Chapter 1
Introduction
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Introduction

1.1 Introduction to Software Industry in India

Software development involves complex activities such as domain analysis, requirements specification, communication with the customers and end-users, designing and producing different artifacts, adopting new paradigms and technologies. It also involves complex processes such as evaluating and testing software products, envisioning potential upgrades and negotiating about them with the customers, installing and maintaining the application at the end-user's site, providing customer support, organizing end-user's training, and many more.

1.2 Software Industry in India

Software and technology development has brought opportunities for many countries. India, which is traditionally lagging behind developed countries in terms of economic growth, has suddenly found itself as a most wanted location for customized software development. India's success story in the Information Technology has tempted other countries to emulate India's example. This technology growth in India also competes with the software industries in the developed world.

1.2.1 Overview of Software Industry in India

India has lot of advantages compared to other countries. It has a tradition of mathematics and science. It has the world's largest technical workforce of more than three million engineers, scientists and other technologists. The largest workforce does not have equal number of jobs. Less than three fourths of this workforce found technical or scientific jobs due to lower wage and fixed number of jobs available. This scenario helped India to suddenly transform itself into a preferred destination with programmers work for less than $12 to $ 15 per hour. Indian firms complete the software projects for less than half of the cost compared to United States.
1.2.2 History of Indian Software

In 1994, the software industry had sales mounting to 17.15 billion rupees ($560 million). Ten years ago, the sales were less than 300 million rupees ($10 million) and it employed around 120,000 people. In terms of growth, the compound annual growth rate for the industry was 38.6% with the export industry growing at 46.6%. The distribution of software were like 61% to US, 17% to Europe, 5% to West Asia, 4% to Japan, and 5% to South East Asia. This status clearly indicated that these countries used comparative advantage prediction and took advantage of India's presence of highly skilled professionals.

As indicated by the government in its report on STPI (www.stpi.in), government of India had set up many software industrial parks in 1990. These software parks allowed 100% export oriented units. Companies set up in these parks can import software as duty free and were exempted from corporate taxes for the first five years. The software parks were equipped with centralized computing facilities and the members get full access to faster data communication links and internet. The leaders of these software parks provide a one point of contact for all procedures such as licenses, import certificates, etc. which allows the firms to avoid the bureaucracy of the central government. The government also provided sops such as duty free imports, income tax holidays, and simplified procedures. These software parks maintained themselves independently from the profits they earn from companies that used their facilities. As of 2011, there were 6554 operational STPIs operating in India.

The government of India passed an important act, the SEZ act in 2005 to install confidence in investors and signaled the governments' commitment for a stable SEZ policy regime. The draft also provided stability to the SEZ regime, thereby generating greater economic activity and provided employment through their establishment. The bill was a comprehensive draft prepared after extensive discussions with the stakeholders. As per SEZ India website, 2012, India has 80+ IT related operational SEZ in 2012.

These positive activities by the Indian government allowed foreign companies to utilize the skilled talent available in India. Large scale projects for the telecom sector, gem exploration and mining dominated the domestic software market, whereas professional services topped the
export market. In these software activities, within the top 72%, 62% of the work was done on site while 38% were done offshore in India.

Many companies acted as agents or domestic distributors for foreign companies. International operators like Microsoft and Oracle used these companies as points of entry into the Indian market. The distributors in India further helped the foreign software companies integrate into Indian systems. By acting as agents, these companies acquired knowledge and earned quick profits. Both lower and high-end markets used professional and consultancy services. The international software market required latest techniques and methodologies for the higher end work. The lower end work, usually dominated by the smaller companies, did not require the latest tools.

Along with pure Indian companies, joint ventures also existed. These joint ventures allowed a transfer of methods and capital from one company to another. The western companies used Indian partners as marketing channels and as a source of skilled labor for their overseas operations. Large companies set up wholly owned subsidiaries in India for these purposes. To cite an example, Tata Unisys and Tata Consultancy Services both associate with the well-known Tata group of companies.

As of 1993-94, hundred Indian companies exported software worth more than 10 million. This number was only 5 in 1991. During 1993-94, 15 companies exported software worth more than 150 million rupees, whereas in 1990 only 3 companies exported software worth 150 million rupees. The top eight firms accounted for 30% revenue in the export market. The top 20 companies obtain 70% of the export revenue. The software industry was less competitive when compared to other industries that required unskilled labor. Due to this advantage, many of the top companies gained significant profits. This also made these companies to gain a large amount of market power while others did not. The interesting trend found in the industry is that the top companies were moving towards lesser market dominance which resulted in a more competitive structure.
1.2.3. Current Scenario-Impact of Software Industry in Indian Economy

IT sector is an important growth catalyst for the Indian economy. Additional to this, the IT sector is also influencing the lives of its people, as it contributes directly or indirectly to various socio-economic parameters such as standard of living, employment and diversity among others. The industry transformed India’s image from a slow moving bureaucratic economy to a land of opportunities and innovative entrepreneurs and a global player in providing excellent technology solutions and business services. The industry also helped the nation to transform from a rural and agriculture based economy to a knowledge-based economy.

Figure 1.1 IT –BPO Sector in India (Source: NASSCOM)

Between years 1994 and 2012, the growth of IT Industry was tremendous. The year 2012 turned out to be a milestone year for the IT-BPO industry. The aggregate revenues cross the USD 100 billion mark. Exports stood at USD 69 billion. India was able to increase the market share, within the global sourcing industry, from 51% in 2009 to 58% in 2011. These achievements highlights India’s continued competitivemess and effectiveness of India-based providers delivering transformational benefits. Software and services revenues, which comprises of nearly 87% of the total industry revenues posted is more than USD 87 billion in
FY 2012, with an estimated growth of about 14.9% over FY2011. The industry continued to be a net employment generator and provided employment to approximately 8.9 million people in 2012.

The growth in the software industry has increased a great proportion of national GDP. The sector revenues have grown from 1.2 percent in the financial year 1998 to an estimated 7.5 percent in FY 2012. Indian IT services provide full service offerings such as testing services, infrastructure services, consulting and system integration services.

The new decade is approaching with opportunities and challenges for the software industry. It heralds the strategic shift for the IT organizations from 'One factory, one customer' model to a 'one factory, all customers' model. Adding to this strategy is the acceptance of cloud-based solutions that offers best in class services at lesser cost. Software export services is the fastest growing segment, which accounted for exports worth USD 40 billion, a growth of 19% in FY2012. Cloud computing, mobility, social media and data analytics are some of the emerging technologies that is providing new opportunities for the industry. In the domestic market, IT services are the fastest growing segment; worth 589 billion rupees this segment saw a growth rate of 18%. There was a visible compounded annual growth rate (CAGR) of 16% from FY 2008 to FY 2012.

![Figure 1.2 Indian IT Service Exports](image-url)
The past few years have seen changes in the Indian software business ecosystem. These changes have created an enabling environment for the growth of the Indian software products. The changes include acceleration in product business activity, innovation in software product technology, growth in talent, talent management, process improvements, new business models and changes in the Indian economy. These changes are helping to catalyze the development of software products. Increasing adoption of IT services by the in India has also helped to create a sizeable business market opportunity. NASSCOM estimates software product exports is entitled to reach USD 1.5 billion, year on year growth of 13%, driven by the emerging technologies such as cloud applications and small and medium business units.

The domestic software product is grown to approximately 180 billion rupees in FY 2012. It accounts for a growth of approximately 13 percent over FY 2011. The growth is driven by the need to replace legacy systems, and technology advancements around cloud and mobility.

1.2.4 Geographical Distribution of Software Industry in India

The success of the Indian Information technology industry and related businesses has produced an exuberant reaction among other countries that they have started calling India a 'Knowledge-based society' and 'Information Superpower'. This qualifies India for a special global status. Though the knowledge based description sounds odd in a society in which almost half of the population is illiterate, the skills are low compared to other countries as well as the division based on class, caste and gender restricts knowledge transfer; the description seems right based on its status in the IT Industry.

The IT business has grown tremendously in India, but the growth is so unevenly spread. The uneven spread of illiteracy, education and infrastructure has no hand in this uneven distribution. The distribution of software business is concentrated more on the south, which accounts for 42 percent, while the North accounting for only 27 percent. The East lags behind the North and South with only 5 percent. Even in the North’s 27 percent, Delhi and its
adjoining Uttar Pradesh and Haryana accounts for more than 20 percent. West India has its share of 22 percent.

As indicated by the 42 percent, the South has always taken the lead in IT, with Karnataka accounting for more than half the region's share. There are no indications of this uneven distribution narrowing down. The uneven growth of Software industry is also due to the basic constraints such as poor infrastructure, low telecom density, and lack of penetration of computers.

According to the investment banking research, Brean Murrary Research, India has emerged as the preferred ITES outsourcing destination ahead of many countries including China and Russia. This is because of advantages like low costs, language proficiency, scalability and stability of policy.

India boasts several software companies; however, few noteworthy ones share a larger pie of the market. Following table gives a glimpse of the top three IT firms in India (Source: Rediff.com, web sites of NASSCOM, TCS, Infosys and Wipro)

**Tata Consultancy Services (Rank 1)**

TCS is the largest provider of information technology services in Asia and second largest provider of business process outsourcing services in India. Headquartered in Mumbai, TCS has over 2,75,000 employees. The revenue earned for FY 2012 was Rs. 62,989 crore INR.

**Infosys Technologies (Rank 2)**

Infosys is the second largest IT Company in India with more than 1,56,000 employees as of March 2012. Infosys was ranked 28th globally in the list of IT services providing firms. It has offices in 33 countries and development centers in India, China, Australia, UK, Canada, Brazil and Japan. The revenue earned for FY 2012 by Infosys is INR 33,734 crore.
Wipro (Rank 3)

Wipro is the third largest IT services company in India and employs more than 1, 45, 000 people worldwide as of March 2012. Wipro was ranked 31 globally in 2011 in the list of IT service providers. The company does business in information technology, consumer care, lighting, engineering and healthcare businesses. The revenue earned by Wipro for FY 2012 was 37,525 crore.

The Indian software sector displays several unusual features from an Indian perspective. The obvious one is the export orientation, which accounts for more than 65% of the total software export revenue. There are certain important differences in the quality or the type of the software that is exported and the one used in the domestic market. International market accounts for export of newly developed software, whereas the domestic software market's revenue is from the sale of software packages and products. When the domestic and international market is compared, it can be found that 40% revenues are from the sale of products in the domestic market whereas, 10% in the export market. In the export market, 80% are export of software services including custom software development, consultancy and professional services.

1.2.5 Common Business Domains Supported by Indian Software Industries

The following are the common business domains which software industry in India is supporting.

- Banking
- Insurance
- Information and Media
- Pharmacy & Life Sciences
- Engineering Applications
- Aerospace
- Mining
• Oil & Gases
• Automotive
• Marine
• Rail
• Military
• Home Appliances
• Telecom
• Manufacturing
• Retail
• Process Automation
• Construction
• Building Automation
• Energy Industry
• Safety and Security
• General Business Application
• Travel and Tourism

1.3 Quality Assurance

Quality Assurance (QA) refers to the planned and systematic activities implemented in a quality system so that quality requirements for a product or service will be fulfilled. It is the systematic measurement, comparison with benchmarks or standards, analyzing the processes and an associated feedback loop that confers 100% accuracy. Quality Assurance matches the standards meant for Quality Control, which focuses on process outputs.

“Fit for purpose” and “Right first time” are the two important principles included in QA. Fit for purpose means, the product should be suitable for the purpose it is made and ‘Right first time’ means, delivering products with zero errors. QA also includes managing the quality of the components of the products such as, raw materials, components and products, services related to production, and management, production and inspection processes. This also includes developing and implementing processes as well as imparting training for the same.
Quality suitable for the product is benchmarked by the product users, customers or clients and by the society at large.

1.3.1 Review and Quality Improvement

Review of quality assurance is an important part in any business, since quality assurance is not static and is subject to change based on the requirements. Companies should consistently strive to improve the quality assurance through review cycles, both internal and customer driven. Stakeholder feedback is an important component of this process. Review of the entire system should also accompany the usual review of individual systems. This helps to meet the evolving standards in the market. External reviews competent with the new standards can help the companies achieve this.

1.3.2 Quality Culture

Organizations should internalize a quality culture. Everyone involved in developing the software or product should commit for professional excellence. It is also important for the organization, that the senior management exhibit leadership in areas of quality. Organizations, in which the senior management and CEO show a clear commitment towards quality improvement and quality assurance, it is much likely that all the members of the organization will treat issues related to quality seriously.

It is the responsibility of the organization to deliver products of the highest quality, since quality does matter. Products delivered with the principle 'Fitness and Purpose' in quality assurance ensures that the products meets all the standards set by the stakeholders, thereby the organization also demonstrates accountability to the community.

1.3.3 Quality Assurance Best Practice in Software Industry

The complex process of software development involves activities such as requirements specification, domain analysis, communication with the customers and end users, adoption new technologies, production different artifacts, evaluation and testing of software products,
installation and maintenance of the application and the end-user's site, end user training, customer support, negotiation with the customers on potential upgrades and many more.

In order to avoid tricky situations like exceeding the budget and time, the project managers should exercise control and guidance over the software development team throughout the project lifecycle. This can be done by applying a number of tools of both economic and managerial nature. Economic category of tools include features like budgeting, budget monitoring, user chargeback mechanism, continuous cost/benefit analysis and budget deviation analysis. The managerial toolbox includes long-range and short-term planning, schedule monitoring, feasibility analysis, software quality assurance, organizing project steering committees and the like.

![Diagram of Software Project Management](image)

**Figure: 1.3: Various components of Software Project Management**

These tools help the project managers to manage a number of important issues in the software development process of life cycle.

Nowadays, IT companies have started to adopt global quality management standards proposed by International Organization for Standardization such as ISO 9001 and Information Security standard such as ISO 27001 as well as the Capability Maturity Model Integrated (CMMI)
proposed by Software Engineering Institute. India based centers hold the record for the largest number of quality certifications from any one country.

The number of companies acquiring different certification are rising steadily. In the last three years, 18% increase in the number of IT companies in acquiring quality certifications; 30% increase in performance based certifications and 20% increase in security certifications are seen. According to Nasscom, the companies which have acquired quality certifications have invested in obtaining level 4 and 5 certifications of CMMI exhibiting great sophistication.

1.3.4 Challenges in Software Quality Assurance

Quality assurance is primarily implemented in the manufacturing industry in assuring the quality of a manufactured final product. This is achieved by evaluating the product in the various stages of its production cycle. However, the case is different in software, as it is not tangible as products that are physical. Typically, a software product is for its functionality and not for its use. The software is usually evaluated using codes, which may or may not have documentation. Daniel Galin (2004) says that assessing of the quality of software becomes complex due its invisible nature. He further adds that industrial products are termed as visible and software products as invisible and points that defects in the physical products can be assessed by different methods in the process cycle itself, while defect in software products cannot be assessed as the parts of the software project may be absent from the beginning.

Software is developed by a team, or a set of people who carry out specific roles as part of a team. These people play different roles during the different stages of software development. The teamwork mode of development lifecycle is prone to a multitude of problems, since the members of the team are interdependent in the process stages. Problems appear inside the team in many ways, as the team has to gel together. Relationships between the team members affect the productivity and creativity of the individual and the team. The experience of the team can also have implication on the team, where the experience members of the team support the inexpeience members. If a member leaves the team in the middle of a software
production, the consequences of the member's departure may influence the success of the project.

These types of complications are always found in a team-oriented project, but the software product's invisibility and intangibility make it complex further. External factors such as customer's requirements and how they represent the actual requirements do affect the software development team. Added to this is the budget allocated to the project, which will also have an impact on the quality of the software. After the project completion and installation in the customer's environment, the system must then be maintained for the duration of the proposed lifespan. The ease in which these steps are conducted can also affect the quality of the system.

The software engineering includes the process cycle from the first step to the last step, from understanding the customer's requirements to delivering the final software product. The product quality can be determined by analyzing the number of defects that arise in the software. The Software Quality Assurance (SQA) domain deals with the quality principles of the software engineering development process. SQA defines and measures the outputs at the various stages of the software development process and quantifies the quality in terms of defects. It is always advantageous to know what to measure to analyze software quality. SQA also deals with the process implementation, their gap analysis and support in taking necessary and corrective and preventive actions.

1.3.5 Factors that impact Software Quality

Daneil Gallin (2004) had identified three different categories of factors that can be analyzed for software quality. These factors occur throughout the lifespan of the application and not just only on its original development. They have identified both project related and team related factors that affects the software quality.

1.3.5.1 Project factors

- Magnitude of the project
- Technical complexity and difficulty
• Extent of reuse of software components
• Severity of failure outcomes if the project fails
• Software redundancy

1.3.5.2 Team factors

• Academic qualification and experience of the team members
• Team acquaintance with the project and its experience of the subject domain
• Availability of support team for the project.
• Familiarity within the team members, the ratio of new people versus existing team members

Quality analysis needs the outputs of the different stages of the software development, such as analysis, and coding. Each of these stages needs to be monitored, measured and managed, so that the output values can be compared to the standard values. When the final software product completes the coding and integration stages, it needs to be tested against the customer requirements and user requirements. Senior team members should sign off the product as passed validation testing. At each stage of the product development, it is important to measure the efforts of the team members, so that the efforts can be improved where possible to cut costs and remain competitive. This is not an easy task in the software development process as the output of the process is intangible or invisible. This makes the software quality assurance complicated.

1.4 Total Quality Management (TQM) Approach

The question big pending is, how does a quality assurance professional manage a complete engineering strategy to counter the issues that could affect quality of the software and develop a quality improvement initiative? This is answered using a few different management approaches. There are similar characteristics to each of these techniques.
Total quality management (TQM) is one such approach. It is based on a Japanese style of management. In TQM, quality assurance is implemented in each of the levels of software development to improve client satisfaction. The principles of this technique is matching the product quality with the expected quality by the customer through continuous process improvement and monitoring.

Some of the highlights of this approach include:

1. Customer focused approach for total customer satisfaction
2. Continuous improvement on business and product processes
3. The Human Element to quality, advocating companywide quality culture
4. Analysis and measurement of quality metrics to achieve target quality
5. Need for executive leadership in the corporation

TQM has been included at different degrees in the works of Crosby (1979), and Juran and Godfrey (1998). Deming (1986) described a feedback system that optimizes a process for statistical quality improvement. This process of quality involved Plan, Do, Check and Act, in short called as PDCA. Experimentation is very important with this quality process and the feedback helps to improve the process.

The Quality Improvement Paradigm proposed by Basili and Rombach (1987) is aimed at building continuous improvement to the organization based on its evolving goals and assessment of its status relative to the defined goals. This approach uses internal assessments and techniques such as Goal/Quality/Metric GQM, model building and Qualitative / Qualitative analysis to improve the quality of the product through the process.

The six fundamental steps of the quality improvement paradigm are

1. Characterize the project audits environment
2. Set the goals
3. Choose the appropriate process
4. Execute the process
5. Analyze the data
6. Package the experience for reuse

1.5 Practical Quality Assurance in Software Projects

Monitoring the software and its development process, ensuring that the products, process and standards are visible to management and ensuring compliance with standards are the goals of SQA.

Quality is the operation and behavior of the software in line with the user's requirements. It comprises of external and internal characteristics. External quality characteristics are associated with the environment of the product, for example usability and reliability. Internal quality characteristics indicate how the software product is developed. Characteristics such as the structural complexity, size, test coverage and fault rates are internal quality traits. Other important factors are process maturity level of the company that developed the product, product development environment that includes the design methodology and the development team's experience and skill.

The software development organization desires to plan and control product quality during the development stages. Project managers do not have the budget and time to go back and add quality by the time quality problem is detected. It could probably too late to address it or fix it. This is the primary reason to develop processes, procedures and expectations for high levels of quality even before the development begins. In addition, factors like, hiring developers with proven quality code developing skills, proper staffing, ensuring peer-level code reviews and external reviews must be of top priority for project management.

Some points on how to ensure planning and controlling software Quality during development:

- Establish targets for external quality characteristics
- Set and pursue targets during each phase of the development cycle by defining and monitoring targets for internal quality characteristics, this can be done using conventional software measures of size, fault rates, change rates, structure, test coverage and so on, taken early in product development.
• Establish association between the internal and external characteristics, using prior experience from similar software development projects.
• Identify and set targets for internal quality characteristics

1.6 Statement of the Problem

The society expects only quality products and services from the manufacturers and service providers. This may be due to the very high level of awareness among the customers about the product or services, the technology upgradation, more competitive products and higher literacy level. New products and services are coming to the market at regular intervals. So one of the parameters adopted to select the product or service is ‘quality’. To maintain or sustain quality for a long period is essential and also very difficult in the absence of systematic inbuilt quality assurance procedure in the system of the organization.

Quality Assurance is an important activity that helps the projects to attain their goals in a cost effective way, while meeting the customer expectations. As the old saying goes, prevention is better than cure; quality assurance focuses on preventive activities to ensure the success of the project as it is cost effective. Quality Assurance focuses on the success of the project through effective implementation of well defined processes across various phases of the project’s life cycle. As Software projects are highly demanding due to the continuous changes experienced during the execution, this focus on the process helps the projects to attain the goals in the turbulent environment. A study on this also helps the software companies to fine tune their quality assurance strategies in software development project by focusing on important areas.

Quality Assurance is very important for software organizations, because it can answer the following questions:

• How to improve customer satisfaction across all project executed in the organization?
• How to improve ROI by improving the performance of the projects?
• How to reduce of rework in the software projects?
• How to reduce turnaround time for delivery, so that the organization can take up more work from customer?
• How to sustain the success attained in one project across all projects in the organization?

The software industry is one of the emerging and developing industries, not only in the developed countries, but also in the developing and underdeveloped countries. The industry also generates lot of employment opportunity, so that more youngsters are inclined towards software industry for their well being. All the studies carried out in the past are of general in nature, or focused on one particular area of software project management. But the quality assurance practices in the industry are to be followed on all the areas of the software project management, so that the overall quality can be enhanced. So a research study is needed to identify the quality assurance practices adopted in the industry in India in general and software industry in particular, focusing on the software service industry, because more than 60% of the members of Nasscom are from software service industry (Nasscom report 2011-2012). Hence in this study, an attempt is made to study the quality assurance practices in selected organizations of the software industry, specifically on the important areas such as risk management, project monitoring and control, configuration management, requirements management and quantitative project management, which are identified through brain storming involving experts from the software industry.

To understand more about the quality assurance practices followed in different software organizations in India, a separate study of this nature is required. So, in this study, an attempt is made to bridge some of the gaps identified in various areas of project management relating to software development.

1.7 Objectives of the Study

The following are the important objectives of the study

1. To assess and identify the practices followed by different software development organizations in India

2. To identify the factors influencing activities such as configuration management, project monitoring and control, Risk Management, Requirements Management
and Quantitative Project Management in any software project in the software development organizations in India

3. To assess the difference in the opinion of the project managers performing and not performing the various identified activities relating to quality assurance.

4. To explore the relationship between various activities relating to quality assurance practices in the software organization.

5. To offer suggestions in improving performance of the company by strictly adopting the quality assurance practices.

1.8 Limitations

The following are the important limitations of the study:

1. The size of different companies selected is not uniform.

2. The response is collected only from IT/software services companies.

3. The study confine to the software industry only and the results may not be generalized because the objectives, size, environment etc. of each of the companies may vary.

1.9 Methodology

There are 957 software service companies in India (Nasscom research report for 2011-2012). A sample of ten percent of the companies (96) was selected using stratified sampling technique, which is one of the powerful probability sampling techniques. A questionnaire was framed in consultation with the quality assurance experts from different software organizations. The areas covered in the questionnaire are selected based on expert judgment. The questionnaire comprises of demographic and certain organization factors and the quality assurance practices in the area of configuration management, project monitoring and control, Risk management, Quantitative project management and Requirement management adopted in the software industry. The questionnaire developed is based on real-time practices in software projects for the identified areas. To ascertain the opinion from the company a project
manager/developer/tester/quality assurance persons was contacted. A pilot study was conducted after collecting the opinion from ten companies and the questionnaire was modified based on the outcome of the pilot study. Suitable tools, in tune with the objectives of the study were adopted in analyzing the collected data. Statistical tests were conducted at 5% level of significance. A detail of research methodology followed in the study is described in chapter 3.

1.10 Scope

1. The results of the study may be useful not only the for upcoming organization in developing their quality assurance practices to perform well in the future, but also for the existing companies in designing their quality assurance system.

2. The findings of the study may lead to the future studies by other researchers who intend to work in quality assurance practices.

1.11 Chapter Scheme of Thesis

Chapter 1: Introduction
The chapter gives a brief introduction about the quality assurance practices. It also describes the statement of the problem, common models for enhancing quality assurance, objectives of the study, limitation of the study, methodology adopted, scope of the study and chapter scheme.

Chapter 2: Review of Literature
The chapter 2 is divided into two sections- section 1 deal with various concepts and tools relating to quality assurance practices and section 2 describes various studies conducted by different authors pertaining to quality assurance practices.

Chapter 3: Research Methodology
In this chapter, detailed description on the research methodology used in this study is presented.
Chapter 4: Analysis and Interpretation
This chapter describes the data Analysis and Interpretation.

Chapter 5: Conclusion
This chapter presents the findings based on the study, suggestions and conclusions.