM and IT are summarized in the Table 2.3.

2.3 HISTORY OF ICT IN INDIA

ICT has grown from strength to all organizations. It has occurred and taken for the developmental to work as a necessary tool. In 1965 many Indians professionals migrated for research opportunities in the USA, due to fast growing IT sectors in USA, IT professionals were needed outside the USA. India had a population that is educated, technically strong and possesses English speaking skills.

IT-BPM exports grew by 7.7 per cent to US\$126 billion in 2017-18 and is estimated at US\$136 billion for 2018-19. E-commerce market is estimated at US\$43 billion for FY 2018-19, at the growth rate of 12 per cent.

Recently, Ministry of Statistics and Programs Implementation (MOSPI) has signed a memorandum of understanding to participate in the project on a statistical compilation of the ICT sector and policy analysis undertaken by Orbicom. This project is trying to compile data on the contribution of the ICT sector to Gross Domestic Product (GDP) and employment to the Indian economy (International Telecommunication Union).

2.4 BACKGROUND OF ICT INDUSTRY

The Information Communication and Technologies became popular in early 1997. ICT is a term that consists of any communication application or device, incorporate: television, radio, cellular phones, computer, software, network hardware, satellite system as well as various application and services associated with them.

ICT can be broadly seen under two parts, information technology & communication. For the past couple of decades, these sectors have made significant growth. In the present study ICT organizations, including different four sectors named as information technology, software development, Business Process Outsourcing (BPO) and telecommunication are studied. In India, IT sector is formed by software services and information technology enabled services which comprise BPO. Secondly, telecommunications and mobile service provider comprise telecommunication from one end to another end.

2.4.1. INFORMATION TECHNOLOGY

IT has to lead the economy transformation of the country and altered the perception of India in the global economy. IT has produced fundamental changes in the US economy, leading to a permanent improvement in growth prospects.

India's IT & ITeS industry grew to US\$ 181 billion in 2018-19. Exports from the industry increased to US\$ 137 billion in FY19 while domestic revenues (including hardware) advanced to US\$ 44 billion. Spending on Information Technology in India is expected to grow over 9 per cent to reach US\$ 87.1 billion in 2018. revenue from digital segment is expected to comprise 38 per cent of the forecasted US\$ 350 billion industry revenue by 2025.

2.4.2. SOFTWARE DEVELOPMENT

The software sector in India began in 1970 with the entry of Tata Consultancy Service in the domain of outsourced application migration work. The software sector of India, one of the world's successful industries, has grown more than 30 % annually for 20 years.

As per the report of NASSCOM, the revenue for the software product segment currently stands at 2.2 billion USD, is expected to reach 10 billion USD by 2020.

2.4.3. BUSINESS PROCESS OUTSOURCING

BPO, the outsourcing functions in which the organization outsources, specific activity/process related to its business to a third party service provider. BPO, fastest growing sectors of ICT organizations.

Figure 2.4 presents, various Indian BPO services offered such as customer support, technical support, telemarketing services, insurance processing, data processing, forms processing, bookkeeping and tech supporting web research.

US has traditionally been the biggest importer of Indian IT exports; over 62 per cent of Indian IT-BPM exports were absorbed by the US during FY18. Non US-UK countries accounted for just 21 per cent of total Indian IT-BPM exports during FY18.

2.4.4. TELECOMMUNICATION

India is currently the world's second largest telecommunications market and has registered strong growth in the past few decades. The Indian mobile economy is growing rapidly and will contribute substantially to its GDP.

Indian telecom sector's revenue grew at a CAGR of 7.31 per cent from US\$ 19.6 billion in FY06 to US\$ 42.6 billion in FY17. During the first half of FY18, gross revenues of telecom sector in India reached US\$ 20.4 billion. Revenues from the telecom equipment are expected to grow to US\$ 26.38 billion by 2020. As per Union Budget 2018-19, Government of India is expecting a 58 per cent increase to Rs 48,661.42 crore (US\$ 7.52 billion) in telecom sector revenue. India is currently the 2nd largest telecommunication market and has the 3rd highest number of internet users in the world.

2.5 RESEARCH GAP

It is apparent from the literature that ICT industry make serious penetration with TQM and IT. There is evidence that IT will improve the impact of TQM in the business organization. Extensive literature review in the present study has identified and also addressed those gaps. TQM and IT together gained competitively and provided a lead for future research work, identifying gaps in the existing literature. There are many studies discussed on TQM in different areas, but little work was noticed on exploring a relationship between TQM and IT. Siam et al., identify which TQM and IT factors support TQM in order to fulfill the role of IT in executing TQM. Also, Dewhurst et al., investigated the relationship between how TQM and IT affect the organization. On the other hand, Perez Arostegui et al., suggests that IT competence is composed of IT infrastructure, IT technical and managerial knowledge integration of IT strategy with firm strategy and quality performance.

2.6 SUMMARY

The present literature review classified into different categories of overview on TQM, overview on TQM and IT which is covered by different research approaches, tools and techniques, research type and region. It covers history of ICT industry and their role of ICT in Indian growth, an overview of the ICT industry of various sector, information technology, software development, business process outsourcing and telecommunication. It

also represents a comprehensive literature review on TQM & IT in ICT industry of India. At the end, research gaps are identified on the basis of the current study.

CHAPTER – III

NAMING THE TQM FACILITATORS & IT RESOURCES

3.1. INTRODUCTION

There are several studies that have been conducted by different researchers on TQM and IT. IT could be and already used for enhancing quality management. In most organizations, TQM has been executed by using IT.

Goal of this chapter is to naming the TQM facilitators & IT resources for the benefits of researchers in industries. The results of this study will help researchers to choose TQM facilitators and IT resources for developing a framework/model.

3.2. OBJECTIVES AND METHODOLOGY OF RESEARCH

Briefly Study objectives of this chapter, what is to be acquired by the research. This study is considered because of important studies of TQM facilitators and IT resources. This paper is two-fold as follows:

- To observe TQM facilitators and IT resources from the previous studies on them.
- To apply frequency of occurrence method on the TQM facilitators and IT resources to help researchers find which facilitators and resources are frequently used by the ICT industry and have a greater effect on it.

Research Methodology is a set of scientific process which is guides researchers as to what steps need to be taken to meet the research objectives. The literature review was employed in this study and focused on TQM facilitators in the IT industries. Several papers have been published on TQM facilitators, but this study identifies those research papers published in between 2000 and 2016.

3.3 TQM FACILITATORS IN INDIAN INDUSTRY

ICT industry makes a fast change in the development of technological services. Industries picture reflect that past two decades, ICT industry has been one of the fastest growing businesses.

Many software companies facing difficulties from financial setbacks therefore, they are trying to low investment and control the cost. Quality of software gets more attention by the concept of TQM. The need of quality management becomes highly relevant in software projects. Many software advancement enterprises apply philosophy of TQM for improving the software quality and to enhance their efficiencies of development. The below Table 3.1 shows different studies on TQM facilitators in the ICT organization.

3.4.IT RESOURCES IN INDIAN INDUSTRY

IT resources are considered like vehicles for process improvement in the company. Resources retrieve and transfer more accurate information, improve communication links and facilitate execution of TQM. The use of resources also brings competitive posture in the industry. IT

resources are used as specially used for accessing and growing quality management. From different studies by different researchers it is demonstrated that IT resources are ever-increasing elements for TQM and result in increasing the impact of IT on TQM Technology gives better integration of supply chain in the industry.

Prajogo and Sohal employed the SEM approach to examine the multi dimensionality of TQM in association with organizational performance. SEM helps gain insight into the interaction and association among the different facilitators of the conceptual model. There are selected studies on IT resources shown in the Table 3.2. Moreover, based on the above discussions of TQM facilitators and IT resources identified by many authors are shown in the Table 3.3 & 3.4.

3.5. SUMMARY

The finding of this chapter is review TQM facilitators and IT resources by different authors. This study was conducted in different ICT organizations and explored facilitator and resources. This study is suggesting that which TQM facilitators and IT resources were highly supporting the ICT industry. The extensive literature explored a total of 66 TQM facilitators and eight IT resources for successfully execute the TQM and IT program in the ICT organization. The study named 17 major factors from those nine facilitators and eight resources. These 9 TQM facilitators and 8 IT resources were frequently used by different researcher in their studies named as: Top management commitment & support (TMCS), Customer Satisfaction (CS), Empowerment (EMPW), Total employee involvement (TEI), Teamwork (TW), Culture Change (CC), Democratic Management Style (DMS), Electronic Data Interchange (EDI), Computer Aided Design (CAD), Computer Aided Manufacturing (CAM), Enterprise Resource Planning (ERP), Computer Aided Process Planning (CAPP), Computer Aided Engineering (CAE), Statistical Packages for Social Science (SPSS) and Structural Equation Modelling (SEM).

CHAPTER – IV

GRADING AND CATEGORIZING OF TQM FACILITATORS AND IT RESOURCES

4.1. INTRODUCTION

Due to emergence of new products and improved management, Total Quality Management has become the buzz word in the management practices and it has grown competition in the world of business.

Facilitators and resources together have given birth to a new requirement, which is to successfully amalgamate TQM and IT in any organization [22]. No study has been found using ISM (Interpretive Structural Modeling) approach on TQM and IT facilitators; so this is considered as the first study in this direction. This study will support for understanding the TQM facilitators and IT resources with respect to their interdependence and their driving and dependence power with the support of MICMAC analysis.

- To name and grade TQM facilitators and IT resources in the ICT industry.
- To find out the contextual relationship among named TQM facilitators and IT resources by using the ISM approach.
- To categorize the naming of TQM facilitators and IT resources by using MICMAC

analysis.

4.2. TYPES OF TQM FACILITATORS

Facilitators are defined as one that enables another to achieve an end, where “enables” implies to make able or give power, competency or ability. Khanam *et al.*, [54] explored 9 TQM facilitators and 8 IT resources which help managers in smoother execution of TQM and IT in ICT industry. These facilitators are discussed as follows:

- Top Management Commitment and Support (TMCS)
- *Customer Satisfaction (CS)*
- *Empowerment (EMPW)*
- *Total Employee Involvement (TEI)*
- *Continuous Improvement (CI)*
- *Continuous Training (CT)*
- *Teamwork (TW)*
- *Culture Change (CC)*
- *Democratic Management Style (DMS)*

4.3 TYPES OF IT RESOURCES

Resources are services, materials, or other assets that are converted to create benefits and, in the process, may be consumed or made unavailable. IT resource is a owned technical recruiting and consulting firm focused on the IT industry. IT resources are virtual or physical component of limited availability within the organizations. There are different types of resources applied by authors and IT resources are ever increasing elements of TQM and result in the impact of IT on TQM [99; 51].

- *Electronic Data Interchange (EDI)*
- *Computer Aided Design (CAD)*
- *Computer Aided Manufacturing (CAM)*
- *Enterprises Resources Planning (ERP)*
- *Computer Aided Process Planning (CAPP)*
- *Computer Aided Engineering (CAE)*
- *Statistical Packages for Social Sciences (SPSS)*
- *Structural Equation Modelling (SEM)*

4.4 ISM (INTERPRETIVE STRUCTURAL MODELLING)

ISM is one of the interactive management tools, which is identifying and summarizing the relationship between specific elements. It is used by researchers and practitioners to understand the relationships among various variables. ISM transforms unclear, poorly articulated mental models of a system into a visible well defined hierarchical model.

In addition, another study Thakkar *et al.*, used ISM as a tool like the cause effect diagram and AHP (Analytic Hierarchy Process) to develop a balanced scorecard using quantitative and qualitative approaches. Hasan *et al.*, used this technique to establish a relationship among the barriers in agile manufacturing. ISM based methodology is applied to study the interrelationship among the variables and check the performance of the variables in the automotive service center. Above literature review reflects that ISM various features and gives its application in different fields.

4.4.1. ISM METHODOLOGY

This research work carried out an extensive literature review and expert opinion from organization and academia. A total of 21 participants, including 9 quality experts, 7 industrialists from the ICT sector and 5 from academia were consulted. After the end of three brainstorming session a total of 17 variables, including 9 TQM facilitators and 8 IT resources were identified in this paper. ISM methodology is mainly intended as a group learning process, but can also be used individually. The following steps are involved in the ISM techniques.

- Step 1. Naming the facilitators/ resources relevant to issues or problem with the help of expert opinion and literature review.
- Step 2. A contextual relationship is established between facilitators/resources and examined pairwise facilitators.
- Step 3. Structural self-interaction matrix (SSIM) is evolved for facilitators/resources and have shown relationship between pairwise facilitators.
- Step 4. Construct reachability matrix (RM) from the SSIM.
- Step 5. After construction of RM partition into different levels.
- Step 6. Revised RM again: make the transitivity relationship between facilitators/resources and obtained the FRM (final reachability matrix).
- Step 7. Based on the FRM developed an ISM model and the transitive links are removed.
- Step 8. Develop ISM digraph
- Step 9: Apply MICMAC analysis on the model.

4.4.1.1. STRUCTURAL SELF-INTERACTION MATRIX (SSIM)

To analyze the contextual relationship between the variables a lead type must be chosen. In other words, a contextual relationship means that one variable lead to another variable (i and j). To develop SSIM, four symbols are used to represent the relationships between the variables (i and j).

1. V: facilitator/resources i will alleviate facilitator/resources j.
2. A: facilitator/resources j will alleviate facilitator/resources i.
3. X: facilitator/resources i and facilitator/resources j will alleviate each other i.e. relation in both directions.
4. O: facilitator/resources I and facilitator/resources j is unrelated, i.e. no relationship exists between facilitator/resources.

The developed SSIM model is based on the contextual relationships and recognized as 9 TQM facilitators and 8 IT resources from the ICT industry.

- TQM facilitator 1 (Top management commitment and support) helps to lead cell 1 i.e. TQM facilitator 1 (Top management commitment and support). Thus, the relationship between TQM facilitators is represented by Symbol 'V'.

- TQM facilitator 2 (Customer satisfaction) can be achieved by cell TQM facilitator 5 (Continuous improvement). This means that continuous improvement will lead to the customer satisfaction in ICT organization. These relationships are represented by symbols 'A'.
- TQM facilitator 3 (Empowerment) and facilitator 4 & 8 (Total employee involvement and Culture change) can be achieved by each other; it means to change the culture need empowerment and total employee involvement. Similarly, for the employee empowerment need total employee involvement and culture in the organization. Thus, the relationship is represented by the symbol 'X'.
- TQM facilitator 7 (Teamwork) has no relationship with the TQM facilitator 9 (Democratic management style) means 'democratic management style' have no role play in 'teamwork'. Symbol 'O' is represented there is no relationship exist between the facilitator.
- IT resource 7 (statistical package for the social sciences) helps to lead the IT resource 8 (structural equation modeling) meaning SEM will be achieved by SPSS. It is denoted by symbol 'V'
- IT resource 1 (electronic data interchange) can be alleviated by other resources meaning all the resources will lead to "electronic data interchange". Thus the relationship is denoted by the symbol 'A'.
- IT resource 2 (computer aided design) and IT resource 3 (computer aided manufacturing) can be achieved by each other. Thus the relationship is denoted between them by symbol 'X'.
- IT resource 4 (enterprise resources planning) have no relationship with the IT resources 8 (structural equation modeling) meaning 'enterprises resources planning' can't be affected by 'structural equation modeling'. Thus the relationship between the two resources is denoted by 'O'. The SSIM matrix of TQM facilitators and IT resource shown in the Table 4.1 & 4.2.

4.4.1.2 REACHABILITY MATRIX (RM)

The RM is obtained by conversion of SSIM. The SSIM is into the binary form of various symbols V, A, X and O representing the relationship between facilitators and resources, these symbols are replaced by binary digits (1 and 0) in the SSIM. The given rule has been followed by reachability matrix:

- If the (i, j) entry in the SSIM is V, then the (i, j) entry in the reachability matrix becomes 1 and (j, i) entry becomes 0.
- If the (i, j) entry in the SSIM is A, then the (i, j) entry in the reachability matrix becomes 0 and (j, i) entry becomes 1.
- If the (i, j) entry in the SSIM is X, then the (i, j) entry in the reachability matrix becomes 1 and (j, i) entry becomes 1.
- If the (i, j) entry in the SSIM is O, then the (i, j) entry in the reachability matrix becomes 0 and (j, i) entry becomes 0. The initial reachability matrix below shown in the Table 4.3 & 4.4.

These driving powers and dependency will be used in MICMAC analysis. In the MICMAC analysis facilitator and resources will be divided into four clusters named autonomous (cluster 1), dependent/dominant (cluster 2), linkage/relay (cluster 3) and independent/dominant (cluster 4).

4.4.1.3. LEVEL PARTITIONS

According to Warfield [379], reachability set and antecedent set are obtained from the final reachability matrix. The reachability set consists of facilitator/resources itself and other facilitator/resources may help to achieve, whereas antecedent set consist of facilitator/resources itself and other facilitator/resources helps in achieving it. For example, facilitators 3 have reachability set consists of the horizontal entry with 2,3,4,5,8 and antecedent set consist of vertical entry with the 1,3,7,8 (Table 4.7). Then the intersection of reachability and antecedent sets is iterated and levels derived from all the elements. The element for whom the reachability set and intersection set is same the top level element in the ISM hierarchy. Those elements have a top level hierarchy would not lead to achieve any other element above their own level. From the Table 4.7 & 4.8, found that facilitator (customer satisfaction) and resource (electronic data interchange) cited at level I.

On the Table (4.7-4.8), the elements have shown their level along with reachability set, antecedent set and intersection set.

4.4.1.4 FORMATION OF CONICAL FORM MATRIX

Conical matrix is achieved by reachability matrix. Level of elements is obtained by the intersection of reachability and antecedent sets and it can be transformed in lower triangular matrix. Customer satisfaction (facilitator 2) and electronic data interchange (resource 1) are found at level 1 whereas top management commitment and support (facilitator 1) and statistical package for social science (resource 7) situated on the last level. Table (4.9-4.10) shows conical matrix and later this will help in digraph and ISM model.

4.4.1.5 DEVELOPING DIGRAPH

Structural model is generated from the final reachability matrix and if a relationship exists between the variables will be shown by a digraph. Finally developed digraph is transformed into the ISM model.

Debnath and Shankar [376] investigate and examine the opportunities (facilitators) and issues (barriers) with help of facilitator and barriers model in the technical education in the India. Simultaneously, in this study author proposed to a model of TQM facilitator and Information Technology resources for successfully execute the ICT organization. From the figure 4.2, It is evident that facilitator 2 (customer satisfaction) which is assigned at the level I while facilitator 1 (top management commitment and support) has been located at the last level VI. Top management commitment and support is a very significant TQM facilitator for the organizations as it forms the base of the ISM hierarchy. It is promoting organization at the top level and provides the leadership and vision to the employees so that they can effectively lead the teams and continuously improve the performance of the organization. Facilitator 1 (Top management commitment and support) leads to the flow of facilitator 6 (continuous training), facilitator 7 (teamwork) and facilitator 8 (culture change). These facilitators are interrelated to each other and hence they appear at the same level of the hierarchy in the model. Facilitator 3 (empowerment) and facilitator 4 (total employee involvement) have two way relationships between them and lead to facilitator 9 (democratic management style).

Further, facilitator 9 (democratic management style) leads to the facilitator 5 (continuous improvement), organizations needs democratic management style to be a winner and to meet global standards for the continuous improvement. Facilitator 5 (continuous improvement) leads

to facilitator 2 (customer satisfaction) and it can be achieved through successful execution of TQM.

Similarly, from Figure 4.3, it is evident that EDI (resource 1) is assigned at the level I while SPSS (resource 7) is assigned at level VI. SPSS (resources 1) will lead to computer aided design (resources 2) and computer aided manufacturing (resource 3). Statistical software packages for social science are software package which is used by a researcher and practitioner for collecting and analyzing data. It is the vital IT resource to successfully execute the TQM program. Resource 2 (computer aided design) and resource 3 (computer aided manufacturing) having two way relationships, which provides communication among those involved in the design, manufacturing and other process.

As shown in the figure 4.3, resource 4 (enterprise resource planning) leads to resource 5 (computer aided process planning) i.e. it integrates different business and organizational performances. Enterprises resource planning is a way of doing business for productivity improvement for effective decision making across the whole organization with the integration in the philosophy of TQM. Resource 6 (computer aided engineering) and resource 8 (structural equation modelling) leads to resource 1 (electronic data interchange). Resource 6 (computer aided engineering) has been introduced in order to increase productivity while resource 8 (structural equation modelling) tests and estimates causal relations of production by using a amalgamation of statistical data and qualitative causal assumptions. IT resource 6 & 8 provide information to the electronic data interchange about increment and the relations of production. Resource 1 (electronic data interchange) is important for companies as it can significantly reduce the cost of sending documents because it can automatically send the electronic data to the vendors. Electronic data interchange has been found on top of the hierarchy and it is the driven of the model.

4.4.1.6 MICMAC (Matrix Of Cross-Impact Multiplication Applied To Classification) Analysis:

MICMAC analysis, classification assist to clarify behavior of a variable in the system and how it should be managed. MICMAC technique analyzes the dependency and driving power of the variables. In this analysis, variables are plotted on the graph with dependence on X- axis and driving power on Y-axis. The MICMAC method reveals hidden variables by taking account of indirect relationships and feedback loops. The indirect relationships are analyzed by using matrix multiplications. This multiplication process continues until the cross-impact matrix is raised to a certain power in which the variables' order proves to be stable, the row and column classification becomes stable. The variables are divided into four categories.

- The first category variables are those which have weak dependency and weak driving powers are called “autonomous variables”. These variables are disconnected from the system. Figure 4.4 & 4.5 shows there is no autonomous variation in the matrix.
- The second category of variables has high dependence and low driving powers are called “dependent variable”. These variables are strongly connected with the entire system. Facilitator’s customer satisfaction (facilitator 2), continuous improvement (facilitator 5), democratic management style (facilitator 9) and resources computer aided process planning (resource 5), computer aided engineering (resource 6), and structural equation modelling (resource 8) and electronic data interchange (resource 1) are dependent variable. Among these variables customer satisfaction and electronic data interchange are driven of the system.

- The third category of variables having high dependence and high driving power are called the “linkage variable”. Linkage variables affect higher level variant, but they themselves are dependent on lower level variables. There are two linkage facilitators culture change (facilitator 8) and total employee involvement (facilitator 4), that are unstable and before making any changes in them care should be taken care of consecutively in other variables.
- The last and fourth category variables having low dependency and high driving powers are called “dependent variable”. These are the most important variables as they influence the other variable. The last category has the four facilitators, top management commitment and support (facilitator 1), teamwork (facilitator 7), continuous training (facilitator 6), empowerment (facilitator 3) and computer aided design (resource 2), computer aided manufacturing (resource 3), enterprise resource planning (resource 4) and statistical package for social science.

Both models represent the major hindrance, and they are the duties of the ICT organization. As hierarchy is followed, it is observed that the TQM facilitators and IT resources have enhanced the quality of product and services in the ICT.

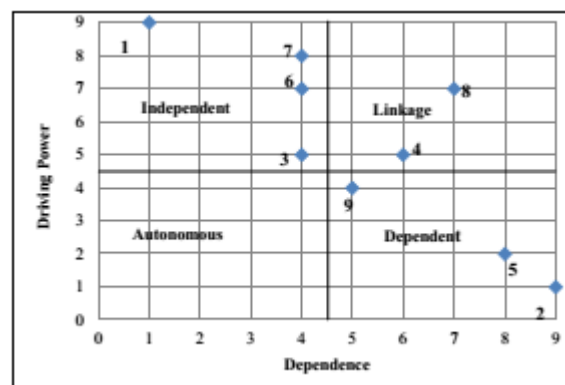


Figure 4.1. MICMAC matrix of TQM facilitators

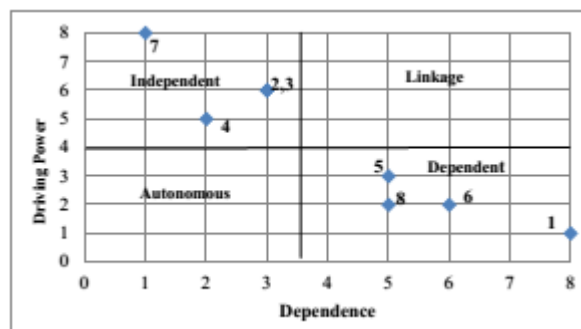


Figure 4.2. MICMAC matrix of IT resources

4.5 RESULTS AND DISCUSSIONS

In the current research ISM model was developed to understand the contextual relationship between TQM facilitators and IT resources that would importantly help managers and practitioners of the ICT industry. The following things were observed from the MICMAC analysis.

- From the MICMAC matrix, it is observed three facilitators namely customer satisfaction, continuous improvement, democratic management style and four IT resources, namely

computer aided process planning, computer aided engineering, structural equation modelling, electronic data interchange are the dependent variable and have strong dependency and weak driving power. They are at the top of the ISM model, therefore management should give high priority to tackle these variables.

- The MICMAC matrix indicates that four TQM facilitators top management commitment, teamwork, continuous training, empowerment and four IT resource computer aided process planning, statistical package for social science, computer aided engineering, electronic data interchange are independent variables. They have weak dependency and strong driving power. These variables are found at the bottom of the hierarchies of the ISM model and help to achieve the outcomes of the variables. It can be anecdotal that management should work out strategies to facilitate these independent variables in order to enhance the business performance and customer satisfaction.
- It is seen from the Figure 4.4, TQM facilitators namely culture change and total employee involvement are the linkage variables. They have strong dependency as well as strong driving powers are found in the middle of the ISM model. If any change occurring to these variables will have an effect on others and also a feedback on themselves. Hence, these variables are unstable in nature which may affect the successful ICT organization either in a positive or negative way. But Figure 4.5 shows that there is no linkage resource means all IT resources are stable.
- MICMAC matrix shows that, there is no autonomous variable. Autonomous variables have weak dependency and also weak driver power. The absence of autonomous variables indicates that management considered all variables to influence in the execution of the ICT industry.

4.6. SUMMARY

The aim of this research is to naming the significant TQM facilitators and IT resources and analyze them. Previously TQM facilitators and IT resources relationship model were not developed in the ICT organization. A contextual relationship can be easily developed between TQM facilitators and IT resources by using brainstorming and ISM, thus produced model depicting interaction would be of great help to managers and practitioners in the organization.

This is the study that discovered nine TQM facilitators and eight IT resources with the help of ISM and MICMAC method. This study highlighted on top management commitment and support and electronic data interchange and their role in executing ICT industry. Commitment of Top management and support facilitator and electronic data interchange resources was found as the major factor and lead to all facilitators and resources (Figure 4.2 & 4.3) meaning that can be treated as a base for the execution of an industry.

The major finding of the current study gives significant guidelines for both managers as well as the academicians. This study draws attention on top management commitment and supports that continuously giving effort to customer services for never ending customer satisfaction. The statistical packages for social science are one of the resources used for large data analysis, which is time effective for the researcher.

MICMAC analysis categorized the TQM facilitators and IT resources according to their dependence and driving power. Strong driving power, influence the customer focus thus strong driving facilitator and resources continuously achieved the customer satisfaction.

CHAPTER – V

RESEARCH METHODOLOGY

5.1 INTRODUCTION

The basic methodology was taken for this research is a questionnaires based survey. The aim of this research is to examine the degree of association between TQM facilitators, IT resources (independent variables) and customer satisfaction (dependent variable). The target population has been divided into different sectors. The result of the survey was subjected to different analysis. The different procedures that were followed by researchers in collecting data is explained in the below sections. It also includes sample characteristics of variables and the formation of the questionnaire.

5.2 RESEARCH METHODOLOGY

A questionnaire survey methodology was adopted and a designed questionnaire was sent to selected sent to selected ICT industry. The aim of this research is to execute TQM & IT in ICT industry of India that could improve the operational performances that significantly satisfied the customers.

5.2.1. RESEARCH DESIGN

In the present study descriptive nature is adopted because it helps researchers, generate data that can explain the composition and characteristics of relevant groups. In other words, descriptive research is used to explain the characteristics of a population.

This research uses cross-sectional design. The cross sectional design proves to be cost effective and consumes less time as compared to longitudinal study design. Moreover, this study also adopted survey method, which is to collect data and information from members of population to check the current status of that population. There are variuos types of survey methods to collect data from the respondents. The most common type of questionnaire survey can be named as: telephonic interview, personal interview, postal interview, e-mail interview. In this study e-mail survey has be taken to collect the data and information from the population.

5.2.2 SAMPLE DESIGN

The principle of statistical sampling to secure representative sampling is employed for economy and speed. The aim of statistical sampling is to maximize the chance of uncovering particular mean difference, which is also statistically important. Sample design is the most critical component of research for almost every organization. Questions like population, sample size, sample frame and sample unit must be considered by the researchers at the time designing of a sample..

5.2.2.1 TARGET POPULATION

The target population covered these steps:

- An element is the object from which or about which the information is desired, e.g. the respondents. In present study top manager's information is desired to execute TQM and IT in the ICT industry of India.
- A sampling unit is an element that is available for selection at some stages of sampling

process. Here sampling unit is ICT industry.

- Extent refers to the geographical boundaries. This study geographical area is India.

5.2.2.2. SAMPLING FRAME

This study covers ICT industry of India, including four sectors (Table 5.1), namely Information Technology (IT), Software development, telecommunication, Business Process Outsourcing (BPO) and mobile service provider. A total number of 801 sample size was finalized from Nasscom [4] list.

Table 5.1. Different sector percentage

Sector	No. of Companies	Percentage
Information Technology	390	48.6%
Software Development	230	28.7%
Telecommunication	63	7.9%
Business Process Outsourcing	118	14.8%
Total	801	100%

5.2.3 SAMPLE TECHNIQUES

This study adopted convenience sampling. Convenience sampling is available to the researcher by virtue of its accessibility. There are two reasons for choosing convenience sampling in the present study:

- 1) Respondents were distributed all over Indian it is not possible to build the sampling frame from the researcher themselves, so non probability purposive convenience sampling was done.
- 2) Secondly, here researcher was interested only in customer satisfaction in the ICT sector. By using convenience sampling researcher could get a good response rate for this study which could provide the beginning of future research.

5.2.4. SAMPLE SIZE

The sample size is a significant feature of any study in which aim is to make inferences about a population from the sample. To measure the sample size Green [402] suggests a desirable sample size formula:

$$n > 50 + 8V$$

Where 'V' is the number of independent variables.

The current study divided sample size into four sectors (Figure 5.3), Information Technology (390), software development (230), telecommunication (63) and Business Process Outsourcing (118) and total sample size is n=801.

5.3 SAMPLING UNIT

Data collection is the way of gathering information. Primary data were collected to accomplish the purpose of research objectives. However, primary data were directly collected from managers through the questionnaire, while population details were obtained from a previous

study conducted by NASSCOM [4] annual report.

5.4 DEVELOPMENT OF RESEARCH INSTRUMENT

In developing the structured research instrument for this study, an important source of input, which was used in the designing the research instrument were derived from a variety of important issues related to TQM and IT which were reflected from the literature (Chapter 2). The following instrument were separated in four parts and accomplish the research objectives.

Section I, included the demographic factors, this part of the questionnaire was split into two parts, company profile included name of respondents (optional), gender, age, respondent's qualification, job designation, and length of services. Second part of the section I, having name of industry, types of business sectors, total number of employees, annual turnover and dose your industry apply TQM & IT.

Section II collects information on naming and grading the TQM facilitators and IT resources in the ICT industry.

Section III gathers information to understand the awareness of IT resources and TQM program in the ICT industry.

Finally, Section IV examines the degree to which IT resources and TQM facilitators are executed as well as the relationship among the named TQM facilitator and IT resource on customer satisfaction in the ICT industry.

Also, a total number of 145 items were initially created from the 17 TQM facilitator and IT resource. There are the following number of items of TQM facilitators and IT resources are listed below:

1. Top management commitment & support (TQM facilitator) having eight items to improve quality performance, effectively support quality awareness to the industry.
2. Customer satisfaction (TQM facilitator) containing nine items, it is related to the customer requirement, improvement in quality programs, designing new product and services use the required customer satisfaction.
3. Empowerment (TQM facilitator) comprises eight items, allow employees to use their skills and gives an opportunity to employees to develop their career.
4. Total employee involvement (TQM facilitator) containing eight items, it encourages employees suggestion and innovation, continuous improvement of employees.
5. Continuous improvement (TQM facilitator) including 9 items, used to identify area of improvement, reduce order processing and service deployment cycle time.
6. Continuous training (TQM facilitator) comprises 8 items, it provides an opportunity to reform employees about the goal of the industry, ensures
7. Total employee involvement (TQM facilitator) containing 8 items, it covers the employee involvement, develop trust and encourage leadership traits.
8. Culture change (TQM facilitator) including 9 items, it is related with TQM, measure the total quality, access the behavior factors of TQM.

9. Democratic management style (TQM facilitator) having 9 items, investigate the improvement of industrial goal, increases job satisfaction, gives feedback and motivates the employees.
10. Electronic data interchange (IT resources) comprising ten items, improves the communication link with suppliers, facilitates electronic exchange of good and services, contributes to quality data, reconfiguring industry function.
11. Computer aided design/ Computer aided manufacturing (IT resources) containing nine items, it is related to the elimination of unnecessary hand-off delays in the information & material flows, designing product at faster rates, increasing the probability of business by reducing design and manufacturing cost.
12. Enterprise resource planning (IT resources) comprises 9 items, improves the working capital and execution of TQM culture, increasing productivity & empowering the customer to modify the business process and alleviates the arduous job of supporting inflexible systems.
13. Computer aided process planning (IT resources) including 8 items, identifies all aspects of production planning, optimizes the industry performance in a global context.
14. Computer aided engineering (CAE) containing 8 items, covers the robustness and performance of quality, gives information to assists support design teams in decision making and reduces the exploitation period of products.
15. Statistical packages for social science (IT resources) having 9 items, it is analyzing the collected data, facilitate the statistical for large amount of data, formulate hypothesis, examine the relation between data.
16. Structural equation modelling (IT resources) having 8 items, examines the dependent and independent variables, integrates standard method, proposes the newest procedure to handle missing data.

5.4.1 MEASUREMENT SCALE

The present study uses 5-point Likert Scale.

5.5 PILOT TEST

A preliminary test will be done on the data collection tools and procedures to identify likely problems. To validate the instrument with a group of 25 experts including ten academicians and 15 quality experts who have knowledge related to the TQM and IT.

5.6 QUESTIONNAIRE & DATA COLLECTION PROCESS

The survey was done with the assist of semi-structured questionnaire including closed and open- ended questions.

Table 5.2: Collection of responses from different categories of ICT industry

ICT Industry	1st wave survey		2nd wave survey		3rd wave survey		4th wave survey		Total no. of Responses Received
Category	No. of Questionnaire sent	No. of responses received	No. of Questionnaire sent	No. of responses received	No. of Questionnaire sent	No. of responses received	No. of Questionnaire sent	No. of responses received	
Information technology	119	15	239	02	390	12	390	15	104
Software Development	150	24	<i>no</i>	19	218	32	230	13	88
<i>BPO</i>	85	11	101	53	110	24	118	9	97
Telecom	22	8	40	9	39	5	42	8	30
Total	376	58	550	143	757	73	801	45	319

5.7 DATA ANALYSIS

The measurement instrument was used to test reliability, face and content analysis and finally construct analysis. SPSS program was used to interpret the quantitative data analysis. To interpret the qualitative analysis, Structural Equation Modelling (SEM) was used to construct analysis including Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). SEM provides hypothesis testing approach to the analysis of a structural theory bearing on the same phenomenon.

5.8 CONCLUSION

This chapter has discussed the choice of research samples and research design. It provides a brief description of research design and methodology to execute the study. This chapter also includes data collection process, identification of sampling units, the development of the instrument, pilot testing of instruments, questionnaire and data analysis procedures. The questionnaire based survey was planned for primary data collection. Also, to accomplish the objective of the study research questions and hypotheses are formulated. The testing of hypotheses and results are presented in the Chapter 6. It has highlighted the various statistical tests that are used to test the hypotheses are descriptive statistical, scale reliability, exploratory factor analysis, confirmatory factor analysis and finally SEM mainly used to validate the model by testing hypotheses. The applied detailed research methodology and data collection procedure will confirm that result supported familiar.

CHAPTER – VI

DATA ANALYSIS AND RESULTS

6.1. INTRODUCTION

The present research, conducting a survey-based study to the recognition of TQM facilitators and IT resources which gives the quality performance. Moreover, executing a set of TQM facilitators and IT resources and finally developing a model.

6.2. DEMOGRAPHIC PROFILE OF THE RESPONDENTS AND COMPANIES

Demographics were divided into two parts, the first section of demographic describes the profile of respondents, and second parts explore the characteristics of ICT industry.

6.2.1. RESPONDENTS' PROFILE

6.2.1.1. GENDER BIAS

It is found from the Table 6.1 & Figure 6.1, that industry of India support males because they positively effect the economic development by participating at different levels like managerial administrative and human resource position.

6.2.2.2. RESPONDENT'S AGE

With regarding the 'respondent's age' shown that in the Table 6.1 & Figure 6.2, 106 respondents are coming under age between 25-30 year.

6.2.2.3. RESPONDENT'S QUALIFICATION

As shown in Table, 6.1 & Figure 6.3, respondents were undergraduate, 97 respondents were graduate, 144 respondents were postgraduate and 23 respondents had other qualification.

6.2.2.4. JOB DESIGNATION

This study conducted job designation of the respondent's. With regarding designation (Table, 6.1 & Figure 6.4), 60 respondents were manager, 40 respondents were general manager, 32 were senior managers and 147 were engineers respondent's and last 40 were other respondent's.

6.2.2.5. LENGTH OF SERVICES

With respect to the length of services, survey received responses from experienced respondent's, who are currently working in ICT industry of India. It was found from the Figure 6.5 that majority of respondent's job tenure at their present industry is 1-5 year.

6.2.3. INDUSTRY PROFILE

6.2.3.1. INDUSTRY SCOPE

It is shown from the Figure 6.6, 119 IT companies employees are involved in the survey while 87 software development companies employees and 52 BPO companies employees and finally 77 telecommunication companies employees take place in the survey of the present study.

6.2.3.2. Number of employees

It is depicted from the Figure 6.7, a total number of employees working in the ICT industry were split into four groups, and first 68 companies reported that they had less than 50 employees.

6.2.3.3. Annual Turnover

With regard to annual turnover, ICT industry performed very well reported in the Figure 6.8. The annual turnover were split into four groups; less than a crore, 50–200 crore, 200–500 crore and more than 500 crore.

6.2.3.4 APPLYING TQM & IT PROGRAM

A question was asked from the respondents ‘Does your industry apply TQM & IT program. It is shown from the Figure 6.9, 215 respondents says that yes they are using TQM and IT and they were aware of TQM & IT program..

6.3. AWARENESS OF TQM & IT IN THE ICT INDUSTRY OF INDIA.

This is the first objective of the research which accesses the awareness of TQM and IT program together. A research question was formulated and hypotheses were proposed to accomplish the objective.

RQ1: Are ICT Industry of India Aware of TQM And its Program?

The corresponding hypothesis of this research question is:

H1: ICT industry is aware of TQM & IT program.

To achieve this objective a 5-point Likert scale was used in this study to show the respondent’s awareness regarding TQM and IT.

Pearson Correlation Analysis of The Awareness Statement

A Correlation analysis was conducted in this study for the two purposes. First, to investigate the relationship between two variables and secondly, to measure dependency between variables.

Rowntree [407] formed guidelines for the interpreting correlation value ranges. These are the following ranges:

1. If correlation values (r) ranges between 0.0–0.2 means relationship is very weak and negligible
2. If correlation value (r) ranges between 0.2–0.4 means relationship is weak or low.
3. If correlation value (r) ranges between 0.4–0.7 means relationship is moderate.
4. If correlation value (r) ranges between 0.7–0.9 means relationship is strong and high.
5. If correlation value (r) ranges between 0.9–1.0 means relationship is very high.

6.4. GRADING OF TQM FACILITATORS AND IT RESOURCES.

RQ3: What are TQM facilitators IT and resources for execution of TQM and IT programs in the ICT industry in India.

The corresponding hypothesis is:

H3: There are 9 facilitators and 8 resources for executing the TQM and IT programs for ICT industry in India.

The 9 TQM facilitators and eight IT resources were named through extant literature were discussed in the previous chapter. The named 9 facilitator & 8 resources were examined by descriptive statistical analysis, which is shown by graphical representation. The grading was done by the most and last usable TQM facilitator and IT resources.

Table 6.4 and 6.5 shown the descriptive statistics of TQM facilitators and IT resources in the ICT industry in India. The Tables 6.4 and 6.5 demonstrated the grading and recognition of TQM facilitators and IT resources on the basis of mean score, standard deviation and responses count.

This study indicates that these TQM facilitators and IT resources are considered as an important factor for TQM and IT execution in the ICT industry in India. Hence, it is found that the majority of named facilitator and resources in the ICT industry in India is perceived to be significant and are being considered for successfully execute quality programs. The execution of these TQM facilitators and IT resource will improve the business performance and customer satisfaction.

6.5.EXAMINE THE DEGREE TO WHICH TQM FACILITATORS AND IT RESOURCES ARE EXECUTED IN INDIAN INDUSTRY

RQ4: The degree to which TQM facilitator and IT resources executed in the ICT industry of India?

H4: There is no significant difference in the TQM facilitators and IT resources as executed by the ICT industry of India.

This section checks the execution level of named 9 TQM facilitators and 8 IT resources across ICT industry of India. The ANOVA (one way analysis of variance) was used to test differences in the execution between various sectors of ICT industry. Before conducting the ANOVA test there are two assumptions to test first is normality of population and second is the homogeneity of variance assumptions.

It is concluded that four TQM facilitators top management commitment and support, customer satisfaction, empowerment and continuous improvement and three IT resources computer aided design, computer aided manufacturing are effectively executed in the ICT industry, while three TQM facilitators continuous training, culture change, democratic management style and two IT resources electronic data interchange and statistical packages for social science are partially executed across ICT industry of India..

6.6. EXAMINE THE RELATIONSHIP AMONG NAMED TQM FACILITATOR AND IT RESOURCE ON CUSTOMER SATISFACTION IN INDIAN INDUSTRY

This section deals with the relationship between TQM facilitator, IT resources and customer satisfaction. To achieve this objective, research question (RQ5) and hypothesis (H5) is proposed. Responses were received based on 5-point Likert scale where 1 representing “strongly disagree” and 5 “strongly agree”. The research question and hypothesis were:

- RQ5: Do the named TQM facilitators and IT resources have relationship with customer satisfaction in ICT industry of India.
- H5: There are significant positive relationships between TQM facilitators and IT resources and customer satisfaction.
- H51: Top management commitment and support for TQM facilitators have positive relationship with the customer satisfaction.
- H52: Empowerment for TQM facilitators have positive relationship with the customer satisfaction.
- H53: Total employee involvement for TQM facilitators have positive relationship with the customer satisfaction.
- H54: Continuous improvement for TQM facilitators have positive relationship with the customer satisfaction.
- H55: Continuous training for TQM facilitators have positive relationship with the customer satisfaction.
- H56: Teamwork for TQM facilitators have positive relationship with the customer satisfaction.
- H57: Culture change for TQM facilitators have positive relationship with the customer satisfaction.
- H58: Democratic management style for TQM facilitators have positive relationship with the customer satisfaction.
- H59: Electronic data interchange for IT resource have positive relationship with the customer satisfaction.
- H5 10: Computer aided design for IT resource have positive relationship with the customer satisfaction.
- H511: Computer aided manufacturing for IT resource have positive relationship with the customer satisfaction.
- H5 12: Enterprise resource planning for IT resource have positive relationship with the customer satisfaction.
- H5 13: Computer aided process planning for IT resource have positive relationship with the customer satisfaction.
- H514: Computer aided engineering for IT resource have positive relationship with the customer satisfaction.
- H5 15: Statistical package for social science for IT resource have positive relationship with the customer satisfaction.
- H5 16: Structural equation modeling for IT resource have positive relationship with the customer satisfaction.

6.6.1. VARIABLE MEASUREMENT

Independent Variable

A total no. of 152 items captured for the TQM facilitator and IT resources under investigation. In the present research, customer satisfaction is dependent variable and remaining 16 variables are an independent variable.

Dependent Variable

In the present study CS chosen as dependent variable which was derived and adapted from numerous existing studies [246; 411; 133]. The research instrument followed a 5-point Likert scale with the choice of responses as strongly disagree to strongly agree to measure customer satisfaction.

6.6.2. RELIABILITY AND VALIDITY

There are basic two requirements to measure the variables. First, measures the variable should be accurate or valid and second measurement process check the outcome variables must be consistent or repeatable

Reliability

Reliability test can be expressed in terms of stability, equivalence and consistency. Reliability test measures internal consistency which is commonly expressed in the form of Cronbach alpha. But present research considered only Cronbach alpha's is the all possible spilt half coefficient resulting from different ways of splitting the scale items.

Validity

The validity of an instrument is the degree to which measure what it is supposed to measure. It is an evaluation of the extent to which theory and empirical evidence support the inference and explanation of the research data. There are various types of validity test that will be discussed in the below section.

- **Face Validity**

A scale is said to have face validity if it 'looks like' it is going to measure what is supposed to measure [420]. Face validity was established by different experts for e.g. academician, industrialist and quality performance.

- **Content Validity.**

Content validity is a general agreement among the subjects and researchers that the instrument has measurement items that cover all aspects of the variable being measured. It avoids repetition of similar statements and adding a more suitable term for the better understanding of the respondents. Hence, it is strongly built a methodologically rigorous assessment of survey instrument's content validity.

- **Construct Validity**

Construct validity was designed to measure the theoretical constructs. Construct validity is performed to check whether there exist any subscales within the same construct. Factor analysis can be used for construct validity.

There are two types of factor analysis, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) both have been used for defining the underlying dimension in a data matrix. On the basis of nature of the study, both EFA and CFA were used to measure the construct validity.

6.7 EXPLORATORY FACTOR ANALYSIS (EFA)

EFA can be used to find out the underlying structure of a moderately large set of variables set up links when the observed (items) and latent (independent) variables are unknown or uncertain. There are seven different types of extraction method named as, Principle component analysis (PCA), Unweighted least squares, Generalized least squares, Maximum likelihood analysis (MLA), Alpha factoring and Image factoring. In the present study researcher used PCA extraction method. In the current study researcher iterated with PCA method followed by Varimax orthogonal rotation.

Table 6.1 Sample Adequacy test

KMO and Bartlett's test		
Kaiser- Meyer-Olkin Measure of Sampling Adequacy		0.777
Bartlett's Test of Sphericity	Approx. Chi- Square	49264.57
	df	10153
	Sig.	0.000

The factor analysis results are shown below in the Table 6.9, it is found that all the 151 items in 17 factors.

The KMO measure of sampling adequacy was 0.777 (Table 6.10) which is greater than 0.60 indicates sufficient correlations while the Barlett's test of sphericity was significant (Chi square= .49264, df=10153, sign=.000). Finally, a total no. of 72 items loaded in the construct were retained for further analysis.

6.8 CONFIRMATORY FACTOR ANALYSIS (CFA)

CFA was used to determine construct validity of the survey Items. It means how well is the construct explained the variables under the constructs.

There are many indices show the GOF like Goodness of-fit index (GFI), normal fit index (NFI), comparative fit index (CFI), no normed fit index (NNFI), also named Turker Lewis index (TLI). The most common GOF indices used are Chi- Square Statistics, root mean square error of approximation (RMESA), GFI, TLI, NFI .

CFA Measurement Model

To apply CFA under structural equation modelling (SEM) approach most of indices are categorized into three parts, absolute GOF indices, Parsimonious GOF indices and incremental GOF indices. The first category is absolute GOF indices evaluate the overall incongruity between observed and implied covariance matrices [440]. GFI (Goodness of Fit Index) and SRMR (Standardized Root Mean Square Residual) are reported as absolute indices. Parsimonious indices appraise the discrepancy between observed and expected covariance matrices while taking into account the model's complexity. The RMESA (root mean square error of approximation) and AGFI (Adjusted Goodness of Fit Index) are

parsimonious index. NFI (Normed Fit Index) and CFI (Comparative Fit Index) are incremental indices compares the performance of the proposed model with the model.

The selected indices like Chi square, degree of freedom, GFI, AGFI, RMSEA, and NFI were used by Hair et al.. It is mandatory that Chi-square test and its degrees of freedom is associated with p-value Hooper et al. Table 6.11 shows that CFA measurement model is fit on the basis of model fit indices value which is acceptable means model (Figure 6.13) can go for further analysis.

Assumptions in CFA measurement model: To check the robustness of the model, there are four steps to checking the robustness was introduced by.

Handling Model Fit: In the reference to the model fit research use model fit indices which is shown in the table 6.11.

Validity and Reliability Test:

As an overall model accepted, now each of the factor was evaluated separately for composite reliability (CR) and average variance extracted (AVE). According to Hair et al., [403] value of composite reliability (CR) should be >0.7 and average variance extraction (AVE) >0.5 . The below Table demonstrated that CR ranges from 0.718 to 0.877 and AVE value lies between 0.522 to 0.668.

Common Method Bias:

In this analysis, extraction method constrained no. of factor is 1 and unrotated solution. In the present study maximum variance explained by variance is 27.09%, which is $>50\%$ variance it means present dataset is not suffered from common method bias.

Invariance Test: Invariance testing confirmatory factor analysis is carried out to assess the measurement model across different groups. The researcher divided the sample into specific groups based on demographics..

6.9. PATH ANALYSIS AND HYPOTHESIS TESTING (STRUCTURAL EQUATION MODELING)

In the present research, the measurement model was found to be a good fit and the validity of measure was confirmed. Then the structural model of industrial effectiveness was tested. Maximum Likelihood Estimation (MLE) was employed in AMOS for calculating path analysis. It is robust and logically tolerant violations which are common in psycho-behavioral studies. Path analysis to describe the directed dependencies among of variables. It is assumed that all variables are measured without error.

Table 6.2. Model Indices of Path model (SEM)

Model Fit Index	Model 1	Model 2	Expected values
GFI (Goodness Fit Index)	0.771	0.749	<0.9
AGFI (Adjusted Goodness Fit Index)	0.742	0.702	<0.9

Root Mean Squared Error (RMSE)	0.766	0.764	<1.00
Normative Fit Index (NFI)	0.381	0.373	<0.9
Confirmative Fit Index (CFI)	0.378	0.36	<0.9

Table 6.3. Summary of SEM results and Hypothesis testing

Hypotheses	Path	Estimate	C.R	P value	Result
H ₆₁	TMCS → CS	.098	3.25	0.001***	Significant
H ₆₂	EMPW → CS	-.029	-0.85	0.395	Insignificant
H ₆₃	TEI → CS	-.036	-1.20	0.227	Insignificant
H ₆₄	CI → CS	.028	6.27	0.000***	Significant
H ₆₅	CT → CS	.028	1.26	0.206	Insignificant
H ₆₆	TW → CS	.028	-3.69	0.000***	Significant
H ₆₇	CC → CS	.026	0.65	0.511	Insignificant
H ₆₈	DMS → CS	.028	-1.15	0.249	Insignificant
H ₆₉	EDI → CS	.030	-2.11	0.034*	Significant
H ₆₁₀	CAD → CS	.027	4.13	0.000***	Significant
H ₆₁₁	CAM -----> CS	.026	0.83	0.404	Insignificant
H ₆₁₂	ERP → CS	.028	6.32	0.000**	Significant
H ₆₁₃	CAPP → CS	.025	1.86	0.062	Insignificant
H ₆₁₄	CAE → CS	.024	27.3	0.000***	Significant
H ₆₁₅	SPSS → CS	.027	-3.64	0.000***	Significant
H ₆₁₆	SEM → CS	.028	-3.51	0.000**	Significant

Significant at $p < 0.05^*$, $p < 0.01^{**}$, $p < 0.001^{***}$

To the overall model (Figure 6.14), we could claim that there is nine direct relationships between hypothesis means path are important, whereas eight hypothesis have indirect relationship means path are insignificant (Table 6.14).

6.10. SUMMARY

This chapter sought to achieve five research objectives. It began with a descriptive of a sample demographic profiles shown the characteristics of the respondents. The initial descriptive results provide the background of the respondents' profile and their knowledge toward the TQM and IT. The overall result shows that respondents who participated in this study were male and female, they were properly qualified and working in the ICT industry of India. The result of the variable measure based on the five point Likert scale, these measurement scale for each variable satisfies at least the minimum acceptable level.

The next objective analyzes the awareness of TQM and IT in the ICT industry of India. This results extracted the majority of the variables mean values are greater than 3 which is more than mid-point scale employed. Also, most of the standard deviation values implies that the data are distributed consistently.

The third objective is name and grade the TQM facilitator and IT resource in the ICT industry of India. The result reveals that the most important facilitators named top management commitment and support, customer satisfaction, empowerment, teamwork, total employee involvement, continuous improvement, continuous training and least important facilitator are culture change and democratic management style. Similarly, results obtain the most significant resource namely, electronic data interchange, computer aided design, enterprise resource planning and least important such as, computer aided process planning, computer aided engineering, statistical packages for social science and structural equation modelling.

The fourth objective was to examine the degree to which TQM facilitator and IT resources are executed in the ICT industry of India. Accordingly, it is used ANOVA test, having two assumptions first is used to test the normality of population and second is the homogeneity of variance assumptions means population is taken normal. Also, name 4 TQM facilitators, top management commitment & support, customer satisfaction, empowerment, continuous improvement and three IT resources computer aided design, computer aided manufacturing are effectively executed in the ICT industry, while continuous training, culture change, democratic management style, computer aided engineering, computer aided process planning and structural equation modeling are partially across ICT industry of India. The remaining facilitator total employee involvement, teamwork and IT resource electronic data interchange and software packages for social science effortly can execute the TQM and IT across ICT industry.

The last objective evaluates the relationship among the name the TQM facilitators and IT resources on customer satisfaction in the ICT industry of India. Accordingly, the assessment of reliability and validity of each measurement scale is presented. The study observed the procedure by using exploratory factor analysis, confirmatory factor analysis. CFA validates the latent and observed variable. Finally, the hypothesized relationship between the variables were tested by using structural equation modelling.

CHAPTER – VII

IMPLICATION, CONCLUSION, LIMITATION AND FURTHER STUDY

7.1.INTRODUCTION

In the wake of growing attempts to make changes into opportunities in the new industrial environment, there is extensive research on total quality management. The vital role played by information technology also for TQM. The purpose of this study to execute TQM and IT together in the ICT industry of India to satisfy the customer regarding to quality aspects. The present literature suggests that there is a lot of research have been done on TQM in a different industry, whereas there is no study on execution of TQM and IT together in a specific industry. There is an important effort in aiding and smoothing the adoption of IT by TQM in the late 1980's. But ICT industry easily and successfully aids the TQM and IT together in result of increased competition among industries. In different words IT support TQM which resulting increasing industrial performance because top management shows strongest points IT with business strategy. Due to this researcher try to combine TQM and IT. In the present model nine TQM facilitator and IT eight resources were considered from various academic and

practitioner's perspective. They included top management commitment & support, customer satisfaction, empowerment, total employee involvement, teamwork, continuous improvement, continuous training, culture change, democratic management style, electronic data interchange, computer aided design, computer aided manufacturing, enterprise resource planning, computer aided process planning, computer aided engineering, statistical package for software and structural equation modelling. The execution of TQM and IT were formed by combining these facilitator and resources with the support of several previous researches.

7.2. SUMMARY OF CURRENT WORK

This research was carried out to naming and execute the TQM facilitators and IT resources in the ICT industry of India. It means models were developed for the categorizing and grading the relations of TQM facilitators and IT resources. A literature review related to TQM execution in Indian industry was studied, whereas there is no specific study on TQM and IT together in the industry of India to satisfy the customer to fulfill the aspects of quality program. The present research covers the following objectives:

- To naming the TQM facilitators and IT resources in ICT industry of India.
- To categorize and grade the TQM facilitators and IT resources for ICT industry Of India and develop contextual relationships between them.
- To understand the awareness of TQM program & IT resources in ICT industry
- To examine the degree to which TQM facilitators & IT resources are executed in the ICT industry of India.
- To examine the relationship among the named TQM facilitators and IT resources in the ICT industry of India.

The present research encompasses the following tasks to fulfill the above objectives:

- An extensive literature review was carried out TQM and IT. The review of literature mainly focused on research approach, different tools & techniques, research type and region which place research was done. This study was done in different four sectors, namely information technology, software development, business process outsourcing, telecommunication and specifically study of TQM & IT in Indian context was elaborated and finally identify the gap related to TQM and IT.
- A detailed literature review found out TQM facilitators and IT resources from different databases.
- An ISM-MICMAC model was developed to categorize, grade and establish the relationship between named TQM facilitators and IT resources. The model was named significant TQM facilitator and IT resource that would be importantly helps managers and practitioners of the ICT industry.
- Five hypotheses were formulated to test the present research. These hypotheses were formulated after consulting literature and discussion with academicians, practitioners and quality experts.
- An instrument was developed to conduct a survey to capture the awareness, naming and grading of TQM and IT. The instrument that could be used in the survey based empirical

study.

- The final instrument was organized survey across 301 ICT industry from those 119 information technology sector respondents, 71 software development respondents, 52 business process outsourcing sector respondents and finally 77 telecommunication sector respondents’.
- Primarily instruments were tested for reliability and internal consistency. A descriptive statistics were calculated for different test and responses were used to test the hypothesis formulation. At the end EFA and CFA were used to validate the model.

7.3. IMPLICATION OF CURRENT RESEARCH

This study has a consider implication for the development of a framework to assist with execution of TQM and IT in the ICT industry of India. The proposed theoretical framework developed with the support of the literature review and framework was empirically examined by using a suitable methodology. There are some implications for the academicians as well as practitioners found in the present study.

Implication for academicians

This research work found the integration of TQM and IT with better customer satisfaction which is ultimately increase the quality performance of product and services

- The present research contributed to the literature review on TQM and IT which will be helpful for identifying research gaps for further study.
- This study also contributed to formulate hypotheses in the ICT industry of India.
- The developed questionnaire can be used for different studies in another industry.
- The ISM-MICMAC is a relatively new modeling techniques for TQM and IT which gives the direction to academicians to use the same techniques in other studies.
- The different facilitators and resources were found the present study will be helpful for academicians to derive new facilitators and resources for further study.
- This study identifies the strength and weakness in the present scenario of quality management and support the ICT industry by adopting TQM and IT both.

Implication for Managers

This study tells managers that information technology can be one of the effective approaches to improve quality management for better customer satisfaction. It means they need to know how to mobilize and deploy IT in combination with quality performance in the industry. There are many insights can be obtained from a managerial viewpoint. This study demonstrates that how TQM and IT increase the performance of industries. Thus, this study presents some managerial recommendation are following:

- This study provides the practical understanding of TQM facilitators and IT resources and their advantages in the ICT industry of India. Managers could use appropriate facilitators and resources to measure the effectiveness of specific TQM facilitator and IT resources.
- The finding of this suggests that the execution of TQM and IT together can be a step

towards as customer satisfaction.

- The result suggests that TQM facilitator and IT resources are the two most important factors relating to customer satisfaction. Managerial implication is that each facilitator and resource must recognize their role in executing TQM and IT which affects the ICT industry performance.
- This study confirms that top management commitment and electronic data interchange have a major role towards the successful execution of TQM and IT.
- Similarly, remaining TQM facilitators and IT resources also indirectly expand the performance of industry by executing the TQM and IT. They are very significant to continuous improvement and they should not neglect.
- The present research provides the functional experiences for the use of TQM facilitator and IT resource in several ways. This will enable to them to update their professional knowledge regularly and learn different quality improvement techniques so that they increase the performance of industries.
- This finding has valuable implications for ICT industry of India to motivate to work of TQM and IT program together, which is improve the Indian economy by satisfying the quality of product and services.
- This study will allow that managers can integrate the execution of TQM and IT at the same time as well as can access the quality performance and customer satisfaction.
- With the help of this study manager will be better able to evaluates benefit and problem from which facilitator and resources have more realistic experience of effort to move forward ICT industry.

7.4. CONCLUSION

This study has several limitations which in turn offer opportunities for future researchers. This research contributes to a better understanding of how customer satisfy with the quality program. In terms of aiding and smoothing the TQM and IT, there is some agenda which must be consider for future research.

- This study was conducted in one country only, it can be expanded into different countries to achieve higher generalization.
- Customer satisfaction data were obtained from industry managers rather than customers. In other words, questionnaire respondents were taken only from managers and engineers not from other lower level of employees.
- This study focusses only ICT industry's four sectors, namely information technology, software development, business process outsourcing and telecommunication. This study can be extended into different areas like education, banking, transportation, real estate, hospital extra.
- In the present research ICT industry was selected from NASSCOM database further collect databases from other sources in an exhaustive manner.
- For the ICT industry the concept of TQM may be relatively new and this may cause a bias in the data gathering and in the data interpretation.

- The developed instrument would be used in subsequent academic studies as well as in industrial context.
- This study was conducted only in the business industry but it would be extended into academic as well as.
- There are 21 experts from different sectors were participated in the judgment process for ISM-MICAM model development. In further studies number of experts can be increases and from different sectors.
- In the present study only ISM-MICMAC model techniques were used besides it QFD, Fuzzy QFD, AHP, Fuzzy AHP, ANP, Fuzzy ANP and TOPSIS method can be used for developing models.
- DEA (Data Envelopment Analysis) can be used with TQM because DEA includes many variables that could help managers identify the inefficient areas in their TQM-IT system and make the system efficient.
- DOE (Design of Experiments) and Taguchi method can also use for quality control and tries to eliminate in production before they can occur. IT would act like nectar for DOE and Taguchi method, and they could easily control the quality which will enhance the effectiveness of quality of industry.
- Meta analysis approach can be used for TQM and IT to enhance the understanding, generalizability and applicability of comparative research.
- In a fuzzy system decision maker use fuzzy set theory in hierarchical and network structure analysis and found that interval judgment is more confident than fixed value judgment. Fuzzy AHP and Fuzzy ANP could identify and emphasize the important criteria and attribute for TQM-IT in the ICT industry.
- QFD (Quality Function Deployment) provides a systematic process for integrating TQM into the product design process. QFD and IT together will facilitate TQM in new product development.
- FEMA can combine with the IT which helps people to identify the foreseen failures in a product or process and plans to eliminate the failure. Combining FEMA and IT together will enhance the TQM program in the industry.
- The JIT (Just In Time) and IT would be applied together in the ICT industry for customer service involved in applying information system and mobile hardware to deliver customer information as needed, and reducing waste by video conferencing to cut travel time.
- SPC (Static Process Control) methods are useful to enhance profitability by improving process and product quality. SPC techniques were used in manufacturing but it would be used in an ICT industry with the help of IT.
- This study can be extended to discover the effect of execution of TQM and IT together with increasing business growth and assists in adopting new management techniques.

7.5. LIMITATIONS AND FURTHER STUDY

This chapter finds the significant research contributions, findings, implication of the study, limitations and future scope are discussed. This study has enlightened many important

contributions and implications which may be carried forward for the growth of the ICT industry in developing ICT economy. The finding of this thesis revealed that the concept of execution of TQM and IT by various phases and planning. It is investigated and brought to the forward that TQM and IT together gives bright potential to the ICT industry of India. In order to effective execution of TQM and IT there are nine TQM facilitator were taken from among seven facilitators namely top management commitment and support, customer satisfaction, empowerment, total employee involvement, teamwork, continuous training, continuous improvement and three IT resource namely electronic data interchange, computer aided design and enterprise resource planning have special attention to execute TQM and IT. While boosting industrial performance by integrating TQM and IT has vital importance and managers are ready to bring this type of research in their industry. The present research will helpful for managers, academicians, practitioner related to TQM and IT area.

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