Chapter 2- Literature Review

PART- I

2.1 Overview
Chapter 1 presented an overview of this research, by briefly reviewing the background to the research, the research objectives, the research questions and the justification for the research. It has also presented the methodology, an outline of the chapters, the definitions of key terms, the limitation, scope of the study and finally the conclusion to the chapter.

This chapter is divided into two parts. The purpose of the first part of this chapter is to review the literature on leadership in organisations and leadership theories. It highlights the leadership instrument that has been used for the research and its application and also discusses the critical success factors of the Project Implementation Profile (PIP).

The purpose of the second part is to provide an introduction to information technology, evolution and definition of software, information technology industry and software development industry of India, concepts of project management, project management life cycle, software development life cycle, methodologies for quality assurance etc.

2.1.1 Literature Search Strategy
The search of relevant literature involved the use of the following professional discipline categories, key words and phrases: leadership, leadership theories, transformational, transactional, passive/avoidant, technical, project management, software project management, software development, project life cycle, critical success factors, information technology industry, NASSCOM.

Sources included: Project management body of knowledge (PMBOK) publications, referred journals, articles and professional websites.

Many research papers and articles were accessed through search engines available: EBSCOhost, ProQuest Center, Science Direct, InfoSci and ERIC.

The search strategy yielded 247 articles and references germane to the study. In addition 25 textbooks were referred.

Additional guidance was also obtained through review of 35 doctoral dissertations on topics similar in nature.
This part begins with an overview of this part of the chapter in Section 2.1. Section 2.2 considers the introduction to the topic of leadership and Section 2.3 throws light on the nature and definition of leadership. Section 2.4 discusses the concept of leadership and management. Section 2.5 discusses the various leadership theories. Section 2.6 highlights the various leadership styles. Section 2.7 discusses leadership in IT projects. Section 2.8 addresses critical success factors of IT projects. The ten factor model of project implementation profile is presented in Section 2.9. This is followed by a summary of this part of the chapter in Section 2.10.

The diagrammatic presentation of the structure of Chapter Two: Part-I is shown in figure 2.1.

**Figure 2.1: Structure of Chapter 2: Part-I**

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2.1 Overview of Chapter
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2.2 Introduction to Leadership
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2.3 Nature and Definition of Leadership
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2.4 Concept of Leadership and Management
   ↓
2.5 Leadership Theories
   ↓
2.6 Leadership Styles
   ↓
2.7 Leadership in IT Projects
   ↓
2.8 Critical success factors of IT Projects
   ↓
2.9 Ten factor model of Project Implementation Profile
   ↓
2.10 Summary
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Source: Developed for this research
2.2 Introduction

Demand for great leaders is growing in modern times, as society and technology is becoming increasingly advanced. The ever changing business environment has created a need for leaders who can meet the demands and challenges of organisations functioning in complex competitive environments, with the world open for trade.

Therefore, it is essential for a project manager to understand that leadership is an essential part of effective project management. Remarkable leadership behaviour stresses upon building an environment in which each and every employee develops and excels. Leadership is defined as the potential to influence and drive the group efforts towards the accomplishment of goals. This influence may originate from formal sources, such as that provided by acquisition of managerial position in an organization.

This is the type of role every manager must fill in his work place. He has to manage, advice, teach, decide and direct. The list goes on but it’s all leading. Therefore, a manager must have traits of a leader, i.e., he must possess leadership qualities. Leaders develop and begin strategies that build and sustain competitive advantage. Projects require vigorous leadership and robust management for optimal efficiency.

The project manager's real leadership skills include: enabling others, communication, flexibility, ability to sell and innovation. If there were a key to success for leaders, a major component would be the ability to ‘enable others’. Leaders achieve success by providing direction and then allowing others to act. When things become difficult, the leader looks for leadership from within the team, here is where the strength is. True leaders know the value of the team and regardless of leadership style, their success depends on the collective knowledge and abilities of the team. Strong leaders gain strength from their teams and know when to ask for help. Asking for help is not a sign of weakness but it’s a sign of respect, trust and true leadership.

The project manager must develop their leadership skills and use leadership styles and behaviours as needed during the course of a project. Leaders must use a wide array of tools and techniques to fit the situation and the desired outcome. It is the same for project managers to deliver a successful project.
There is a lot of research done in the past in the area of leadership. Many theories have been evolved in the last one hundred years. **Psychoanalyst Michael Maccoby conducted research and concluded that organisations require a higher level of leadership than ever before to survive and prosper.** There are certain challenges like increasing competition, changing government regulations, technological advances and attitude of the workers confronting almost every organisation. Information technology involves intellectual human capital to deal with the development of the software. The forces of globalisation and contributions of young talents is driving IT business for last 25 years. The new kind of leadership should evolve which can tackle multi-cultural interconnected environment, managing talents and technology.

*The researcher finds no identical work done previously to explore significant leadership style for the IT industry in India. Therefore, this study tries to bridge this gap and tries to explore some new facets of this industry.*

**2.3 Nature and Definition of Leadership**

According to Bass (1997), Leadership definitions and good leadership of the world abounds with great leaders, from Moses and David in the Old Testament to Napoleon in the 1700s and Nelson Mandela and Martin Luther King in the 1900s. Year after year leadership literature has seen an endless growth of terms and definitions to immensely understand and transact with it. Our understanding of leadership has changed over the years, but the basic constructs have remained the same. There are numerous ways of looking at leadership styles and many interpretations can be drawn of its meaning.

Generally, leaders are people who are able to turn their beliefs and visions into reality, through their power of control and influence they exercise over others.

- Mullins (1999) define leadership as being ‘a relationship through which one person influences the behaviour of others’.
- Hellriegel, et al. (2004) describe it is as ‘The ability to influence others to act towards the attainment of a goal’.
- Schilbach (1986) defines leadership as ‘an interpersonal process through which a leader directs the activities of individuals or groups towards the purposeful pursuance of given objectives within a particular situation by means of communication’.
According to the above perspectives, there is a need for leaders to be skilled in varying degrees of emotional intelligence to adaptively manage environmental demands. A brilliant business leader is one who understands the importance of employees in achieving the ultimate goals of the organization and motivating these employees to achieve the business goals.

Leadership is the ability to firmly have confidence and support the subordinates who are ultimately going to achieve the goals of organisations.

- Evans and Evans (2002) suggest that ‘leadership involves leading, conducting, escorting, guiding, tracing, steering and managing others’.

- According to Pierce and Newstram (2003), ‘Effective leaders take a personal interest in the long term development of their employees’. They use motivation tactics and varied skills or experiences to support their employees to achieve organisational goals. This is about tapping into individual motivation in the interests of fulfilling an organisation goal.

- Bass (1990) defines leadership as: ‘An interaction between two or more member of a group that often involves a structuring or restructuring of the situation and the perceptions and expectations of the members. Leaders are agent of change persons whose acts affect other people more than other people's acts affect them’.

Therefore, with these broad definitions, any member of the group can exhibit some amount of leadership and the number will vary in the extent to which they display so.

- Yukl (1998) perceives leadership as: ‘the process wherein an individual member of a group or organisation influences the interpretation of events, the choice of objective and strategies, the organisation of work activities, the motivation of people to achieve the objectives, the maintenance of cooperative relationships, the development of skills and confidence by members and the enlistment of support and cooperation of people from people outside the group or organisation’.

The definitions of leadership change all the time, it has been defined in many ways and in several kinds. Below are the leadership definitions and quotations given by innumerable scholars.
• “Leadership is the ability to evaluate and or forecast a long term plan or policy and influence the followers towards the achievement of the said strategy.” Adeoye Mayowa: A Leadership Manager in Nigeria (2009)

• "Leadership is like the Abominable Snowman, whose footprints are everywhere but who is nowhere to be seen"- Bennis & Nanus: 'Leaders: Strategies for Taking Charge' (1997)

• "There are almost as many definitions of leadership as there are persons who have attempted to define the concept."- Stogdill (1974)

• "A leader is a dealer in hope."-Napoleon Bonaparte, French soldier, statesman, revolutionary (1769-1821)

• "A leader is best when people barely know that he exists, not so good when people obey and acclaim him, worst when they despise him. ‘Fail to honour people' they ‘fail to honour you.' But of a good leader, who talks little, when his work is done, his aim fulfilled, they will all say, 'We did this ourselves.'"- Lao Tzu, Chinese founder of Taoism, author (6th Century BC)

• "A leader shapes and shares a vision which gives point to the work of others."- Charles Handy (1992)

• "A manager takes people where they want to go. A great leader takes people where they don't necessarily want to go, but ought to be."- Rosalynn Carter, US First Lady (b.1927)

• "As we look ahead into the next century, leaders will be those who empower others." - Bill Gates

• "Be willing to make decisions. That's the most important quality in a good leader." - General George S. Patton Jr.

• "Leaders are individuals who establish direction for a working group of individuals who gain commitment from these group of members to this direction and who then motivate these members to achieve the direction's outcomes.”- Conger, J.A. ‘Learning to Lead’ San Francisco: Jossey-Bass (1992, p18)

• "Leaders are those who consistently make effective contributions to social order and who are expected and perceived to do so."- Hosking (1988, p.153)

• "Leadership (according to John Sculley) revolves around vision, ideas, direction and has more to do with inspiring people as to direction and goals than with day-to-day implementation. A leader must be able to leverage more than his own capabilities. He
must be capable of inspiring other people to do things without actually sitting on top of them with a checklist."- Bennis, W. ‘On Becoming a Leader’ Reading, MA: Addison-Wesley Publishing, (1989, p.139)

- "Leadership and learning are indispensable to each other."- John F. Kennedy
- "Leadership is a combination of strategy and character. If you must be without one, be without the strategy."- Gen. H. Norman Schwarzkopf
- "Leadership is a development of a clear and complete system of expectations in order to identify evoke and use the strengths of all resources in the organization the most important of which is people."- Batten, J.D. ‘Tough-minded Leadership’ New York: AMACOM (1989 p. 35)
- "Leadership is a function of knowing yourself, having a vision that is well communicated, building trust among colleagues and taking effective action to realize your own leadership potential."- Warren Bennis
- "Leadership is a process of giving purpose (meaningful direction) to collective effort and causing willing effort to be expended to achieve purpose.”- Jacobs & Jaques (1990, p.281)
- "Leadership is a process of influence between a leader and those who are followers.”- Hollander (1978, p.1)
- "Leadership is a process whereby an individual influences a group of individuals to achieve a common goal."- Northouse (2004, p 3)
- "Leadership is an attempt at influencing the activities of followers through the communication process and toward the attainment of some goal or goals.”- Donnelly, J.H. & Ivancevich, J. M. & Gibson, J.L. ‘Organizations: behavior, structure, processes 5th Ed.’ Plano,TX: Business Publications Inc. (1985 p362.)
- "Leadership is an influence process that enable managers to get their people to do willingly what must be done, do well what ought to be done.”- Cribbin, J.J. ‘Leadership: strategies for organizational effectiveness’ New York: AMACOM (1981)
- "Leadership is defined as the process of influencing the activities of an organized group towards goal achievement.”- Rauch & Behling (1984, p.46)
- "Leadership is discovering the company's destiny and having the courage to follow it.”- JoeJaworski - Organizational Learning Center at MIT.
- "Leadership is influence - nothing more, nothing less.”- John Maxwell, 1998
"Leadership is interpersonal influence, exercised in a situation and directed, through the communication process, towards the attainment of a specified goal or goals." - Tannenbaum, Weschler & Massarik (1961, p.24)

"Leadership is not a person or a position. It is a complex moral relationship between people, based on trust, obligation, commitment, emotion and a shared vision of the good." - Joanne Ciulla (1998)

"Leadership is that process in which one person sets the purpose or direction for one or more other persons and gets them to move along together with him or her and with each other in that direction with competence and full commitment." - Jaques E. & Clement, S.D. ‘Executive Leadership: a practical guide to managing complexity’ Cambridge, MA: Carson-Hall & Co. Publishers (1994, p.4)

"Leadership is the accomplishment of a goal through the direction of human assistants. A leader is one who successfully marshals his human collaborators to achieve particular ends." - Prentice, W.C.H. ‘Understanding Leadership’ Harvard Business Review September/October 1961 vol. 39 no. 5 p.143.

"Leadership is the art of influencing others to their maximum performance to accomplish any task, objective or project." - Cohen, W.A. ‘The Art of a Leader’ Englewood Cliffs,NJ: Prentice Hall (1990, p. 9)


"Leadership is the behavior of an individual when he is directing the activities of a group toward a shared goal.”- Hemphill & Coons (1957, p.7)

"Leadership is the capacity to translate vision into reality.”- Warren G. Bennis

"Leadership is the incremental influence that a person has beyond his or her formal authority."- (Vecchio, 1988)

"Leadership is the influential increment over and above mechanical compliance with the routine directives of the organization."- Katz & Kahn (1978, p. 528)

"Leadership is the initiation and maintenance of structure in expectation and interaction.”- Stogdill (1974, p.411)

"Leadership may be considered as the process (act) of influencing the activities of an organized group in its efforts toward goal setting and goal achievement.”- Stogdill, (1950, p.3)
• "Leadership requires using power to influence the thoughts and actions of other people.”- Zalenik, A. ‘Managers and Leaders: are they different?’ Harvard Business Review March/April 1992 p.126.

• "Management is efficiency in climbing the ladder of success; leadership determines whether the ladder is leaning against the right wall."- Stephen R. Covey

• "People ask the difference between a leader and a boss… The leader works in the open, and the boss in covert. The leader leads, and the boss drives."- Theodore Roosevelt

• "The final test of a leader is that he leaves behind in others the conviction and will to carry on."- Walter Lippman

• "The first responsibility of a leader is to define reality. The last is to say thank you. In between the two, the leader must become a servant and a debtor. That sums up the progress of an artful leader."- Max DePree

• "The function of leadership is to produce more leaders, not more followers."- Ralph Nadar

• "The growth and development of people is the highest calling of leadership."- Harvey S. Firestone

• "The job of the leader is to speak to the possibility."- Benjamin Zander, British conductor, management presenter (b.1939)

• "The key to successful leadership today is influence, not authority."- Kenneth Blanchard, US management author, presenter (b.1939)

• "The only definition of a leader is someone who has followers."- The Drucker Foundation, 1996

• "You manage things, you lead people."- Admiral Grace Murray Hooper, US naval officer (1906-1992)

• “A leader is the person in a group who directs and coordinates task-oriented group activities.”- Fiedler (1967)

• “Leaders are those who consistently make effective contributions to social order and who are expected and perceived to do so.”- Hosking (1988)

• “Leadership is a social process in which one individual influences the behaviour of others without the use of threat or violence.”- Buchannan and Huczynski (1997,p.606)

• “Leadership is about articulating visions, embodying values and creating the environment within which things can be accomplished.”- Richards and Engle (1986)
• “Leadership is the ability to step outside the culture to start evolutionary change processes that are more adaptive.”- Schein (1992)

• “Leadership is the creation of a vision about a desired future state which seeks to enmesh all members of an organisation in its net.”- Bryman (1986, p. 6)

• “Leadership is the lifting of a man’s vision to higher sights, the raising of a man’s performance to a higher standard, the building of a man’s personality beyond its normal limitations.”- Drucker, P. F. (1955)

• “Leadership is the process of influencing the activities of an individual or a group in efforts toward goal achievement in a given situation.”- Hersey, P. & Blanchard, K. ‘Management of Organizational Behavior’. Englewood Cliffs, NJ: Prentice Hall (1988 p. 86)

• “Leadership is the process of making sense of what people are doing together so that people will understand and be committed.”- Drath & Palus (1994)

• “Leadership: the art of getting someone else to do something you want done because he wants to do it.”- Dwight D Eisenhower (1890 - 1969) US Statesman

• “One of the hardest tasks of leadership is understanding that you are not what you are, but what you're perceived to be by others.”- Edward L. Flom, CEO of the Florida Steel Corporation, in a speech, May 6, 1987.

• “Leadership is all hype. We've had three great leaders in this century - Hitler, Stalin and Mao.”- Peter Drucker, quoted in Fortune, 21/02/94

• “Leadership is an intangible quality with no clear definition. That's probably a good thing, because if the people who were being led knew the definition, they would hunt down their leaders and kill them.”- Scott Adams, The Dilbert Principle (1996)

• "Leadership: The capacity and will to rally people to a common purpose together with the character that inspires confidence and trust"- Field Marshal Montgomery

• "A Leader: A person responsible for achieving objectives through others by creating the conditions in which they may be successful and for building and maintaining the team that he or she is a member of."- Jeremy Tozer

• "Leadership is a purposeful relationship, which occurs episodically among participants, who use their individual skills in influence, to advocate transforming change."- (c) Michael S. Kearns, 2005
• "Leadership is an influence relationship among leaders and followers who intend real changes that reflect their mutual purposes." - Joseph Rost, Leadership in the 21st Century, (1993, p.102)

• “The servant-leader is servant first…It begins with the natural feeling that one wants to serve, to serve first. Then conscious choice brings one to aspire to lead…” - (Greenleaf, 1970)

• “My definition of a leader . . . is a man who can persuade people to do what they don't want to do, or do what they're too lazy to do, and like it.” - Harry S. Truman, 1884-1972, Thirty-third President of the United States.

• You cannot manage men into battle. You manage things; you lead people.- Grace Hopper, Admiral, U. S. Navy (retired), Nova (PBS TV), 1986

• The superior leader gets things done with very little motion. He imparts instruction not through many words but through a few deeds. He keeps informed about everything but interferes hardly at all. He is a catalyst, and though things would not get done well if he weren’t there, when they succeed he takes no credit. And because he takes no credit, credit never leaves him. - Lao Tse, Tao Te Ching

• Leadership occurs when one person induces others to work toward some predetermined objectives.- Massie

• Leadership is the ability of a superior to influence the behavior of a subordinate or group and persuade them to follow a particular course of action.- Chester Bernard

• Leadership is the art to of influencing and directing people in such a way that will win their obedience, confidence, respect and loyal cooperation in achieving common objectives.- U.S. Air Force

• The feminine leadership style emphasizes cooperation over competition; intuition as well as rational thinking in problem solving, team structures where power and influence are shared within the group- interpersonal competence; and participative decision making.- Marilyn Loden, Founder and president, Loden Associates, Management Review, December 1987

• The first job of a leader is to define a vision for the organization.... Leadership of the capacity to translate vision into reality.- Warren Bennis, President, University of Cincinnati, University of Maryland symposium, January 21, 1988

• The ultimate test of practical leadership is the realization of intended, real change that meets people’s enduring needs.- James MacGregor Burns
Managers have subordinates; leaders have followers.- Murray Johannsen

If your actions inspire others to dream more, learn more, do more and become more, you are a leader.- John Quincy Adams quotes (American 6th US President (1825-29), eldest son of John Adams, 2nd US president. 1767-1848)

I am looking for a lot of men who have an infinite capacity to not know what can't be done.- Henry Ford

Leadership is a two-way street, loyalty up and loyalty down. Respect for one's superiors; care for one's crew.- Grace Hopper, Admiral, U. S. Navy (retired), Speech, Washington, D. C., February 1987

As for the best leaders, the people do not notice their existence. The next best, the people honor and praise. The next, the people fear; the next, the people hate- Lao Tse, 604-531 B. C., Chinese philosopher and founder of Taoism, Tao Te Ching

From the several leadership definitions and quotations above, the researcher tries to link and analyze the characteristics and behaviours of Indian software project managers and their dominant leadership style to make a project successful. The literature also suggest that there are various forces that have an influence on the leadership style, they are as follows:

- How much time is available to complete the task?
- Are relationships based on trust and respect or disrespect?
- Who has more and correct information leaders or subordinates?
- How well employees are trained and how well they know the task.
- Internal conflicts.
- Stress level.
- Type of task, whether it is structured, unstructured, complicated or simple.

2.4 Leadership and Management

In order to understand the nature of leadership among managers it is necessary to first consider the broader notions of leadership and management. The literature suggests that they need to be considered as separate ideas and concepts. Leadership is said to be a process of influencing others to achieve the long term goals of the organisation. Good leadership includes forming good strategies, in order to complete the organisational goals. Managers need to work according to process, seek stability, control and also try to resolve problems quickly. An organisation definitely needs the support of both managers and leaders to successfully achieve the organisational goals.
According to Dumaine (2004), good leadership must maintain a balance between vision, strategy and results. Managers and leaders, and also subordinates, must know where they are and where they need to go. Leaders also have to confront any obstacle and support their subordinates to solve problems. They have to clearly communicate their leadership and inspire their team to finish the goals.

All managers require good leadership skills because they need to motivate their subordinates to adopt good work practices. Also managers need people skills to gain the confidence of the workers. When managers give orders they must have the power and motivation techniques to instil confidence so that the subordinates can gain positive feelings towards the task and the managers, so that they can provide better results. The managers of an organisation must exhibit that they have excellent leadership skills to achieve the targets and also show that they have the power to control their subordinates.

In general, managers and leaders have different roles. Several scholars have explored the difference between leadership and management. One clear distinction would provide the following definition:

- **Management involves power by position whereas Leadership involves power by influence**

Abraham Zaleznik (1977), delineated differences between leadership and management. He saw leaders as ‘inspiring visionaries concerned about substance’; while managers are viewed as ‘planners who have concerns with future.’

Warren Bennis (1989), further drew twelve differences between the two groups:

- Managers administer, leaders innovate;
- Managers ask how and when, leaders ask what and why;
- Managers focus on systems, leaders focus on people;
- Managers do things right, leaders do the right things;
- Managers maintain, leaders develop;
- Managers rely on control, leaders inspire trust;
- Managers have a short term perspective, leaders have long term perspective;
- Managers accept the status quo, leaders challenge the status quo;
- Managers have an eye on the bottom line, leaders have an eye on the horizon;
- Managers imitate, leaders originate;
Managers emulate the classic good soldier, leaders are their own person;
Managers copy, leaders show originality.

Thus, both roles are crucial, but they differ profoundly. Organisations need both managers and leaders to successfully reach their goals together. The literature suggests that a person can be both a virtuous leader and a good manager but it is not necessary that good managers are also always good leaders. There are scholars like Armstrong and Stephens (2005) who says that there are eleven qualities, which should be possessed by excellent managers. These are command of basic facts, relevant professional knowledge, continuing sensitivity to events, problem solving and decision, social skills, emotional resilience, proactivity, creativity, mental agility, balanced learning habits and self-knowledge. It can be understood that good management is not possible without good leadership. Good management requires crucial goal setting and then leading subordinates to achieve the organisational goals in the most effective manner.

But, Chapman (1991), differs with the above, according to him “you can be an excellent manager without becoming a good leader, but you cannot be an excellent leader without becoming a good manager”. According to him, good management is the basis for strong leadership. A person cannot become an effective leader unless the management side of the operations is running smoothly.

Thus, different scholars have different views on the concept of leadership. Therefore it can be opined that, each manager has a unique style of leadership. Some are more open and participative while others are very assertive. There are a number of identified leadership styles such as: Transformational, Transactional, Laissez-Faire, Participative, Democratic and Authoritarian. These leadership styles are not fixed and may depend on the situations.

The researcher is interested in researching the dominant leadership style of Indian software project managers, to assess the effects of these leadership styles on project team members willingness to exert extra effort, perception of project manager's effectiveness and satisfaction with the project manager, augmentation effect of transformational leadership, most effective leadership style at each phase of the project life cycle and dominant critical success factors of the Project Implementation Profile (PIP) at each phase along with verifying robust presence of critical success factors in successful projects.
The MLQ (5X-Short Form) instrument questionnaire is used to measure the three leadership styles: Transformational Leadership, Transactional Leadership and Passive/Avoidant Leadership. Since, the research is based upon Indian software project managers working in Information Technology Industry, therefore one more type of leadership style i.e. Technical has been added. The researcher is also interested to know the most effective leadership style at each phase of the project life cycle and dominant critical success factors of the Project Implementation Profile (PIP) at each phase, accordingly additions have been made to the MLQ.

2.5 Overview of Leadership Theories
In an attempt to understand the nature of leadership and its different aspects, it is necessary to discuss the different theories of leadership that have been developed over time, as various schools of thought have brought their differing ideas and knowledge to this discipline. There are various theories of leadership, which tries to explain the factors involved in the emergence of leadership, the nature of leadership or the consequences of leadership (Bass, 1990). These leadership theories can be applied to a research focus on project managers.

2.5.1 Great-Man Theory
In the early 1900s, Great-Man theories were popular and focused on great leaders that helped to change and shape the course of world events. These theories focused on great leaders such as Moses, Thomas Jefferson, Teddy Roosevelt, and Winston Churchill and attempted to explain leadership based upon inheritance. The belief was that leaders were born and not made.

Leaders like these possessed specific traits or characteristics that enabled them to stand out from others and attract their followers, to set direction, and to be strong leaders in their time. The leadership trait model was established in the early 1900s, with its associated theories and perspectives. In essence, this was the first attempt at the theoretical understanding of the nature of leadership. The theory evolved was the natural forerunner to trait theory.

2.5.2 Trait Theory
Trait theory focused on identifying superior and specific traits or characteristics of effective leaders and much of this work was developed in the first half of the 1900’s. The earliest research conducted on the concept of this type of leadership focused on identifying the unique qualities or traits that appeared common to effective leaders. According to Hersey and
Blanchard (1988), most leadership researches before 1945 suggested that certain traits were inherent in all leaders and were transferable from one situation to another.

These researches led to the identification of some traits that are inherent in most leaders. Researchers such as Bernard (1926), Kilbourne (1935) and Stogdill (1974) have tested and studied the impact of traits on leadership. According to Maude (1978), the trait approach attempts to explain leadership effectiveness in terms of the personality and psychological traits of the leader. These traits included emotional intelligence, having an extrovert personality (charisma), dominance, masculinity and conservatism and better adaptability according to situation. Various studies have identified emotional intelligence as a critical element for the success of a leader and as a vital resource for any team.

However, only the **physical and personality characteristics are focused** by the trait approach. More recently, the researchers moved away from assessing individuals in terms of traits, towards analyzing how leader behaviour contributes to the success or failure of leadership.

**2.5.3 Behavioural Theory**

The research based on leadership behaviours began in the late 1920s and focused on identifying behaviour of effective leaders. Many leadership studies were conducted and theories were developed over the next thirty to fifty year period. Out of those, studies done by Western Electric Company and Mayo, multiple concepts and theories put forth by the University of Michigan as well as Ohio State University, the Managerial Grid model by Blake and Mouton, participative leadership with Theory X and Theory Y by McGregor were the most significant ones.

This theory **mainly focused on the supervisory behavioural traits** like closeness of supervision, degree of authority delegated to employees, degree of pressure imposed on subordinates, approach to employees, freedom of conduct permitted to employees and warm versus cold personality etc.

According to Swanepoel, et al (2000), alternative approaches to leadership began to develop after the decline in popularity of trait theories. Researchers moved away from assessing individuals in terms of traits and focused on assessing how leaders’ behaviour contributes to the success or failure of leadership. But this move from the trait approach ignited research where leaders were studied either by observing their behaviour in laboratory settings or by
asking individuals in field settings to describe the behaviour of persons in positions of authority, then applying different criteria of leader effectiveness to these descriptions. This resulted in the development of a leadership-behaviour model which led to the establishment of the “behavioural school of leadership”. The behavioural approach suggests that the leader’s behaviour, and not the personal characteristics, influence his followers. Extensive research has been done in the area of behavioural approaches to leadership.

The limitations of these behavioural theories, are their omission of situational factors on the leader's effectiveness. A major concern was to identify, whether one particular method of leading was appropriate for all situations, regardless of the type of organisation, the business environment in which it operates or the type of people working with it. The perception of leadership progressed and the researchers began to focus on how a leader ought to behave in a particular situation in order to be effective.

2.5.4 Contingency Theory

According to Utrecht and Heier (1986), leadership effectiveness or success depends upon the appropriate matching of the individual leader's style of interacting with the influence that the group situation provides. The main emphasis of this theory is that effective leadership is as dependent upon the group situation as it is upon the leader. **One leadership style cannot be appropriate for all situations.** A leader can be effective in one situation and ineffective in another.

Within the contingency theory, there are three major situational variables that determine, whether a group situation is favourable or unfavourable to a particular leader:

- **a) Leader-member relations:** focus on the amount of tension involved in the interpersonal relationships between the leader and group members and are dependent upon the leader's personality.
- **b) Task structure:** refers to whether a task has been done step by step in a certain way (structured) or whether the requirements are not clear and there is no particular way to do the task, and
- **c) Leader position power:** enables the leader to get his team to comply with and obey his directions because of the power of his position that he/she is holding.

Using these variables, Hersey and Blanchard (1969), identified four different leadership styles, one of which would be the most appropriate to use based upon the specific situation.
The four styles identified are: telling or directing, persuading or coaching, participating or supporting and delegating.

This model was further validated by Hambleton and Gumpert (1982) by conducting a survey of 159 managers of an unspecified company. The study, supported the validity of the model and indicated that managers that applied the theory appropriately, performed significantly better and employee job performance increased. Although this study looked promising, more needs to be done before generalizing the findings of the study.

2.5.5 Situational Theory
Situational/Contingency approaches to leadership have come about as a result of attempts to build upon and improve the trait and behavioural approaches to leadership. This approach to leadership examined how leadership changes from situation to situation. According to this model, effective leaders are those who diagnose the situation, identify which leadership style will be most effective, and then assess whether they can implement the required style or not. According to Bass (1998), most prominent among these theories are Fielder’s Contingency Theory of leadership, the Path-Goal Theory of leader effectiveness which embodies Transactional leadership, Hersey and Blanchard’s Life-Cycle Theory, the Cognitive-Resource Theory and the Decision-Process Theory.

The dynamic environment requires different types of leaderships. Situational leadership does not promote an ideal leadership style, but rather considers the ability of a leader to adapt to the environment. Hersey and Blanchard (1988), argued that there was no best leadership style, in varying situations, but rather there could be best attitudes for managers. The crux of the situational approach is recognizing the fact, that for different development levels and different types of situations, different leadership styles are more effective. Leadership styles can therefore be understood as the behaviour or attitude of a leader as influenced by the situation surrounding that leader. Yukl (1998) states that although situational leadership theories provide insights into reasons for effective leadership, conceptual weaknesses limit the approach’s utility. Thus, it is difficult to derive specific strong inferences from the approach.

There have been many criticisms of the traditional approaches discussed above. One such criticism, by Bass (1990), is that these approaches have not been rigidly tested in practice and are too specific either in defining leadership in terms of traits, behaviours or situation.
According to Pierce and Newstrom (2003), effective leaders must correctly identify the behaviours each situation requires and then be flexible enough to understand how they can be applied in that situation. Leaders, who lack the necessary leadership skills must be trained. Each situation requires a different leadership style; in every situation there is a leadership style that will be effective. This theory accords with Contingency Theory. Managers have to use their strategies to solve any problem in any situation and must also, always be aware of team's emotions.

2.5.6 Path-Goal Theory
The main concept of this theory is that the leaders have to support their subordinates in achieving the goals of their organisations. The leaders in an organization have to provide similar pathways to achieve the desired goals of the organisations. The Path-Goal Theory of leadership was developed to describe the way by which leaders encourage and support their followers in achieving the goals that have been set and thus making the path that they should take clear and easy.

According to House & Mitchell (1974), leaders in particular:

- Clarify the pathway so subordinates know with the best way to go.
- Remove any obstructions that are stopping subordinate to reach the goals.
- Increase the rewards when subordinates achieve excellent results.

According to Silverthorne (2001), the theory proposes four different kinds of leadership styles:

- **Directive leaders** explain subordinates what is expected of them and give specific guidance and enforce rules and procedures.
- The **supportive leader** gives strong attention to the needs and well-being of their subordinates.
- The **participative leader** involves subordinates in the decision-making process.
- The **achievement-oriented leader** seeks to improve performance, sets high standards, and shows confidence to their subordinates will achieve these standards.

If the task is well defined, then less guidance is needed and the leader can give fewer directives, whereas if the task is poorly defined, subordinates will require more guidance and directions from the leader. The Path-Goal Theory argues that a leader should be able to be
either task or relationship oriented as the particular situation requires. Following the concept of this theory can be beneficial for managers as well as their subordinates. It could support the managers in working with greater capacity.

The great-man theories, trait theories, behavioural theories, situational and contingency theories have been helpful in introducing new ideas and proposing new research questions. Over time, focus has moved from leadership traits, to leadership behaviours, to using different leadership styles in various situations. However, the theories discussed so far have not agreed on the best approach for leaders to motivate and influence their followers towards higher productivity.

Theories had focused primarily on making operations effective and efficient. Further, researchers have found ways to increase production and improve business operations. Employee motivation has been the key to success. Vroom’s expectancy theory noted that motivation effects job performance and that workers were motivated by receiving rewards and avoiding punishment. They tied the level of their effort to their expected outcome. Workers were motivated by wages, social interaction and social status of their position. It was observed that, employees were generally transaction driven. Thus, transactional leaders understood the needs of their employees and how to meet those needs in exchange for the appropriate level of effort. According to Bass (1985), transactional leaders focused on efficiencies, current processes, maintaining the status quo and meeting contractual agreements.

However, there was something missing in the previous researches. There were researchers who saw situations where groups were led by visionary and charismatic leaders that helped the organizations achieve more than what was expected. These leaders helped to move individuals from the lowest level of Maslow’s hierarchy of needs to the highest level that included the need for growth, self-actualization and developing their own potential. Charismatic leaders such as Winston Churchill, Martin Luther King Jr., President John Kennedy and Lee Iacocca were able to transform their followers, to raise their level of self-awareness, to help them think beyond themselves towards the good of the organization and to move the organization beyond what others thought possible. Researchers and events like these have helped to lay the foundation for transformational leadership theory.
2.5.7 Leader-Member-Exchange (LMX Theory)
Yukl (1998) suggests that the Leader-Member-Exchange (LMX) theory of leadership explains that the relationship between managers and their subordinates develops over time as a result of role-making processes and social exchange between them. Managers always develop a more favourable relationship with some subordinates than with others. When there is strong mutual trust and loyalty, subordinates are provided with more responsibility. A subordinate who is seen as trustworthy by a manager is more likely to consulted for advice and given more responsibilities.

2.5.7.1 Transformational and Transactional Leadership
Evidences of these leadership theories can be traced back thousands of years ago. In modern times thought on transactional and transformational leadership began to develop in the 1970s and 1980s. The phrase, “transformational leadership” was first of all used by a researcher named Downton in the year 1973, followed by Burns in 1978 in the political arena, who considered the terms transformational and transactional leadership as the opposites of each other.

Another researcher Bass in 1985, added to these concepts but believed that managers could exhibit both depending upon the situation. Later, in 1987 Bass, Waldman and Yammarino recognized the fact that transformational leadership was just an extension of transactional leadership. Modern approaches towards transactional and transformational leadership is based upon the work done by Burns (1978) and Bass (1985).

Transactional leadership
According to Bass (1985), the ‘transactional’ leader pursues a cost-benefit, economic exchange to meet subordinates’ current, material and psychic needs in return for ‘contracted’ services rendered by the subordinate. Transactional leaders always make clear the role and task requirements for the subordinates to reach the desired outcomes. This is intended to give the subordinates sufficient confidence to exert the necessary effort. Transactional leaders pretend to know what the subordinates needs and wants are and accordingly clarify how they can be satisfied by the subordinate by putting requisite efforts. The transactional leader basically focuses on the process and not the substance of issues. The reasons behind failure of transactional leadership given by Bass and Avolio (1990) are as follows:
1. The leaders often tend to underutilize transactional leadership methods due to time pressures, poor appraisal methods, doubts about the efficacy of positive reinforcement and lack of skill or confidence.
2. The leader may lack the necessary reputation or resources to deliver the needed rewards.
3. Non-contingent rewards sometimes work along with contingent rewards to support performance.
4. When the contingent reinforcement used is negative, the success of the transactional leader drops down and
5. Followers may take shortcuts to complete the exchange of a reward for compliance to a task, thus, sacrificing quality.

Thus, while contingent reinforcement is successful in meeting objectives at the lower level but quite often, they fall short of accomplishing objectives at the higher level.

**Transformational leadership**

Bass perceives a ‘transformational’ leader as the one who ‘motivates the subordinates to do more than what they are originally expected to do’. This is achieved by any one of the three interrelated ways:

1. By raising followers’ level of awareness of the importance of achieving valued outcomes and the strategies for reaching them.
2. By encouraging followers to transcend their own self-interest for the sake of the team, organisation or society.
3. By developing followers’ needs to higher levels in such areas as achievement,
4. Autonomy and affiliation, which can be both work-related and non-work-related.

Transformational leaders always try to inspire, set direction & vision, encourage subordinates to participate and take the initiative to change the organization. When employees think beyond themselves, they would then put extra effort to do the work, have more job satisfaction, be effective in getting the job done and increase productivity of the organisation. They would also exhibit more trust, loyalty and respect towards the leader. Transformational leaders are considered to be highly charismatic that lead, inspire and improve behaviour and performance. Transformational leaders take a real interest in the growth and well-being of their employees which leads to the growth of the organisation.
In terms of **distinction between transactional and transformational** leadership, Bass (1985) differs from Burns (1978) in three respects:

**First**, he added the “expansion of followers’ needs and wants”.

**Second**, for Burns, the actions are transformational only if society benefits from them whereas, in Bass’s point of view, transformational leadership is not necessarily a beneficial relationship.

**Third**, Burns sees transformational leadership as the opposite end of a single continuum from transactional leadership. Bass felt that leaders will exhibit a variety of patterns of transformational and transactional leadership. In other words, according to Burns a leader can either be transformational or transactional, whereas for Bass a leader can be both.

Thus, it can be observed, that **transactional leadership motivated subordinates by appealing or focusing on their current personal desires whereas transformational leadership motivates the subordinates by aligning personal goals with the organisational goals and by arousing the focus on the long-term needs of an individual in the form of self-esteem and self-actualisation.**

Burns looks transactional leadership as a ‘favour-for-favour’ exchange, where criteria for rewards are based on expected performance. According to him, **Transactional leaders focused on ‘doing things right’ while Transformational leaders focused on ‘doing the right things’**.

He found evidence for five leadership factors: Individualized Consideration, Charismatic Leadership, Intellectual Stimulation, Contingent Rewards, and Management- By- Exception. **Transformational Leadership** consisted of the first three: Charismatic Leadership, Individualized Consideration, and Intellectual Stimulation. **Transactional Leadership** consisted of the last two factors: Contingent Rewards and Management-By-Exception.

Based upon additional researches approximately between 1985 and 1995, the theory was expanded to denote three types of leadership behaviour: Transformational, Transactional and Non-transactional Laissez-Faire Leadership or Passive Leadership and is referred to as the ‘full range of leadership model’.
Emotional Intelligence:
This is the next theory which became popular after the leader member exchange theory. This theory is based upon leaders who apply their emotional skills rather than intellect to understand and deal with a particular situation. In this nineteen related components are identified and categorized into four categories by Goleman et.al (2002). Here, the personal competencies are divided into self-awareness and self-management and social competencies are categorized into social awareness and relationship management.

The full range of leadership Model proposed by Bass and Avolio is the main focus of the research work, but before discussing the model in detail, table 2.1 below summarize the era of all the main leadership styles mentioned:

<table>
<thead>
<tr>
<th>Theory</th>
<th>Time</th>
<th>Main Idea</th>
<th>Leadership Style</th>
<th>Relationship with Project Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trait</td>
<td>1930s - 1940s</td>
<td>Outstanding leaders are born with same traits.</td>
<td>Not defined</td>
<td>Not defined</td>
</tr>
<tr>
<td>Behavioural or styles</td>
<td>1940s - 1960s</td>
<td>The leadership skills can be learned.</td>
<td>Laissez-faire Democratic Autocratic Bureaucratic</td>
<td>Not defined</td>
</tr>
<tr>
<td>Contingency/ Situational</td>
<td>1960s</td>
<td>The effectiveness of leadership styles varies in different situations.</td>
<td>Directive Supportive Participative Achievement-oriented</td>
<td>The leadership should be selected according to environmental and subordinate factors.</td>
</tr>
<tr>
<td>Visionary or Charismatic</td>
<td>1980s - 1990s</td>
<td>The leadership styles are defined according the concern of process and relationships.</td>
<td>Transactional Transformational Laissez-faire</td>
<td>Different leadership styles have different impact on followers in terms of responsibility, momentum, and stress.</td>
</tr>
<tr>
<td>Emotional intelligence</td>
<td>Late 1990s</td>
<td>Leader’s emotional intelligence can influence the performance of subordinates more than intellect.</td>
<td>Visionary Coaching Affiliate Democratic</td>
<td>They are suitable for certain project type. The last two types are considered as toxic</td>
</tr>
</tbody>
</table>
From the above table, the time period in which the various leadership theories developed and flourished can be realized. It can also be observed that now i.e. in 2000’s the era of competency school is in progress, which is goal oriented by focusing on engaging and involving the subordinate team members. With the combination of various competencies like: emotional, managerial and intellectual, different leadership styles can be displayed to meet the requirements of certain project types in an organisation. Through competency theory refinements can be made in the existing transactional and transformational theories and instead of applying a particular leadership style by a project manager, a combination of leadership styles can be suggested to increase the chances of making a project successful. Therefore, the first research question in this study, relates to whether there is a difference in leadership style (transformational, transactional, passive/avoidant and technical) executed by project managers with respect to successful, challenged and failed projects.

Now, the focus moves on to explain the BASS AND AVOLIO’S -“FULL RANGE OF LEADERSHIP MODEL”, which is the foundation of this research work.

2.5.8 Bass and Avolio’s -“Full Range of Leadership Model”
This model essentially covers three types of leadership behaviour: transformational, transactional and non-leadership. The components of these have increased over time based on extensive research and conceptual refinement and presently, the model has nine components (five: transformational leadership factors, three: transactional leadership factors, and one: non- leadership factor) which according to Avolio and Bass (1991) explain the “full range of leadership styles”.

<table>
<thead>
<tr>
<th>Competency</th>
<th>2000s</th>
<th>This is the combination of all the theories, including traits, personal characteristics and essential skills as a leader.</th>
<th>Engaging Involving Goal-oriented</th>
<th>Different leadership can improve the performance of project if the appropriate styles have been selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competency</td>
<td>2000s</td>
<td>Pacesetting Commanding because they have dissonance effect on followers.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Together, they provided a review of hundreds of studies completed over the past thirty years. It appeared that there has been consistent support for the key factors of Transformational Leadership: Charisma/Idealized Influence, Inspirational Motivation, Intellectual Stimulation, and Individual Consideration still the theory continued to be modified.

In 2003, Antonakis et al. suggested using the component, Idealized Influence instead of Charisma and recommended that Idealized Influence should be separated into two parts: Attributed and Behaviour. Further, Hater and Bass noted that Management-By-Exception should be divided into two parts: Active and Passive. Later, Avolio and Bass (2004), Avolio et al. (1999), Geyer and Steyrer (1998) and Den Hartog et al. (1997) suggested using the term ‘Passive/Avoidant’ instead of ‘Laissez-Faire’ because it was more descriptive as the third leadership type. They also suggested that management-by-exception (active) was a better fit with transactional leadership and management-by-exception (passive) was a better fit with laissez faire and these two subscales under the third type of leadership, can be identified as Passive/Avoidant.

**Transformational Leadership**

In this leadership style, the leader tries to escalate, followers awareness of what is correct and important and motivate them to perform 'beyond expectations.'

**Key Factors**

There are five key factors of Transformational Leadership, which are as follows:

- **Idealized Influence (attributed):** refers to charisma, being confident and powerful, focusing on ethics and making the followers to identify with the leader.

- **Idealized Influence (behaviour):** refers to charismatic actions focusing on values and missions, as well as having a trustworthy role model to look upon and follow.

- **Inspirational Motivation:** allows leaders to share a positive vision of the future and challenge followers towards high standards and morals by expressing the importance of desired goals in simple ways.

- **Intellectual Stimulation:** current traditions and beliefs are challenged by the leader and he looks upon new ways of doing things. Questioning beliefs is encouraged even for the employees who are also encouraged to think for themselves.

- **Individualized Consideration:** leaders deal with people as individuals and focus on individual strengths and development areas and help them achieve the higher fragments of Maslow’s needs hierarchy to help improve job satisfaction.
**Transactional Leadership**
This particular, leadership style is based upon mainly physical and security needs of the followers and an exchange process.

**Key Factors**
There are two key factors of Transactional Leadership, contingent reward and management-by-exception (active).

- **Contingent Reward** allows leaders to clarify expectations, make promises, negotiate, and give reward for successful performance and threats for poor performances.

- **Management-By-Exception (active)** allows leaders to closely monitor performance, deviations, mistakes and errors and take corrective actions as quickly as possible. Here, he is pro-active in trying to prevent mistakes.

**Passive/Avoidant Leadership**
This leadership style relates to display of absenteeism or non-availability of the leader.

**Key Factors**
There are two key factors of Passive/Avoidant Leadership, management-by-exception (passive) and laissez-faire.

- **Management-By-Exception (passive)** allows leaders to monitor performance and take action if performance deviates. This occurs when leaders wait to intervene until problems become serious. They wait until mistakes are brought to their attention.

- **Laissez-Faire** describes the leader that avoids responsibilities, fails to take necessary follow up on issues and basically does not demonstrates any kind of leadership.

**2.5.9 Leadership Outcomes**
There are three leadership outcomes as proposed by Bass. They are as follows:

- **Extra effort** pertains to leaders getting team to do more than what is expected, increasing their desire to succeed so as to make them try hard up-to potential and be more productive than they thought they could be.

- **Effectiveness** pertains to the ability of the leader in meeting individual, group and organizational needs and leading the group towards getting desirable results.
✓ **Satisfaction** pertains to follower satisfaction with the leader and how the leader helps followers to work with others in a team in a satisfying way.

Since, a number of studies have been conducted in the past by several researchers to prove that there is a positive correlation between transformational leadership style and the leadership outcomes. **Therefore, the next research question in this study relate to whether there is a relationship between integrated leadership styles (transformational, transactional, passive/avoidant and technical) of the project manager and the combined project leadership outcomes (project team member’s willingness to exert extra effort, project manager’s effectiveness and satisfaction with the project manager) in successful, challenged and failed projects.**

### 2.5.10 Multifactor Leadership Questionnaire - MLQ

Bass created the Multifactor Leadership Questionnaire (MLQ) to measure the effect of the three independent variables of Transformational Leadership, Transactional Leadership, and Non-transactional Laissez-Faire or Passive/Avoidant Leadership upon the three dependent variables of Extra Effort, Satisfaction and Effectiveness.

Originally, the survey included 73 items and was based on the original five factors identified by Bass in 1985. Over the last thirty years, a number of factor models have been used by researchers and items have been changed, added or eliminated. Although the MLQ survey has been by far, the most often used tool when measuring transformational leadership, it also faces criticism from various researchers.

The above fact of shortcomings was acknowledged by Avolio, Bass, & Jung in 1999 and additional studies were conducted to rectify certain errors. Today, the MLQ-5X contains 45 items and it takes approximately 15 minutes to complete it. Of those 45 items, 36 items were based on the current nine components that make up the full range of leadership noted earlier. The other nine items assess three leadership outcomes i.e. extra effort, satisfaction and effectiveness. **Antonakis et al. (2003) and Barge and Schlueter (1991) also support the current MLQ-5X as being a valid and reliable instrument.**
2.5.11 Augmentation effect of Transformational Leadership in consideration with other leadership styles (Transactional, Technical and Passive/Avoidant), accounting for increased outcomes

According to the leadership literature, there is no one leadership style that is always fully effective to handle the complexity of IT projects or to achieve desired level of output. Project managers who exhibit only passive/avoidant leadership tend to produce less than desirable results, lower follower motivation and are seen by followers as ineffective project managers. Other, group of project managers who exhibit only transactional and technical leadership tend to produce average results like: projects are completed but they do not meet their specific time, quality or cost requirements.

It is observed that different situations or phases require different kinds and styles of leadership to be displayed by the project manager. Therefore, a leadership model which uses transactional, technical and a small proportion of passive/avoidant leadership, is viewed as a leadership combination model which can lead to desired/expected output.

However, by adopting transformational leadership methods, along with the above leadership combination model, the project manager can enhance or augment the effectiveness of his/her leadership behaviour. In an ‘optimum’ leadership model, proactive transactional, technical behaviours and reactive passive/avoidant leadership behaviours should be combined with transformational leadership behaviours to achieve extra or performance beyond expectations.

TRANSACTIONAL LEADERSHIP + TECHNICAL+ PASSIVE/AVOIDANT + TRANSFORMATIONAL LEADERSHIP = EFFECTIVE LEADERSHIP

It should be further noted that transformational leadership behaviour does not substitute other leadership behaviours but rather complements them. By, observing the augmentation effect closely it is found that transformational leadership not only augments the outcomes, but the effect of other remaining leadership styles are also subsidized by adding transformational leadership. It is logical to assume that the positive effects that can be seen in other leadership styles are a by-product of transformational leadership. Therefore, the next research question in this study relate to whether there is an improvement in the predictive ability of the model (transactional, passive/avoidant and technical leadership predicting all three project leadership outcomes: project team member’s willingness to exert extra effort, effectiveness

Page | 74
of the project manager and satisfaction with the project manager) for successful, challenged and failed projects after transformational leadership is added to the model.

2.6 Leadership Styles
Though, there are many leadership styles available, this section concentrates on some important leadership styles applicable for IT project management.

2.6.1 Democratic Leadership or Participative Leadership
Leaders using this style provide direction and allow the group to make their own decisions. According to Bartol et al. (2003), specifically, ‘the leader encourages members to determine goals and procedures and stimulates member's self-direction and self-actualisation’. In addition, the democratic leader offers suggestions and reinforces team's ideas as well. The democratic style supports the teamwork method and always coaches and leads staff to achieve the organisational goals.

This style is suitable with the employees who likes to participate and get involved with their managers in making decisions. Democratic leaders likes to work with their subordinates to collect any suggestions and then use those suggestions in making decisions. This style is best suited to motivate subordinates to face any kind of challenge. The democratic leadership style is very good and suitable for use in most organisations because the leader can get feedback from subordinates. Also, the leader and subordinates can work together in suggesting new ideas. Finally, the democratic leadership style ensures very good governance to reinforce the entire subordinate staff.

2.6.2 Authoritarian Leadership
This style is just the opposite of the laissez-faire and democratic style of leadership. Authoritarian leadership builds agendas, determines the group's policies, assigns tasks to the members and makes decisions for the group without consulting subordinates. In the end, the leader takes responsibility for the group's progress. Rarely do the group members communicate with one another. This style is task-oriented because the organisational goals need to be reached as soon as possible at any cost. The authoritarian leadership style keeps a very close eye on all subordinates. The leader likes to work beside them. This style of leadership does not instil confidence in the team.
2.6.3 Servant Leadership
This style gained support in research into the non-profit sector, but soon the ideas encapsulated in this view of leadership were being seen relevant in business context as well. The servant leader leads because he or she wants to serve people. People follow servant leaders because they develop trust in them. A servant leader is a moral leader whose purpose is accomplished when their subordinates become more autonomous.

2.6.4 Charismatic Leadership
According to Pierce and Newstrom, ‘this style is a throwback to the old conception of business leaders as being those who by the force of their personal abilities are capable of having a profound and extraordinary effect on subordinates. They rely on charisma, presumed to be an individual characteristic of a business leader’.

Bass opines that Charismatic Leaders tend to keep employees weak and dependent. They are interested in personal loyalty rather than attachment to values and ideals.

2.6.5 New Leadership Approaches
Organisations and their environments have changed rapidly over the past years and as a result a new style of leadership, one that is more democratic and less bureaucratic, is needed in order to ensure the survival and growth of the organisation. There have also been numerous criticisms regarding the traditional approaches already discussed.

Consequently, a new style of leadership has emerged in order to ensure the survival of organisations and to overcome limitations of the trait, behavioural and contingency theories of the past. The new theories of leadership evolved as a reflex to the traditional sophisticated models, which became difficult to implement. This new leadership approach perceives that there are two views of leadership, transactional leadership and transformational leadership.

2.6.5.1 Transformational Leadership
This leadership style develops trust, loyalty and satisfaction. Working for a transformational leader can be a wonderful and uplifting experience. Transformational leaders put passion and energy into everything. They care about their subordinates needs and want them to excel. Transformational leaders influence their subordinates by motivating them emotionally. They seek to empower their subordinates by developing their independence and by building their confidence. Thus, by working under them the overall personality of the subordinate is groomed. Therefore, if this leadership style is considered to be so important then the next
**Research Question in This Study**: Relate to whether project managers who scored higher on transformational leadership style get better-extra outcomes from their project team members in comparison to those who scored lower on transformational leadership style.

### 2.6.5.2 Transactional Leadership

This leadership style prefers exchange relationship management with employees to meet the goals. Transactional leaders use a technique of motivating subordinates by appealing to their self-interest.

### 2.6.5.3 Passive or Avoidant Leadership/Laissez-Faire Leadership

This leadership style allows the group to develop their own decisions. The leader always avoids making decisions and delays responding to urgent queries.

### 2.7 Leadership in IT Projects

IT projects experience high failure rates since many years. The Standish Group repeatedly reported about significant time and cost overruns, complemented by not completely meeting quality expectations of the project sponsors. Only 29 percent of all projects were ultimately considered successful by their executives, concerning IT projects in India from the year 2011 till today. The reasons for failure are many, but the primary ones are not technological, but rather due to managerial issues.

Behavioural and social factors play a very important role in project management. The role of the project manager in IT projects is therefore, even more challenging and vital than in other types of projects, where these issues are less critical. The challenges are not technical but rather managerial. **Technical leaders can manage the technical aspects of their job, but are not adept at managing the people involved in it.** To successfully implement technical projects, strong project leaders with excellent leadership skills are required, but its importance is still not understood in modern IT environments. The researcher contribute to this stream by conducting research on the specific leadership behaviour and the type of leadership skills which offers the potential to contribute towards IT project success.

Substantial research work has been done to increase team effectiveness and hence, improve project performance but there is lack of research focusing on ineffective leadership which also becomes a hindrance for successful completion of the IT projects. **The literature suggests that IT leaders often lack interpersonal leadership skills, the reason behind this is that technical employees get promoted to become project leaders because to their**
technical knowledge and not for their people management capabilities. They are often found to be lacking in interpersonal and leadership skills either because the framework of their specialty leads to narrow viewpoints or for lack of adequate role models. Often projects fail in absence of proper human resource management skills. The key ingredient to effective project management is definitely good human resource management and leadership skills.

The more complex the human resource situation, the more complex a project manager's leadership capabilities become. In today's multi-national corporations, enormous responsibilities lies with the IT project manager, who must take the corporation's vision and translate that vision into systems that support the company's strategic direction.

Human resource management includes the processes that organise and manage the project team. The project team is comprised of people who have been assigned roles and responsibilities for completing the project. They should be definitely involved in project planning and decision making. Their involvement adds expertise during the planning process and strengthens commitment to the project.

The IT project management literature in recent times has stressed the importance of leadership as a critical success factor. A project's success or failure depends on the leadership of the project's stakeholders. Bridging the gap between software and product development requires effective leadership and project management within the software design teams. Several studies have highlighted the essential leadership qualities and skills required by IT project managers to ensure success, such as the abilities to manage people, stress, emotions, bureaucracy, and communication.

The concept of hybrid managers, combining technical, managerial and business skills is increasingly gaining prominence. The earlier mentioned theories and literature on leadership do not show what different roles the leaders have to play or style of leadership which prove to be effective and contribute towards project performance in the IT domain. Therefore, there is lack of empirical studies on the nature and importance of leadership in technical project management, this is where the researcher tries to draw attention.

2.7.1 Technical Leadership
In this study technical personnel are assumed to be considerably different from the personnel of other occupations in terms of their personality, professional profile, motivational issues and work-related issues. Therefore, the person who lead them need to keep these
differences in mind along with the unique challenges of this profession and adapt his/her leadership style accordingly. Leading achievement-oriented technical professionals in an unstable business environment requires non-traditional leadership skills and therefore, an understanding of the concept and nature of technical leadership is required.

Table- 2.2, presents a comparative study, of the view of various acknowledged experts on the essential qualities and skills of technical leaders.

Table 2.2: Essential Qualities and Skills of Technical Leaders/IT Project Managers

<table>
<thead>
<tr>
<th>Research Experts</th>
<th>Qualities and Skills of Technical Leaders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weinberg, 1986</td>
<td>Understand problems, manage the flow of ideas and maintain quality.</td>
</tr>
<tr>
<td>Rahn, 1987</td>
<td>Willingness to take risks, willingness to commit time, ability to handle stress well, deposition to people management, right emotional disposition, communication skills, ability to handle politics.</td>
</tr>
<tr>
<td>Rosenbaum, 1991</td>
<td>Coach for peak performance, manage organisational interference, orchestrate professional development of subordinates, expand individual productivity through team work and facilitate self-management.</td>
</tr>
<tr>
<td>Geaney, 1995</td>
<td>Problem solving, managerial identity, achievement orientation, strong influence.</td>
</tr>
<tr>
<td>Bloom, 1996</td>
<td>Technical competence, political and people skills, handle obstacles, maturity to accept full project responsibility, stamina and sense of humour.</td>
</tr>
</tbody>
</table>

Source: Developed for this research

Technical leadership in the context of this research refers to the leadership of employees engaged in technical/scientific occupations, such as engineering, information technology and research and development (R&D) activities. According to Thite (1997), scientific/technical employees, particularly in the IT industry, possess certain distinguishing personality traits and occupational related characteristics, such as high need for autonomy, achievement orientation, first and foremost loyalty towards profession and second towards organisation, craftsmanship approach, association with logic or absolutes, project orientation, bifurcated career path, youth, mobility, isolation from corporate society, intenseness and sensitivity towards work.
Therefore, technical leaders in a high-technology world need to be "High-touch", i.e. he must possess certain distinguished skills and competencies, so that he is able to handle the group of such dynamic personnel.

Within the IT environment, several studies have highlighted the essential qualities and skills of IT project managers to ensure project success. Literature suggests, that the project manager should have in built flexibility and adaptability, preference for significant initiative and leadership, aggressiveness, confidence, persuasiveness, verbal fluency, ambition, forcefulness, effectiveness as a communicator and integrator, broad scope of personal interests, poise, enthusiasm, imagination, spontaneity, ability to balance technical solutions with time, cost, and human factors, well organized and disciplined, a generalist rather than a specialist, ability and willingness to devote most of his/her time to planning and controlling, ability to identify problems, willingness to make decisions and take responsibility for such decisions.

Studies revealed that leadership style and competence of the project manager has a direct and measurable impact on the performance of the organization or business. Thus, the researcher tries to study whether the leadership style and competence of the project manager is a success factor on projects and whether different styles are appropriate on different types of projects.

Considering the dearth of empirical work on technical leadership, this study looked at general leadership literature and focused the research work on 'technical transformational leadership' which is said to be a new paradigm in leadership research in IT project management.

2.7.2 Relevance of Transformational Leadership to Technical Personnel
Transformational leadership would mostly appeal to personnel who are well educated and who desire challenges at their work place, to enhance their professional growth and development. Bass (1985) believed that transformational leaders with the superior technical skills will be able to make better use of rational appeals to followers, whereas the leader with less technical skills will rely on more emotional appeals to followers. It is also observed that the transformational leaders are technically more competent. They will make each mistake into a learning experience, both for themselves and for their followers. They will not commit the same mistake repeatedly.
A study of transformational leadership and the performance of project teams in three R&D organisations found that transformational leadership delivered higher project quality and budget/schedule performance ratings. However, the study also indicated that different leadership behaviours are required depending on the type of R&D work performed in a project team. Inspiration and intellectual stimulation (transformational leadership traits) of team members are more effective in research projects which are involved in basic scientific and applied research whereas task allocation and coordination are more important in development projects involved in product/process development and technical service.

Keeping in mind, the high degree of technological obsolescence in high-technology oriented organisations, successful management of technological change is an important challenge to a technical leader. Studies, found that a transformational leadership approach that focus on people related problem-solving skills, with the introduction of technological changes, is more likely to be effective in overcoming barriers to change, than a transactional leadership approach that concentrates more on technical problem solving than issues of people and organisation.

Recent studies have also investigated the effect of the project leader’s style on the speed of new product development. It is indicated that a participatory style of leadership is associated with faster product development, because by delegating the problem to highly skilled and knowledgeable team members, a leader can always take advantage of their expertise. However, the study suggested that the effectiveness of leadership style depends upon the types of projects, its size and whether the technology for the project was acquired from outside and most importantly on the project life cycle. Therefore, the next research question in this study relate to whether there is a difference in the effectiveness of the leadership styles (transformational, transactional, passive/avoidant and technical) of the project manager at various phases (initiation, planning, execution, monitoring & control and closure) of the project life cycle.

2.8 Information Technology Projects

An information technology project is a project that has an assigned start and end date, often with specific milestones and goals to be met during the development cycle.

There is a widespread dissatisfaction about the performance of Information Technology (IT) projects. Report says that nearly, 15% of all software development projects never delivers
anything, in which overruns of 100-200% of cost are common. The projects that are delivered suffer from problems like inordinate delays, excessive budget over-runs, post-implementation testing, user dissatisfaction, late deliveries, poor reliability, maintenance problems etc.

2.8.1 Definition of Project Success
A project will be perceived as an ‘overall success’ if, the project meets the technical performance specifications, mission and there is high level of satisfaction concerning the project outcome among key project team members as well as key users or client of the project.

Project success can be described, as integrating four basic facets. It is generally considered to be successful if it:

- Comes in on-schedule (time criterion).
- Comes in on-budget (monetary criterion).
- Achieves basically all the goals originally set for it (effectiveness criterion).
- Is accepted and used by the clients for whom the project is intended (client satisfaction criterion).

Standish Group's Chaos report divides the project into three categories:

1. Resolution Type 1/Successful Project
2. Resolution Type 2/Challenged Project
3. Resolution Type 3/Failed Project

A successful project, is a project whose solution has been delivered and it meets its success criteria (deadlines, cost, technical efficiency, scope and overall satisfaction) as initially specified or within a range acceptable to the organisation.

A project is considered as challenged, if a solution was delivered but the team did not meet all the project's success criteria within the acceptable ranges. Like; the project’s return on investment (ROI) was low, the project exceeded its time limit or its specified cost etc.

A Failed project, is a project in which the project team did not deliver a solution and was cancelled at some point of time during the development cycle.

In addition, to defining the concept of organizational projects, a comparative analysis on various factors that are considered critical to the success of a project are identified as the
steps that exactly lead to a "successful project". They are described in a ten factor model of Project Implementation Profile (PIP) by Pinto and Slevin in 1986.

2.9 Ten-Factor Model for Successful Project Implementation: PROJECT-IMPLEMENTATION PROFILE (PIP)

Project monitoring and control is a difficult and imprecise process. A project manager constantly look out for different cues and information, as they attempt to track their projects throughout the various implementation stages. Further, the more complex the project is, the project managers are more likely to be faced with technical, human and budgetary issues (or project critical factors). According to Pinto and Slevin (1986), as a result of the complexity involved in project management and the demands on the project manager's time, the project management process has seen the rise and increasing acceptance and use of a wide variety of tracking systems. These systems are both computer-driven and manual and are intended to aid the project manager in keeping track of the variables that must be considered to ensure project success.

Though there are well-established project monitoring aids available such as project evaluation and review technique (PERT), gantt charts and critical path methodologies (CPM) which are extremely useful in helping project managers to keep a track of costs, schedules, performance of project sub-assemblies etc. still, sometimes the project managers ignore certain important, aspects of project management necessary for project success. These important aspects are the behavioural variables like: top management support, quality of personnel, client consultation and acceptance, which are also crucial for project success. Thus, a set of ten critical success factors for monitoring project performance that are crucial to a project success was developed by Pinto and Slevin in 1986. These factors are as follows:

1. **Project Mission:** Mission refers to the initial clarity of goals and overall directions for the project. The decision to develop and implement a new project requires, enormous amount of time, finances, human and material resources. Therefore, before such a commitment, it is important to have a clear, well-acknowledged vision of the goals or mission underlying the project.

2. **Top Management Support:** It refers to readiness of the top management to afford necessary resources and support the project. It also implies supporting a project in times of crisis and adverse circumstances.
3. **Project Schedule/Plans:** This refers to a well laid-out and thorough specification of the individual action plan. It is important that all required activities must be properly scheduled. Further, there must be future plans, to determine when vital and scarce resources, like: human, budgetary and material will be required. Finally, it is important that a measurement device, should be in place to assess the actual progress of implementation against standard schedule projections.

4. **Client Consultation:** The client is the one, who is the ultimate, intended user of the product. As, a project is planned for the client's benefit, it is essential that communication and consultation with the clients occur at the beginning and also throughout the product development and project implementation process. It is important that clients must be kept apprised of the status of the project and any changes made there off. Also, the project team must be kept informed about the client's needs at different points of time.

5. **Personnel:** People are a very important ingredient for successful project implementation. It is necessary for the organisation to recruit or provide additional training to personnel in order to make them work effectively in the project team. An important assumption of researchers, is also associated with this factor. Pinto and Prescott (1988), perceive that in today’s context, in modern project organisations, having trained and qualified personnel is a rule rather than an exception. Therefore, here, they emphasize the importance of displaying ‘high touch’ leadership by the project manager, which is extremely crucial to motivate the project team members towards achieving project success.

6. **Technical Tasks:** Technical tasks refers to the availability of the required technology or technological resources to support project's development. Further, it required examine whether the personnel who are actually developing the project know and understand the latest technological methods. As, for effective project development, skilled people and suitable technology are equally important.

7. **Client Acceptance:** It refers to an attempt to ensure that the project is usable for the client and to deliver him satisfactory solutions. In addition, to performing the technical and administrative activities necessary to develop the project, the project team must also act in a marketing/selling role to gain client acceptance.
8. **Monitoring and Feedback:** It refers to the process of examining the project progress at each stage of project implementation by the project manager and receiving feedbacks. These project control mechanisms allow the project manager to face any kind of potential problems and to implement corrective measures beforehand and prevent deficiencies from being ignored. The better are the control processes, the more the probability, that the final project will retain high quality.

9. **Communication:** It is a basic component for project success throughout the development process. Project team members have to engage in communication within themselves, with clients and with the parent organization. It is important that there is transfer and exchange of relevant information among these three major players in the project implementation process. Further, the project manager should ensure that there is a suitable network, to convey all necessary information concerning the project to each project stakeholder.

10. **Trouble shooting:** Almost, all the projects require continuous fine tuning and modification throughout their implementation process. Therefore, trouble shooting, refers to the readiness of contingency plans, systems or procedures, in order to handle unexpected crises and deviations from plan.

Pinto and Prescott (1988) concluded in another study, that the importance of the critical success factors change significantly according to various phases of the project life cycle. *Therefore, the next research question in this study relate to whether there is a difference in the criticality of the success factors of the Project Implementation Profile (PIP) at various phases (initiation, planning, execution, monitoring & control and closure) of the project life cycle.*

As, successful projects are those projects, who meet its success criteria, therefore, *the next research question in this study relate to whether successful projects exhibit robust presence of these composite ten critical success factors of the Project Implementation Profile (PIP) in comparison to challenged and failed projects.*
2.10 Summary

This chapter presented a brief literature review of leadership theories that have evolved from the great man theory in the early 1900s to trait theory, behaviour theory, contingency theory, and now to the full range of leadership that includes, Transformational Leadership, Transactional Leadership, and Passive/Avoidant Leadership.

Transactional Leadership focused on day-to-day activities, operations, efficiencies and motivated employees by appealing to individual desires. Passive/Avoidant Leadership explains a totally “hands off” management and took no responsibility for the actions of the subordinates. Transformational Leadership was an extension of Transactional Leadership that strive to motivate and inspire followers to develop themselves further and to do more than they themselves thought was possible.

Since, the study is a replication of Bass and Avolio’s (1990) model on the full range of leadership, the various components of the model, the measurement instrument created by Bass i.e. the MLQ (5X-Short Form) to measure the effect of the three independent variables transformational leadership, transactional leadership, and passive/avoidant leadership upon the three dependent variables of extra effort, effectiveness and satisfaction were discussed in detail. The current research study is conducted in the information technology environment, therefore the literature review then covered the nature and importance of technical leadership and finally, the literature on the critical success factors in information technology (IT) projects was discussed.

The next part of the literature review presents an introduction to information technology, evolution and definition of software, information technology industry and software development industry of India, concepts of project management, project management life cycle, software development life cycle, methodologies for quality assurance etc.
Chapter 2- Literature Review

PART- II

2.1 Overview

Part-I of this chapter presented the review of literature on the topic of leadership by discussing the nature and definition of leadership, concepts of leadership and management, various leadership theories, styles and leadership behaviour measurement instrument. It also addressed leadership in Information Technology environment and highlighted the critical success factors for IT projects along with the ten factor model of Project Implementation Profile (PIP).

The purpose of the second part of this chapter is to provide an introduction to information technology, evolution and definition of software, information technology industry and software development industry of India, concepts of project management, project management life cycle, software development life cycle, methodologies for quality assurance etc.

This part begins with an overview of this part of the chapter in Section 2.1. Section 2.2 covers information technology while Section 2.3 and Section 2.4 discusses evolution and definition of software and evolution of software development industry. Section 2.5, Section 2.6 and Section 2.7 considers information technology industry of India, software development industry of India and NASSCOM. Software development industry of Pune, concepts of project management and software project management are discussed in Section 2.8, Section 2.9 and Section 2.10 while establishment of relationship between PMLC and SDLC and process improvement methodology for quality assurance are presented in Section 2.11 and Section 2.12. Section 2.13 and Section 2.14 throws light on managerial aspects of software project management and leadership in project management. This is followed by a summary of this part of the chapter in Section 2.15. Section 2.16 presents the research gaps after studying the issues from both the parts and highlights them.

The diagrammatic presentation of the structure of Chapter Two: Part-II is shown in figure 2.1.

Figure 2.1: Structure of Chapter 2: Part- II
2.2 Information Technology

2.3 Evolution and Definition of Software

2.4 Evolution of Software Development Industry

2.5 Information Technology industry of India

2.6 Software development industry of India

2.7 NASSCOM

2.8 Software development industry of Pune

2.9 Concepts of Project Management

2.10 Software Project Management

2.11 Relationship between PMLC and SDLC

2.12 Process improvement methodology for Quality Assurance

2.13 Managerial aspects of Software Project Management

2.14 Leadership in Project Management

2.15 Summary

2.16 Research Gaps Identified

Source: Developed for this research
2.2 Information Technology

*Information technology essentially refers to the digital processing, storage and communication of information of all kinds.*

**UNESCO** defines, Information Technology as “scientific, technological and engineering disciplines and the management techniques used in information handling and processing information, their interaction with man and machine and associated social, economic and cultural matters”.

Information Technology (IT) has made possible information access at gigabit speed. It had created a positive impact on the lives of millions. Today, a country’s IT potential is dominant for its walk towards global competitiveness, healthy gross domestic product (GDP) and meeting up the energy and environmental challenges.

Information Technology (IT) and Information Technology enabled Services (ITES) sectors go hand-in-hand in every aspect. IT and ITES industry is divided into four major segments basically, IT services, business process management (BPM), software products and engineering services and hardware.

*In this research study, the researcher has focused only on the software segment of Information Technology (IT), which is further being elaborated.*

2.3 Evolution and definition of software

Research says, that the term ‘software’ was created in the late 1950s and till then software was considered to be an integrated part of the computer hardware. According to Peterson (2000), it was formulated by Princeton University Professor John W. Tukey in an article, published in “The American Mathematical Monthly” in January 1958, which became a user-friendly term for the computer programmers who were using terminology ranging from ‘computer program’ to ‘code’.

2.3.1 Software Definition

**The America Heritage New Dictionary of Cultural Literacy, describes software as** ‘the programs and instructions that run a computer, as opposed to the actual physical machinery and devices that compose the hardware’.
A simple definition of software by Pressman (1997), describes it as: ‘Instructions (computer programs) that when executed provide desired performance, data structures that enable the programs to adequately manipulate information and documents that describe the operation and use of the programs’.

Peter (1986), defines software as follows; ‘At a general level of computer software generally consists of a set of instructions and data which is read, interpreted and executed by control units of a software system. This includes an enormous set of products and services but have similar sets of logical instructions but performing different functions and applications’.

According to Dictionary.com, software combines lines of source code written by humans with the work of compilers and assemblers in executing machine code.

Thus, 'IT software' means any representation of instructions, data, sound or image, including source code and object code, recorded in a machine readable form and capable of being manipulated or providing inter activity to a user by means of an automatic data processing machine falling under heading 'IT Products' but does not include 'Non IT Products'.

2.3.2 Classification of Software
Software is classified into two broad categories; system software and application software.

System software: is the software used to manage and control the hardware components and which allow interaction between the hardware and the other types of software. The most obvious type of system software is the computer's operating software but device drivers are also included within this category.

Applications software: (also known as 'apps') are designed to allow the user of the system complete a specific task or set of tasks. They include programs such as web browsers, office software, games and so on. They are usually the reason you bought the computer system in the first place and aren't concerned with the management or maintenance of the system itself.

Apart from these two, there is Utility software which is as software such as anti-virus software, firewalls, disk defragmenters and so on which helps to maintain and protect the computer system but does not directly interface with the hardware.
'IT Service' is defined as any service which results from the use of any IT software over a system of IT products for realizing value addition.

2.4 Evolution of Software Development industry
The software industry came into existence in late 1960's when IBM first unbundled the software from its famous IBM 370 mainframe computers. In 1970's with the introduction of mini computers and then subsequent birth of personal computers in 1980's, an independent software industry got stimulus. The increased use of computers and availability of mini and personal computers led to the development of industry and shrink wrap software packages for commonly used business functions. Many companies were established with the development of software as their main business.

The real technology advancement related events occurred and history was created in the period beyond 1995. In this period, the software industry got attention and gained limelight of all world economies and became ‘sunrise industry’.

The emergence of internet and dot com era actually unveiled real strength, spread and growth of the software industry, which is unprecedented and unparalleled in the modern history in many respects.

2.5 Information Technology industry of India
2.5.1 Evolution of Indian Information Technology industry
Information Technology (IT) defines an industry that uses computers, networking, software programming and other equipment and processes to store, process, retrieve, transmit and protect information.

The first computer came to India in the year 1957, with a lot of resistance of fear of loss of job. It was initially used by scientists and researchers for solving mathematical problems in research and national laboratories. With the development of storage technologies and network in around 1970's, it soon became popular in business houses for ‘paperless’ office work. The IT departments within the organisations started looking after computational applications such as accounting, salary, inventory optimization etc. using mainframe computers, proprietary system software and customized applications. Tata Consultancy Services (TCS) was the first IT company in India established in 1969, which mostly focused on sophisticated imported mainframe machines and automation applications, followed by WIPRO,
International computers limited (ICL), Data Centre Management (DCM) in the decade of 1970.

Internet was the next revolution which has changed the way we do business to a large extent. Basically internet is the huge network of computers all over the world. It is the network of networks, which share a common set of communication protocol between the computers in the network. Internet came to India after 1992, almost at the same time when India opted for open economy through globalisation. It has revolutionized the business world to do business anytime, anywhere with speed of light.

Today, information technology is playing a dominant role in almost every field. Computers are already placed in railways, air reservations, banking, insurance, billing for telephone and electricity thereby reducing the drudgery of work and increasing the productivity and efficiency. It is also used in the areas of weather forecasting, radio astronomy, molecular biology and aerodynamics for achieving faster results, better accuracy and more precision. Other areas, where IT has made greater impact are electronic governance, modernization of office environment, crime detection and telemedicine.

Information Technology (IT) industry in India is one of the fastest growing industries. Indian IT industry has built up valuable brand equity for itself in the global markets. IT industry in India comprises of software industry and information technology enabled services (ITES), which include business process outsourcing (BPO) industry. India is considered as a pioneer in software development and a favourite destination for IT-enabled services. Over a period of time, India has established itself as a preferred global sourcing base in these segments and they are expected to continue to fuel growth in the future.

Indian IT and ITES companies have created global delivery models like, onsite, near shore, offshore, entered into long term engagement with customers, expanded their portfolio of services offerings, extended service leading to quality and innovation and also keeping the cost under control, evolved their pricing models and have tried to find sustainable solutions to various important issues such as risk management, cost management, human capital attraction and retention etc.
2.5.2 Range of Service Offerings

Passengers travelling by many airlines, like: American Airlines, Swissair or Singapore Airlines may not realize, the fact that they need to acknowledge the software companies in India, to run these aircrafts on time. Computers on the London underground railway station similarly need to be grateful to the Indian software companies for providing services efficiently. Likewise, millions of people holding bank accounts in various banks including Citibank, American Express, Deutsche Bank and Hong Kong & Shanghai Bank need to thank many Indian software companies for providing quick software to keep a track record of their receipt and disbursement of cash promptly.

The range of services offered by the Indian IT and ITES industry to these global corporations range from simple tasks to increasingly complex activities and span across the entire value chain of a typical organisation.

The figure 2.2, below explains the range of services offered by Indian IT and ITeS industry.

**Figure 2.2: Range of Service Offerings from Indian IT and ITeS industry**

<table>
<thead>
<tr>
<th>What gets sourced</th>
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<tbody>
<tr>
<td><strong>Information Technology:</strong></td>
</tr>
<tr>
<td>• Information Technology Services.</td>
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<tr>
<td>• Research and Development and Software Products.</td>
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<tr>
<td><strong>Business Process Outsourcing:</strong></td>
</tr>
<tr>
<td>• Customer Interaction Services.</td>
</tr>
<tr>
<td>• Data entry and Transaction Process.</td>
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<tr>
<td>• Content Development</td>
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<tr>
<td><strong>Knowledge Services and Engineering Design:</strong></td>
</tr>
<tr>
<td>• Data Mixing.</td>
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<tr>
<td>• Performance Analysis.</td>
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<tr>
<td>• Financial Modelling.</td>
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<tr>
<td>• Research.</td>
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<td>• Design.</td>
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<tr>
<td><strong>Talent:</strong></td>
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<tr>
<td>• Internal Audit.</td>
</tr>
<tr>
<td>• Management.</td>
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<tr>
<td>• Traders.</td>
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<tr>
<td>• Internal Consultants.</td>
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</tbody>
</table>

People ➔ Projects ➔ Processes ➔ Products

**Source:** India Brand Equity Foundation (2006), Information Technology, pp.3
2.5.3 Role of Information Technology Industry in India's growth and development

‘Information technology added with India's talent is equal to Indian tomorrow (IT+IT=IT)’, said Narendra Modi, Hon. Prime Minister of India.

This phrase certainly reflects the strong role IT plays to foster the economic growth and development of the nation.

The Indian IT industry has been steering the growth of the Indian economy like no other industry in the past by generating jobs, pushing exports, attracting foreign direct investment, creating wealth, boosting foreign exchange reserves, and contributing in many other visible and invisible ways. It has grown at an incredible rate of 50% per annum over the last few years and has the potential to grow even further and faster. It is highly export orientated and extremely knowledge intensive.

Information technology in India is an industry which consists of two major components: IT Services and Business Process Outsourcing (BPO). This industry has been one of the key driving forces fuelling India's economic growth. According to NASSCOM, the sector has increased its contribution to India's GDP from 1.2% in 1998 to 9.5% in 2015. It aggregated revenues of US$ 146 billion in 2015, where export and domestic revenue stood at US$ 98 billion and US$ 48 billion respectively, growing by over 10%.

Information technology is playing an important role in India today and has transformed India's image from a slow moving bureaucratic economy to a land of innovative entrepreneurs. The industry has not only transformed India's image on the global platform, but also fuelled economic growth by energizing the higher education sector (especially in engineering and computer science). It has employed almost 10 million Indians and hence, has contributed a lot to social transformation in the country.

Furthermore, Indian firms, across all other sectors, largely depend on the IT & ITes service providers to make their business processes efficient and streamlined. The Indian manufacturing sector has the highest IT spending followed by automotive, chemicals and consumer products industries. Indian organisations are turning to IT to help them grow business in the current economic environment. IT is seen as a change enabler and a source of business value for the organisations.
The Indian IT-business process outsourcing (BPO) sector, including the domestic and exports segments, continue to grow from strength to strength, witnessing high levels of activity both onshore as well as offshore. The companies continue to move up the value-chain to offer higher end research and analytics services to their clients.

The IT sector in India is generating 2.5 million direct employment. India is now one of the biggest IT capitals of the modern world and all the major players in the world IT sector are present in the country.

The major cities that account for about nearly 90% of the sector's exports are Bangalore, Chennai, Kolkata, Hyderabad, Trivandrum, Noida, Mumbai and Pune. Earlier, in order to cope up with the infrastructure cost the software export industry shifted from Bombay to Bangalore and now it is considered to be the Silicon Valley of India because of its leading IT exports. Exports dominate the industry and constitute about 77% of the total industry revenue. However, the domestic market is also significant with a robust revenue growth. The industry’s share of total Indian exports (merchandise plus services) increased from less than 4% in FY 1998 to about 15% in FY 2015. According to Gartner, the "Top Five Indian IT Services Providers" are Tata Consultancy Services, Infosys, Wipro, HCL Technologies and Tech Mahindra.

*Since, the main focus of the present research is Indian software industry, therefore the researcher would try to explain the evolution of software industry in India.*

2.6 Software Industry of India

2.6.1 Evolution of Software Industry in India

India was motivated to develop self-sufficiency in computers and electronics largely by national security concerns related to border conflicts with China and Pakistan. The main vehicle chosen to gain access to advanced computer technologies was negotiation with multinationals, primarily IBM, which dominated the computer market in India (from 1960-1972, IBM accounted for over 70% of all computers installed in India). From 1966 to 1968, the Indian government tried to get IBM to share equity with local capital in its Indian operations. This lack of authority and technical competence left the government unable to negotiate with the MNCs or to regulate the IT sector effectively. Thereby, the government announced the formation of a separate Department of Electronics (DOE) and a new Electronics Commission.
One of the first steps taken by the DOE, was the establishment of the Santa Cruz Electronics Export Processing Zone (SEEPZ) near Bombay. Foreign and Indian investors were offered incentives to establish an export base in India, including tax breaks, cheap land, duty-free import of inputs and a streamlined permit process. In return, the government required that all or most of the production be exported and that Indian components be used as much as possible.

A second step was the creation of the state-owned ECIL (Electronics Corporation of India Ltd.) for the production of mini computers. ECIL got almost all of the government's computer development funding and the DOE made it very difficult for private competitors to get operating licenses. The government’s plan was to allow imports of mainframes and large mini computers, give the small mini computer market to ECIL and allow private firms to compete in the micro sector. With this support, ECIL's market share ranged from 40% to 53% of the computer installations in India between 1973 and 1977. However, by the end of the decade, ECIL had failed to make a computer that was technologically sophisticated, price competitive or which could be delivered on time.

The third action taken by the Electronics Department and Commission was to once again challenge the position of the multinationals. Using FERA regulations, the government began to pressure IBM and ICL to dilute their equity to 40% in their Indian operations. ICL agreed but IBM refused. Negotiations with IBM went on through 1976 and 1977, but before they took place, two important developments occurred. In 1975, U.S. computer maker Burroughs entered into a joint venture with Tata Consultancy Services, to export software and printers from SEEPZ. This meant the government had two MNCs (ICL and Burroughs) in the country on its own terms, which probably encouraged the government to take a hard line towards IBM. Also in 1975, the Indian cabinet approved a proposal to set up the state-owned Computer Maintenance Corporation (CMC) with a legal monopoly on the maintenance of all foreign computer systems in the country. This reduced the advantage IBM had with users as a result of its superior service capabilities. Now users would have to depend on CMC no matter whose system they purchased. This made IBM to quit India. Its exit was a seminal event and illustrated the extent of the government's ability to exert its power over multinational corporations and direct the development of the IT industry in India.

One effect of IBM's departure was to open up the market to a number of competitors, including ECIL, ICL and the Tata-Burroughs joint venture. ECIL dominated the market for a
time, because of the strong government support, but by the end of the 1970s, local private firms such as HCL, DCM and ORG had emerged to control most of the market. Soon, these companies had superseded ECIL as the major computer suppliers to the Indian market.

2.6.2 Evolution of Software Exports

Dr. Nirmal Jain, Senior Vice President of Tata Consultancy Services (TCS) who answered, when asked why TCS grew at such a high rate, he said, “We were there first.” definitely, they had the advantage of establishing themselves first in the industry early on and established a reputation for quality by quickly collaborating and branching.

During the 1950s and 1960s, there was no software industry in India. India exported its first software services and products in the mid-1970s. Although India was among the first developing nations to recognize the importance of software, the key driver behind exporting software was foreign exchange.

The first software exporting company from India was Tata Consulting Services (TCS) that started operations in 1968. Fortunately, after a few local orders, TCS bagged its first big export assignment in 1973-74, when it was asked to provide an inventory control software solution for an electricity generation unit in Iran. TCS also began doing outsourced application work for organizations such as Central Bank of India and Bombay Telephones.

The origin of software export industry in India can actually be traced to 1974, when the mainframe computer manufacturer, Burroughs, asked its Indian sales agent, Tata Consultancy Services (TCS), to export programmers for installing system software for a U.S. client. It was further activated by Bombay-based conglomerates which entered the business by supplying programmers to global IT firms located overseas. Their success owed to the innovative exploitation of a new global market opportunity and protection from multi-national corporations.

The industry originated under unfavorable conditions. Local markets were absent and government policy toward private enterprises was hostile. Import tariffs were high (135% on hardware and 100% on software) and software was not considered as an “industry”, so the exporters were ineligible for bank finance. While protection led to labour exports, it slowed the inflow of new skills into India. This protected environment restricted the growth of project management and domain skills thereby and despite being access to a large pool of programmers, the industry could not grow in value-addition.
During this period, TCS had also developed a hospital information system in UK along with Burroughs Corporation and it became a role model for other Indian IT companies to follow in the 1980s.

After 1984, the entrepreneurship climate in the IT arena started gaining ground and the Indian software industry, soon realized that its advantage lay in software, rather than hardware development. During this phase, mainframe-based programming and manufacturer specific operating systems and languages gave way to workstation-based programming and standard operating systems and high-level languages. These changes modularized the programming function, i.e., programming could henceforth be done independently of the hardware platform and from the other functions of creating software, such as system design. This, along with policy reforms that reduced costs of imported hardware and software, caused the Indian software industry to shift from supplying programmers i.e. “body shopping” services to offshore software development products.

2.6.3 The New Entrepreneurial Climate
During the 1980s, thousands of Indian programmers trained at the Indian Institutes of Technology (IIT) and the Indian Institutes of Management (IIM) went to the US in the latter half of 1980s and early 1990s, either as students or as software professionals. Many of them took up employment in the US and rose to high-level positions. Many also turned to become entrepreneurs both in USA and in India.

During this period, a new wave of IT entrepreneurship began to take roots in India. Companies like Infosys, Wipro and Satyam were started. These companies were run along the lines of those in the US as, they focused on providing software services with special attention given to training, quality and good working conditions. Thus, at the beginning of 1991, the scene was set for the Indian software industry to gain recognition in the global software arena. Several critical factors were in place: A large number of well-trained, technically-proficient, English- speaking manpower; the presence of excellent education institutions to train software professionals; Indian programmers familiar with modem operating systems; IT programmers' ability to work at all areas of computing from compilers to applications programming; increasing global familiarity of Indian software capability; Indian immigrants and expatriates in the US occupying positions of influence in research labs and corporations, advocating Indian software; improvement in the Indian IT infrastructure.
The main competitive advantage for Indian companies was obviously the cost. Companies looking for software services realize that India has a large number of technically talented English speaking people available at a lower cost. Thus, the companies wish to use this talent to undergo their software projects at a lower cost. The total charges for a software developer in India varied from USD 16,000 to USD 24,000 annually whereas the corresponding charges of sending the same developer to the US varied between USD 32,000 and USD 42,000 annually. Comparing, this to the total cost of a US software developer (USD 60,000 to USD 95,000 yearly) in 1980, the savings were clearly quite significant.

During this time, both private and governmental efforts at software training gained and renewed strength. S. Ramani, a scientist at TIFR, founded the National Institute of Software Technology (NIST) with government support. The National Institute of Information Technology (NIIT) was also started by a group of entrepreneurs around the same time.

According to Ramani and Venkatakrishnan (2004), these two organizations provided non-traditional software training to thousands of aspiring Indians. These efforts were in addition to software training conducted in India's many engineering colleges, especially the IITs. Despite the tough policy with respect to imports, by early 1980s, India was the only developing nation to have significant software export. NASSCOM played an aggressive role in promoting the Indian brand abroad. In some ways, during this period, India was building a launching pad for the eventual take off of its software service industry.

The above description of evolution and establishment of software export industry in India can be understood with the help of the below business models.

2.6.4 Business Models Used For Establishing Software Development Industry in India
There were two types of business models which are been used for establishing software development industry in India, they are as follows:

1. On shore software development model
2. Off shore software development model

The On-shore Software Development Model
In the beginning, Indian IT industry leaders strategically placed key senior persons in upcoming Unites States IT industry and earned dollars and experience. This helped the Indian IT industries to get experienced persons when it was ready to take off. This is popularly known as On-shore software development business model. At the same time many of the
talented young engineers found opportunities in US to work on IT projects. Some of the firms in India were engaged to provide low cost IT professionals to US at that time. These professionals earned dollars and experience and created a brand of low cost Indian IT software professionals in the US market. On, their return to India, Indian IT industry could get experienced and talented professionals without much effort. The onshore software development model is shown in figure 2.3, below.

**Figure 2.3: On-shore Software Development Model (Body shopping model)**

![On-shore Software Development Model](image)

**Source:** Developed for this research

In phase I, there was export growth, in the relatively low level value chain work such as coding, application development, management, change of platform, data base creation etc.

**The Off-shore Software Development Model**

In phase II, Indian IT industry developed the domain experience, superior delivery and was able to capture value in the market. In this phase, offshore software development model was successfully used by Indian leaders. In this phase, large number of IT projects were outsourced to India. With the help of talented low cost IT professionals available in India on a large scale, IT leaders could complete these projects successfully. Most of these projects were on time and on money basis. In this phase, IT leadership focused to build and develop modern infrastructure, quality norms and rigid frame work and systems. Many of Indian IT companies opted for CEI-CMM level five certification in this phase. This business model is shown in figure 2.4, below.
Infosys was established in 1981 in Pune, with an idea of offshore software development model in mind. Thus, by following the off shore software development model by TCS, WIPRO and Infosys, the Indian software industry began to take shape. The main hurdle was to get licenses for mainframe computers and gain trust of international customers about Indian ability to do the work. This is where Government of India took initiative and formulated high power IT committee. The reports of this committee enabled to establish software parks and provided tax concessions to budding IT industry.

2.6.5 Present State

According to Bill Gates, Chief Executive, Microsoft Corporation, Redmond, US, 'India is a software superpower in the making'.

The above statement is definitely true. Today, the Indian software industry is in its third phase which is definitely the phase of take-off. Most leading companies are operating in the high-end software services business and are also making efforts to enter the products segment. A new breed of companies led by second generation software entrepreneurs, are setting up product-oriented companies. The industry has weathered ups and downs in the global market, maintaining a high rate of growth. The industry moved center stage in the domestic media because of its visibility in the United States, high market capitalization and wealth creation for its employees. It is a source of national pride and as a consequence continues to attract disproportionate government attention. The government set ambitious software export targets and has provided the policies to enable the industry to achieve those targets. Software companies are increasingly being recognized for their leadership in
adopting best practices in management by the media. Indian companies have fine-tuned the “offshore model” and project their brands as service companies. Companies have moved further up the value chain, improving productivity, targeting new geographies, vertical domains and businesses.

2.7 Role of the Industry Organization: NASSCOM

As IT industry started taking roots in India, National Association of Software and Services Companies (NASSCOM), India's software industry association was founded in the year 1988, to facilitate business and trade in software services and to encourage advancement of research in software technology. It is a non-profit organisation registered under Indian Societies Act 1860. Currently NASSCOM is headquartered in New Delhi with registered offices in Mumbai, Chennai, Hyderabad, Bangalore, Pune and Kolkata.

**NASSCOM is the premier trade body and is equivalent to Chamber of commerce for IT and BPO industry in India.** It is the global trade body with more than 1200 members from across the world.

NASSCOM is committed to work proactively to encourage its members to adopt world class management practices; built and up hold highest standards in quality, services innovation and remain competitive in today's rapidly changing technology landscape. NASSCOM's vision is to maintain India's premier position in the global offshore IT/BPO industry, to grow the market by enabling industry to hit the emerging opportunities and to strengthen the domestic market.

To achieve this NASSCOM is constantly raising the bar across processes and quality standards within its member companies and making them partners of choice for customers across the globe. It also enables Indian IT/BPO industry to evolve in accordance with the rapidly changing technological landscape by adopting, implementing and creating world class practices.

**2.7.1 Aims and Objectives of NASSCOM**

NASSCOM endeavors to narrow the digital divide in India and enable all citizens to enjoy benefits of IT, through NASSCOM foundation (NF). The NF has been set up with a vision to leverage information and communication technologies (ICT) for empowering and transforming the lives of the underserved. One of the reasons for formation was the commitment of NASSCOM and its member companies to promote social development
through the application of ICT. The objective is to take forward this task in a dedicated and focused manner.

NASSCOM's seven fold strategy towards achieving these objectives are:

1. Strengthen the brand equity of India as a premier global sourcing destination.
2. Partner with government of India and state governments in formulating IT policies legislations.
3. Partner with global stake holders for promoting the industry in the global market.
4. Deliver world class research and strategic inputs for the industry.
5. Expand quality and quantity of the talent pool in India.
6. Encourage and facilitate members to uphold world class quality standards and enhance operational efficiency.
7. Aim to uphold intellectual property rights of its members.

NASSCOM has over 1500 members, of which over 250 are companies from the United States, UK, EU, Japan and China. NASSCOM acts as an advisor, consultant and a coordinating body for the IT/BPO industry in India and has been the proponent of free trade, arguing for zero tariff protector laws, deregulation of telecom market, creation of software technology parks and the private sector participant in the education system are some of its significant measures.

Thus, NASSCOM has been a dominant force for exerting pressure for changing policy reforms, including rules limiting access to capital markets, issuance of stock options, easing rules on foreign currency transactions and improving telecom infrastructure. It played a significant role in establishing a brand image for India in the global software services markets by participating in global trade fairs and events and organizing learning events in India that feature prominent experts from major markets. *Through its annual reports, NASSCOM has become the most reliable source of data and information about the Indian software industry. Therefore, the researcher has focused the research work on the companies registered with NASSCOM of Pune origin only.*

### 2.8 Software Industry of Pune

Nowadays, Pune is the hot destination for IT and ITES companies. It is the home to well-known giants of the Indian software industry like Wipro, Infosys, Mahindra Satyam, Tata Technologies, TCS, Kanbay, Veritas, Cognizant, PCS and Mahindra British Telecom.
According to a recent IDC report, Pune has the highest PC penetration among households. It is also, known as the ‘Oxford of the East’ and is considered as the ‘Education capital’ of India, being the home for several renowned educational institutions. A further feather in the cap is the ‘Indian Institute of Software Engineering’ coming up in association with Carnegie Mellon University, USA.

Close proximity to the financial capital (Mumbai) and rapidly improving infrastructure have made Pune one of the most prominent commercial destination in the country today. The government of Maharashtra has undertaken the ambitious project of developing the Mumbai-Pune Knowledge Corridor, thereby creating a natural home for companies from all over the world, seeking to set up their IT or ITES activities in a safe, business-friendly and progressive environment with world-class facilities and infrastructure, with a long term perspective. It is fast emerging as an InfoTech hub, challenging cities like Bangalore and Mumbai to emerge as one of the top contenders for the ‘Silicon Valley of India’ slot.

The above statement is supported by an article published in The Indian Express Pune - “Pune only behind Bangalore in software exports in India”.

The article states that, in India; Maharashtra has reached the number two position in IT exports and Pune region is the leading source of IT exports. The total software exports out of Maharashtra amount to Rs 51,760 crore, second only to Karnataka (Rs 80,000 crore). Among cities, Pune ranks second in the country in software exports after Bangalore. In the financial year 2012-13, Pune’s software exports were at Rs 29,589.25 crore. Pune is followed by Mumbai, which reported exports of Rs 21,811.13 crore.

According to Dr. Omkar Rai, Director General, Software Technology Parks of India (STPI), Karnataka leads the ranking in IT exports, Maharashtra is second followed by Tamil Nadu and then the NCR, which are followed by Andhra Pradesh and West Bengal (Kolkata). While Pune and Mumbai continue to have the major share in IT exports, other cities of Maharashtra are too, coming up on the IT export map. Prominent among them is Nagpur, which has seen exports of Rs 215.85 crore, Nashik is at Rs 112.36 crore, Kolhapur at Rs 46.80 crore and Aurangabad at Rs 5.56 crore. This takes total exports out of Maharashtra to Rs 51,76,000 crore. The ‘Pune-Mumbai Knowledge Corridor’ has shown impressive growth with the IT and ITES industry firmly entrenched in the two cities. STPI has recently shifted its western India headquarters from Mumbai to Pune, due to the growth shown by the city.
Dr. Rai, mentioned in a media interaction at the IT industry 2014 meet organised by the Software Exporters Association of Pune (SEAP) and NASSCOM in Pune that STPI is trying to reposition itself more seriously than before. STPI will play the role of incubator, assist in getting risk capital, help in marketing and filing of IPRs. It will also be offering product companies a differential tariff structure, to provide them the benefit of paying less lease rent than service companies. STPI is also in the process of revising its regulations to ease the entry and exit for start-ups and simplify procedures under the new national policies on IT and electronics. These revisions are being prepared by the government in consultation with the industry and will aid the start-ups registering under STPI.

In the report by, SEAP, Vice-President Prashant Pansare, ‘Pune has been one of the fastest growing cities in Asia and in India it’s the second largest growing IT destination after Bangalore. SEAP is playing a pivotal role to build an effective eco-system of software exporters, MSMEs, start-ups, innovators and allied segments to position Pune as the preferred IT destination. There have been major changes in the government IT policy and STPI regulations, affecting the productivity and competitiveness of the IT segment and the meeting between SEAP and NASSCOM was held to resolve these issues and highlight the concerns of the industry.’ He further added, that ‘The key focus at SEAP will be encouraging innovation, product development, entrepreneurship and start-up mentoring.’

According to, Abhijit Atre, member of the governing council of SEAP, STPI is creating 10 lakh sq ft space across its facilities in India for IT start-ups. Pune already has 40,000 sq ft of STPI space and 13,000 sq ft of this space is available for start-ups with plug-and-play facilities.

Thus, definitely Pune's prospects for IT exports is bright in the future, therefore it was an obvious choice for pursuing the research on the software development companies associated with Pune.

Now, since the research is done for the project management of the technical field, therefore after the introduction, evolution and general background the focus will move towards concepts of project management and the technical aspect of software development.

2.9 Project Management
Project management has been practiced since early civilizations. Until the beginning of twentieth century civil engineering projects were actually treated as projects and were
generally managed by creative architects and engineers. Project management as a discipline was not accepted. It was in the 1950s that marked the beginning of the 'modern project management era' and organizations started to systematically apply project management tools and techniques to complex projects. In the 1950s, Navy employed modern project management methodologies in their Polaris project. During the 1960s and 1970s, department of defense, NASA and large engineering and construction companies utilized project management principles and tools to manage large budget, schedule-driven projects. In the 1980s, manufacturing and software development sectors started to adopt and implement sophisticated project management practices. By the 1990s, the project management theories, tools and techniques were widely received by different industries and organizations.

As a discipline, Project Management developed from several fields of application including construction, engineering and defense activity. Henry Gantt, the father of planning and control techniques who is famous for his use of the Gantt chart as a project management tool and Henri Fayol, who is famous for his creation of the five management functions which form the foundation of the body of knowledge associated with project and program management; both of them are considered to be the two forefathers of project management.

The “software crisis” of the 1960s and 1970s due to high failure rate of software projects owing to over budgeting and late deliveries etc. led to the application of project management techniques in the software industry.

Good project management techniques cannot guarantee success, but poor project management on significant projects always leads to failure.

2.9.1 Project
A project can be defined as a temporary organization of people with a definite beginning and a pre decided end, undertaken to create a unique product, service or result. It can be of any size and duration.

According to wikipedia, “A project is a temporary endeavour designed to produce a unique product, service or result with a defined beginning and end (usually time-constrained, and often constrained by funding or deliverables, undertaken to meet unique goals and objectives, typically to bring about beneficial change or added value.”
Projects generally involve large, expensive, unique or high risk undertakings which have to be completed by a certain date, for a certain amount of money, within some expected level of performance. At a minimum, all projects need to have well defined objectives and sufficient resources to carry out all the required tasks.

Cleland and Kerzner, in, A Project Management Dictionary of Terms, states that, “A project is a combination of human and non-human resources pulled together in a temporary organization to achieve a specified purpose”.

According to Robert K. Wysocki, “A software development project is a complete undertaking by two or more persons within the boundaries of time, budget and staff resources that produces new or enhanced computer code that adds significant business value to a new or existing business process.”

2.9.2 Project Constraints
Projects need to be performed and delivered under certain constraints. These constraints are known to be the **scope, time and cost**. These are also referred to as the Project Management Triangle, where each side represents a constraint. One side of the triangle cannot be changed without impacting the others. A further refinement of the constraints separates product 'quality' or 'performance' from scope and turns quality into a fourth constraint.

**Time constraint:** refers to the amount of time available to complete a project. For analytical purposes, the time required to produce a product or service is estimated using several techniques. One method to identify tasks needed to produce the deliverables is work breakdown structure or WBS. The work effort for each task is estimated and those estimates are added into the final deliverable estimate. The tasks are also prioritized, dependencies between tasks are identified and this information is documented in a project schedule. Time is neither considered a cost nor a resource, since the project manager cannot control the rate at which it is expended. This makes it different from all other resources and cost categories.

**Cost constraint:** refers to the budgeted amount available for the project. Cost to develop a project depends on several variables like, labour rates, material rates, risk management, fixed assets and profit. When hiring an independent consultant for a project, cost will typically be determined by the consultant's or firm's per day rate basis multiplied by an estimated quantity for completion.
Scope/Performance constraint: refers to what must be done to produce the project's end result. Scope is requirement specified for the end result. It is the specification of what the project is supposed to accomplish and a specific description of what the end result should be. A major component of scope is the quality of the final product. Over the course of a large project, quality can have a significant impact on time and cost or vice versa.

Figure 2.5: Project Management Trade-offs

These three constraints are often competing constraints as increased scope typically means increased time and increased cost, a tight time constraint could mean increased costs and reduced scope and a tight budget could mean increased time and reduced scope. The discipline of project management is about providing the tools and techniques that enable the entire project team to organize their work to meet these constraints.

According to Project Management Body of Knowledge (PMBOK), “Project management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements. It is accomplished through the application and integration of the project management processes of initiating, planning, executing, monitoring & controlling and closing.”

Project management can also be understood as, a carefully planned and organized effort to accomplish a specific one-time objective. It includes developing a project plan, defining and confirming the project goals as well as objectives, identifying tasks and how goals will be achieved, quantifying the resources needed and determining budgets and timelines for completion. It also includes managing the implementation of the project plan, along with
operating regular 'controls' to ensure that there is accurate and objective information on 'performance' relative to the plan and the mechanisms to implement recovery actions where necessary. Projects usually follow major phases or stages like, feasibility, definition, project planning, implementation, evaluation and support/maintenance.

### 2.9.3 Project Management Life Cycle (PMLC)

According to PMBOK, the project manager or the organisation divide projects into phases to provide better management and control with appropriate links to the ongoing operations of the organisation. These phases are collectively known as the Project Management Life Cycle or Project Life Cycle.

It can also be referred as a logical sequence of activities to accomplish the project’s goals or objectives.

Project activities must be grouped into phases because by doing so, the project manager and the core team can efficiently plan and organize resources for each activity and also objectively measure achievement of goals and justify their decisions to move ahead, correct, or terminate. It is of great importance to organize project phases into industry-specific project cycles.

It comprises of **five** phases:

1. Project Initiation
2. Planning and design
3. Execution
4. Monitoring and controlling
5. Closure

**Project Initiation**

The initiation stage determines the nature and scope of the project development. If this stage is not focused well, the project will not be successful in meeting the business objectives. The key project controls needed here are an understanding of the business environment and making sure that all necessary controls are incorporated into the project. Any deficiencies should be immediately reported and recommendations should be made to fix them. The initiation stage should include a plan that encompasses the following areas:

- Analyzing the business needs/requirements in measurable goals.
• Reviewing of the current operations.
• Conceptual design of the operation of the final product.
• Equipment and contracting requirements including an assessment of long lead time items.
• Financial analysis of the costs and benefits including a budget.
• Stakeholder analysis, including users and support personnel for the project.
• Project charter including costs, tasks, deliverables and schedule.

Planning and Design
After the initiation stage, the system is designed. Occasionally, a small prototype of the final product is built and tested. Testing is generally performed by a combination of testers and end users and can occur after the prototype is built concurrently. Controls should be in place that ensures that the final product will meet the specifications of the project charter. The results of the design stage should include a product design that:
• Satisfies the project sponsor (the person who is providing the project budget), end user and business requirements.
• Functions as it was intended.
• Can be produced within acceptable quality standards.
• Can be produced within time and budget constraints.

Execution
The execution process consists of the processes used to complete the work defined in the project management plan to accomplish the project's requirements. The focus is on managing people, following processes and distributing information. It is essentially a guiding, proactive role accomplished by constant referral back to the project management plan.

Monitoring and Controlling
Monitoring and Controlling consists of those processes performed to observe project execution so that potential problems can be identified in a timely manner and corrective actions can be taken, to control the execution of the project. It means measuring the performance of the project to the project management plan, approving change requests, preventive actions and detect repair and managing changes. The key benefit is that project performance is observed and measured regularly at certain time intervals to identify variances from the project management plan.
Monitoring and Controlling includes:

- Measuring the ongoing project activities (where we are);
- Monitoring the project variables (cost, effort, scope, etc.) against the project management plan and the project performance baseline (where we should be);
- Identify corrective actions to address issues and risks properly (how can we get on track again);
- Influencing the factors that could overcome integrated change control so only approved changes are implemented.

In multi-phase projects, the Monitoring and Controlling process also provides feedback between project phases, in order to implement corrective or preventive actions and to bring the project into compliance with the project management plan.

Project Maintenance is an ongoing process, and it includes:

- Continuing support of end users
- Correction of errors
- Updates of the software over time

In this stage, auditors should pay attention to how effectively and quickly user problems are resolved.

Over the course of any IT project, the work scope may change. Change is normal and expected part of the process. Changes can be the result of necessary design modifications, differing site conditions, material availability, client-requested changes, value engineering and impacts from third parties, to name a few. Beyond executing the change in the field, the change normally needs to be documented to show what was actually developed. This is referred to as Change Management. Hence, the owner usually requires a final record to show all changes or, more specifically, any change that modifies the tangible portions of the finished work.

When changes are introduced to the project, the viability of the project has to be re-assessed. It is important not to lose sight of the initial goals and targets of the projects. When the changes accumulate, the forecasted result may not justify the original proposed investment in the project.
Closure
Closing includes the formal acceptance of the project and the ending thereof. It includes administrative activities such as collecting and finalizing all the paperwork required to complete and technical work to verify that the product of the project is acceptable. It also include any work related to transfer the completed project to those who will use it and to return all resources back to the performing organization and the customer. This phase consists of:

- **Project close:** Finalize all activities across all of the process groups to formally close the project or a project phase.

- **Contract closure:** Complete and settle each contract (including the resolution of any open item) and close each contract applicable to the project or project phase.

2.10 Software Project Management
2.10.1 Brief History
At the very initial stage, fifty software engineers from eleven different countries, “all concerned professionally with software” attended a NATO Science Committee Conference in Garmisch, Germany in October 1968. While most discussions were focused on technical aspects of design, production, implementation, distribution and service of software, there were also discussions on, “the difficulties of meeting schedules and specifications on large software projects.” This was the first public recognition on importance of software management.

Afterwards, twenty two international leaders, in software development from academia, industry and research laboratories gathered at Hedsor Park, London, to honour the NATO conference and to analyze the future direction of software. These events became known for having the first serious look towards critically analyzing the “software crisis”.

In the following years, the process of software life cycle began to be considered significant, which led to the development of various software models like: Waterfall Model, Iteration Model, Spiral Model, V-Shaped Model and others. These models have emerged to solve one or the other issue in real world of software development. Today, most professionals would agree that there are so many different types of projects and only one type of SLC cannot possibly fit in all of them. The modern view point is that unique projects require unique models or combination of models to make the project successful.
Thus, according to IEEE Standards for software project management plans, software project management can be understood as “the process of planning, organizing, staffing, monitoring, controlling and leading a software project”. Every software project must have a manager who leads the development team and has to interface with the initiators, suppliers and senior management.

2.10.2 Software Development Processes/Software Development Life Cycle (SDLC)
SDLC stands for Software Development Life Cycle. It is also known as software development process.

A Software Development Life Cycle is essentially a series of steps, phases or planned activities that provide a model for designing, development, alteration, replacement and lifecycle management of an application or piece of software. It is a process used by software industry to design, develop and test high quality softwares. The SDLC aims to produce a high quality software that meets or exceeds customer expectations, reaches completion within times and cost estimates.

The software development life cycle defines a methodology for improving the quality of software and the overall development process. The important activities or steps of the software development processes are as follows:

STAGE I: Planning and Requirements Analysis
Extracting the requirements of a desired software product is the first task before creating it. While customers wants the software according to their needs, it may require skill and experience in software engineering to recognize incomplete, ambiguous or contradictory requirements. It is performed by the senior members of the team with inputs from the customer, the sales department, market surveys and domain experts in the industry. This information is then used to plan the basic project approach and to conduct product feasibility study in the economical, operational and technical areas.

Planning for the quality assurance requirements and identification of the risks associated with the project is also done in this stage. A technical feasibility study, is also done to define the various technical approaches that can be followed to implement the project successfully with minimum risks.
STAGE II: Specification
Specification is the task of precisely describing the software to be written, in a mathematically rigorous way. Specifications are most important for external interfaces. Once the requirement analysis is done the next step is to clearly define and document the product requirements and get them approved from the customer or the market analysts. This is done through ‘SRS’, Software Requirement Specification document which consists of all the product requirements to be designed and developed during the project life cycle.

STAGE III: Software Designing/Architecture
The architecture of a software system refers to an abstract representation of that system. Architecture is concerned with making sure the software system will meet the requirements of the product, as well as ensuring that future requirements can be addressed.

Software Requirement Specification (SRS) is the reference for product architects to come out with the best architecture for the product to be developed. Based on the requirements specified in SRS, usually more than one design approach for the product architecture is proposed and documented in a DDS - Design Document Specification. This DDS is reviewed by all the important stakeholders and based on various parameters as risk assessment, product robustness, design modularity, budget and time constraints, the best design approach is selected for the product. A design approach clearly defines all the architectural modules of the product along with its communication and data flow representation with the external and third party modules (if any). The internal design of all the modules of the proposed architecture should be clearly defined with minute details in Design Document Specification (DDS).

STAGE IV: Implementation/Building or developing the product
In this stage of SDLC the actual development starts and the product is built. The programming code is generated based on DDS during this stage. Reducing a design to code is the other critical part of the software engineering job. If the design is performed in a detailed and organized manner, code generation can be accomplished without much hassle. Developers have to follow the coding guidelines defined by their organization and programming tools like compilers, interpreters, debuggers etc. are used to generate the code. Different high level programming languages such as C, C++, Pascal, Java and PHP are used for coding. The programming language is chosen with respect to the type of software being developed.
STAGE V: Quality Assurance/Software Testing and Documentation

Testing comprises of checking whether the parts of software are working together, as the codes are written by different engineers.

This stage is usually a subset of all the stages as in the modern SDLC models, the testing activities are mostly involved in all the stages of SDLC. In this stage defects of the products are reported, tracked, fixed and retested, until the product reaches the quality standards defined in the SRS.

In this stage, documenting the internal design of software is also done which is an important task for the purpose of future maintenance and enhancement.

STAGE VI: Deployment in the market and maintenance

Once the product is tested and ready to be deployed it is released formally in the appropriate market. Sometimes product deployment happens in stages in accordance with the organizations’ business strategy. The product may first be released in a limited segment and tested in the real business environment (UAT- User acceptance testing). Then based on the feedback, the product may be released as it is or with suggested enhancements in the targeting market segment. After the product is released in the market, its maintenance is done for the existing customer base.

Maintaining and enhancing software to cope with newly discovered problems or new requirements can take far more time than the initial development of the software. Not only may it be necessary to add code that does not fit the original design but determining how software works at some point after it is completed may require significant effort by a software engineer. A large part of software engineering work is basically maintenance, a small part of that is fixing bugs. Most maintenance is extending systems to do new things, which in many ways can be considered new work.

The diagrammatic presentation of the above six stages can be seen from figure 2.6 drawn below:
2.11 Establishment of Relationship between Project Management Life Cycle (PMLC) and Software Development Life Cycle (SDLC)

*In spite of having excellent software development methodologies and project management techniques, still most of the projects in the Information Technology industry fail, are undelivered on time or are having cost overruns.*

The following statistics are from the Standish Group's Chaos Report, 1994 which is widely regarded to be the landmark study on software project failure; according to it less than 31% of projects are cancelled before they get completed, less than 52.7% of projects cost over 189% of their original estimate, less than only 9% of large company projects come in on-time and on-budget but the projects completed by these companies have only met 42% of the proposed scope. Till today, the scenario is more or less similar, as on an average only 29% of the projects are successful, more than half i.e. 52% projects are challenged as they do not meet their specifications and 19% are failed or are cancelled.
Each problem statistic in Project Management (PM) and/or Software Development (SD) is related. Project Management Methodology and Software Development Life Cycle are two different aspects of managing a software development project.

The project management methodology provides detailed instructions for the discipline of planning, organizing, controlling, reporting and managing project resources to successfully complete project goals and objectives whereas SDLC provides a framework that describes the activities performed during each phase of a systems development project.

**Technically, both of them are different entities and both of them should work together simultaneously to get better result.** A project management team is rationally expected to consider both these aspects to achieve their final business goals.

Thus, the solution lies in having an integrated project management and software development approach. A life cycle which integrates and organizes the project management and software development processes into integrated project management/software development process groups. *When applying project management life cycle to software development projects, the project manager should be able to properly mingle it with software development life cycle (SDLC).*

The aligned phases of project management life cycle (PMLC) and software development life cycle (SDLC) is presented with the help of figure 2.7, below.

**Figure 2.7: Aligned PMLC and SDLC**

**IT PROJECT MANAGEMENT FRAMEWORK**

<table>
<thead>
<tr>
<th>Project Selection</th>
<th>Project Control</th>
<th>Project Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiation</td>
<td>Planning</td>
<td>Closure</td>
</tr>
<tr>
<td>Planning and Requirement analysis</td>
<td>Specification</td>
<td>Deployment in the market and maintenance.</td>
</tr>
<tr>
<td>Planning</td>
<td>Execution, Monitoring and Control</td>
<td>Software designing/architecture. Implementation/ Building or developing the product. Quality assurance/ software testing and documentation.</td>
</tr>
</tbody>
</table>

**Source:** Project Management Framework.org, 2009

In the above figure, one can see how both processes are having relationship with each other and can run parallel:
The project management life cycle (PMLC) and the software management life cycle (SDLC) both complement each other. Together they harmonize to form a complete methodology for delivering high quality products to the customers that meet or exceed their expectations. They each have different roles in support of business initiatives. Throughout the life cycle both of these methods work together to achieve business goals, drive the value equation and progress organizational maturity. Though their activities differ greatly, they interrelate and harmonize to produce superior results.

Organizations need to deploy the right skill sets; first of core technical development that can help oversee the SDLC software delivery and another is the project governance that oversees the project delivery. A successful software development organization should figure out how to structure their processes to include both SDLC and PMLC and ensure smooth transitions and doorways within each process and across processes.
2.12  Process Improvement Methodology for Quality Assurance: Capability Maturity Model Integration (CMMI)

According to the research, 80-90% of software projects are delayed or under-estimated. Quality assurance implies creation and maintenance of activities, which would help in keeping of quality.

Many software development organizations implement process improvement methodologies for quality assurance like ISO 9001 (Quality Management System Standard), ISO 27001 (Information Security Management System Standard), Six Sigma and Capability Maturity Model Integration (CMMI).

Among them CMMI is one of the leading models. This is an independent assessment which can be used to collect, review, analyse evidences of compliance and implementation of the CMMI framework and grade organizations, with reference to the effectiveness of the implementation of the CMMI model.

2.12.1 Capability Maturity Model Integration (CMMI)

Introduction

*It is a structured and systematic collection of best practices for process-improvement developed at the Software Engineering Institute (SEI)* at Carnegie Mellon University (CMU) in Pittsburgh, USA by members from defense, industry, government, and academia. It is now operated and maintained by the CMMI institute, an operating unit of CMU. It is the successor of the popular Software CMM, or SW-CMM.

CMU, claims that CMMI can be used to guide process improvement across a project, division, or an entire organization. Under the CMMI methodology, processes are rated according to their maturity levels. CMMI is registered in the U.S. Patent and Trademark Office by Carnegie Mellon University.

Maturity Levels of the Capability Maturity Model Integration

There are five maturity levels of the Capability Maturity Model Integration, which are as follows:

**MATURITY LEVEL 1 - Initial**

This is an immature state. The software processes are usually ad hoc and the organization usually provides an environment which is unstable or unpredicted. Here, only few processes
are defined and success depends on individual effort. Success in these organizations depends on the quality, competence and heroics of the people in the organization and not on the use of proven processes.

In spite of this ad hoc, chaotic environment, maturity level 1 organizations often produce products and services that work; however, they frequently exceed the budget and schedule of their projects. Organizations are characterized by a tendency to over commit, abandon processes in the time of crisis and not be able to repeat their past successes again.

**MATURITY LEVEL 2 - Repeatable**
At this level of CMM integration, project management practices come in existence to track cost, schedule and functionality. Software development success for projects become repeatable. The necessary process discipline is in place to repeat earlier success of projects. The processes may not repeat for all the projects in the organization but process discipline still helps to ensure success using existing practices for projects with similar applications. When these practices are in place, projects are performed and managed according to their documented plans. Project status and the delivery of services are visible to management at pre-defined points. There is still a significant risk of exceeding cost and time estimate of the project.

**MATURITY LEVEL 3 - Defined**
At this level of maturity, the organisation identifies its best practices and integrates them into a common or standard process. These standard processes become the base for this level which are refined over time intervals. These standard processes are used to establish consistency across the organization. All projects use an appropriate tailored version of the standard processes for development and maintenance of new and existing software.

A critical distinction between level 2 and level 3 is that at level 2, the standards, process descriptions and procedures may be quite different for each project but at level 3, the standards, process descriptions and procedures for a project are tailored from the organization’s set of standard processes to suit a particular project or organizational unit which more or less can be similar in nature.
MATURITY LEVEL 4 - Quantitatively Managed
At this level sub processes performance plays a prominent role for overall perfect process performance. These selected sub processes are controlled using statistical and other quantitative techniques. Quantitative objectives are set based on the needs of the client, end users, organization and process improvement. Quality and process performances which are understood in statistical terms are managed throughout the life of the processes. For the various processes, measures of process performance are collected and statistically analysed. Special Causes of process performance are identified and corrected to prevent future occurrences.

The crucial difference between Level 3 and 4 is that at Level 4, performance of process can be quantitatively predicted.

MATURITY LEVEL 5 - Optimizing
This is the highest level of maturity. It focuses on continuously improving process performance through both incremental and innovative technological improvements. Quantitative process improvement objectives for the organization are defined and revised in a continuous manner to meet changing business objectives. The effects of deployed process improvements are measured and evaluated against the quantitative process improvement objectives. Both the defined processes and the organization’s set of standard processes are targets of measurable improvement activities.

Process improvements are made and deployed based upon the common causes of process variation. Processes optimisation depends on the participation of an empowered workforce aligned with the business values and objectives of the organization and the organization’s ability to rapidly respond to changes.

The diagrammatic presentation of the above five levels of CMMI is shown in figure 2.8 below:
The Project Management Institute has evolved two more models the Organisational Project Management Maturity Model (OPM3) and Prince 2 Maturity Model; they have been developed with three maturity levels.
2.13 Managerial aspects of Software Project Development

2.13.1 Responsibilities of a Project Manager

The project management role is the most challenging role within the project team. As the project progresses through its various life cycle stages, project managers must be able to adapt themselves to the changing demands of the project and the team.

The Project Manager's primary responsibility is always to successfully deliver the product according to the expectation of the sponsor of the project. All other day to day activities/responsibilities are supporting the key role.

In order to carry the primary responsibility, the key responsibilities of a project manager includes:

- Defining, planning, tracking and managing the project they are assigned.
- He/she is responsible for identifying key resources and providing the direction required for meeting the project objectives.
- He/she is also responsible for ensuring appropriate management, customer and supplier involvement throughout the life of the project.
- The project manager must be able to manage project schedule and task details and utilize project management tools such as reports, tracking charts, checklists and project scheduling software to delegate appropriately.
- He/she must be able to manage change and take active leadership in timely decision making.
- Finally, a project manager must have the courage to face up the issues directly and early, resolve conflicts, admit to having problems and seek coaching openly, escalate if necessary and support the people and the project up, down and across the organization and with customers.

2.13.2 Other Major Responsibilities of a Project Manager

- Defining the project management process to be applied to the project.
- Select team members and, if cross-functional as the core team leader, select core team members.
- Prepare project plan and obtain management approval of the project plan.
- Assure that all team members understand their roles and accept their responsibilities.
• Apply project resources according to the approved project plan.
• Analyze risk and instigate avoidance activities. Establish contingency plans and identify trigger events and responsibility for initiating corrective action.
• Track and report on progress to plan.
• Analyze the actual performance against the plan and make adjustments consistent with plan objectives.
• Keep all stakeholders informed of progress and issues.
• Involving functional expertise in design reviews and key decisions as well as risk strategies.
• Ensuring timely adaptive action to be taken when required.
• Manage change to preserve business plan commitments.
• Initiate ‘Phase Review’ if objectives need to change.
• Negotiate the performance of activities with team members and their managers.
• Establish and publish clear priorities among project activities.
• Coordinate management and technical decisions.
• Arbitrate and resolve conflict and interface problems within the project.
• Provide input on the performance of project team members to their supervisors.

2.13.3 Duties of a Project Manager

A project manager must ensure that the following activities are carried out in accordance with the defined expectations:

• **Time:** The project manager ensures that the deliverables are being completed within the base lined time scales.

• **Cost:** He ensures that the deliverables are being completed within the base lined cost plan i.e. budget.

• **Quality:** He also makes sure that the deliverables are being completed to defined expectations in the first time itself.

• **Performance (Value):** He ensures that the progress is in accordance with the expected cost.

• **Cash flow:** He make sure that the net project cash flow is being achieved in accordance with the defined expectations.
• **SHE**: He regularly takes follow-ups to maintain required Safety, Health & Environmental standards.

• **Regulatory**: He checks that all required statutory and regulatory conditions are being met.

• **Reporting**: He regularly and timely reports the project progress to the sponsors.

• **Risk**: He proactively manage foreseen project risk and try to mitigate it as possible.

• **Change**: He manages changes to the project without unduly affecting the stated objectives and benefits.

### 2.14 Leadership in Project Management

To make a project successful is a challenging task, while managing the constraints of time, costs and performance expectations. Therefore, it is essential that the project manager possess and display appropriate leadership skills. According to Maylor (2003), by applying the appropriate leadership attributes such as balance, proficiency, persistence, sound decision making, imagination, vision, values, integrity, trust and sincerity a project manager could direct projects effectively and efficiently.

An effective leader is one who motivates the project team towards achieving the desired outcome of a project. Ahmed (2008) suggested that a project manager should be recognized as a leader not only by the project team but also by everyone involved in the process, inclusive of clients and the organization.

Knutson (2001) suggested that the project manager as a leader needs to fulfil the following requirements:

- Determination of the organization’s purpose or vision,
- The exploitation or maintenance of core competencies,
- Development of human capital,
- Sustaining an effective organizational culture,
- Emphasize ethical practices,
- Establish balanced organizational controls, and
- Provide mechanism to transfer knowledge across all parts in the project.

Ability to influence and leadership are considered as the basic ingredients of project management skills. Existing literature suggests that project management competencies are
broad and multifarious. Ahmed (2008) identified some of the requisite project leadership skills as building relationships and communication, adaptability to change initiative, resolving conflict, leading the project team, managing corporate culture, credibility and responsibility, motivating and commitment to project objectives. In contrast, Meredith, Posner, & Mantel (1995) categorized the required skills of project managers as communication, organization, team building, leadership, coping and technological skills.

Basically, the critical role of a project manager is working under defined time and resource constraints and achieving unique outcomes. Thus, to summarize, the role of a project manager, he is one of prioritize goals and make sure that deviations from the established objectives are avoided.

2.14.1 Project Leadership and Stakeholder Interests
In order to cope with the challenges of sustainability, ethics, responsibility and accountability, one definitely requires an awareness and knowledge in the domains of project management. Individuals need certain skills to use this knowledge adequately and to interact with the stakeholders.

According to PMBOK, Project stakeholders are individuals and organisations that are actively involved in the project or whose interests may be affected as a result of project execution or project completion. They may also exert influence on the project's objectives and outcomes. Key stakeholders on ever project include the following:

- **Project Manager**: The person responsible for managing the project.
- **Customer/User**: Customer refer to the person/organisation acquiring the project's product and users are those entity who will directly utilize the project's product. Sometimes, they both are considered to be synonyms as well.
- **Performing Organisation**: The enterprise whose employees are most directly involved in doing the work of the project.
- **Project team members**: The group that is performing the work of the project.
- **Project management team**: The members of the project team who are directly involved in project management activities.
- **Sponsor**: The person or group that provides the financial resources, in cash or in kind, for the project.
• **Influencers:** People or group that are not directly related to the acquisition or use of the project's product, but due to an individual's position in the customer organisation or performing organisation, can influence positively or negatively the course of the project.

• **Project Management Office (PMO):** If it exists in the performing organisation, the PMO can be a stakeholder if it has direct or indirect responsibility for the outcome of the project.

In addition to these key stakeholders, there are many different names and categories of project stakeholders, including internal and external, owners and investors, sellers and contractors, team members and their families, government agencies and media outlets, individual citizens, temporary or permanent lobbying organisations and society at large.

In a project stakeholder environment, organisations and their leaders are confronted with complex challenges. Leading business houses, poses new demands on those who are having the responsibility to lead. These leaders are expected to extend their usual set of business responsibilities and display extra interpersonal competence to meet the challenges effectively. Project leaders, face the challenge of serving the interests of all stakeholders and not just the owners or shareholders. He should try to create a long term relationship with all stakeholders.

Leadership in a project environment also requires emotional, cross-cultural and interpersonal skills. Emotional abilities can prove beneficial in helping leaders to relate and maintain good relationships with different stakeholders. The ability to be empathetic and considerate about others needs and feelings, especially in difficult situations, can help to neutralize conflicting views with stakeholders. Interacting in a cooperative way, displaying respect and showing appropriate and respectful behaviour helps to resolve any kind of disagreement.

People are considered socially intelligent if they achieve a balanced relationship between their own interests and those of others. In contrast, pursuing one’s own goals at any cost and thus alienating others, would be considered as socially incompetent.

**2.14.2 Leadership Challenges Facing Project Managers**

Project management methodologies make project managers accustomed to organized, predictable, logical, well-structured and standardized environment governed by rules, regulations and controllable variables. In contrast, the projects tend to be characterized by
crisis, uncertainty and suspense, which combine to test the ability and performance of the project managers. These differentiating roles make effective leadership one of the most challenging areas in project management.

Project performance widely depends on the personal skills and capabilities of the potential leaders available. The project management literature has emphasized technical knowledge and skills as the key ingredients in managing projects. The growing importance of the organizational and human factors makes the requirement of leadership skills essential for the effective management of projects. Staffing and appropriately assigning skilled project resources to the most challenging areas, employ effective project management techniques.

The Project Management Institute (2008) identified development and management of the project team as core aspects of the human resource management competency in project management. Project teams consist of individuals from previously different organisational areas brought together to perform complex multi-disciplinary task. Undertaking short term projects is one of the greatest challenges to individuals along with managing performances within it. Projects involve undertaking a range of work-related activities for a definite period with one or more defined objectives. Added to this is a project setting characterized by groups of individuals redeployed from elsewhere within the organization.

Cabano (2006) pointed out that many projects are experiencing limited abilities in meeting the demands of capital programs due to limited skills of their human resources. He also mentions the fact that resources level in project management is more acute than most other disciplines. The allocation of human resources in the execution of projects is usually made according to the ability and experience of project managers. It is important that the project managers ensure that the project receives appropriate competent staff to complete the project within the required time frame.

The project management tools and techniques not only help to execute the project as planned but also acts as a guide by providing a mechanism for planning, communicating expectations, and recognizing the deviations or successes of a project. The planning tools provide the original baseline from which actual results are compared. They facilitate learning-by-doing, by providing the explicit definition of the goals and expectations or understanding of the project.
2.14.3 The Importance of Team Performance in Projects

An important concern for the organizations working with project teams is to ensure that they achieve not only acceptable but also exceptional levels of performance. High-performing project teams need to be carefully and systematically developed. The qualities for high performance are unique for each project, team and are tied to its objective. According to Cohen & Bailey (1997) there are four components which should be considered for developing a model for high-performing project teams. They are as follows:

- The roles of team members,
- Team relationships,
- Team activities and
- The culture or environment the team creates and functions within.

In order to stimulate employees towards high performance, the essential characteristics of a working environment should be flexibility, responsibility, clear standards, rewards, clarity of goals and commitment towards work. A team is said to be effective if, team members are ready to take any kind of responsibility and ownership for the decisions. But this does not happen in reality. Therefore, project management must empower teams to act, rather than expecting them to seize authority. Project managers should explain the jurisdiction of the authority of the project teams and then hold them responsible for the decisions taken. The team perform best when the given tasks is clear, easy to implement and require a high degree of interdependence.

The size of the project team should be such that there are requisite members to complete the work and also the number should be limited to maintain efficient coordination and meaningful involvement. Effective project teams are composed of people with high competencies and motivation to perform the task. Every member of the project team should have sufficient drive to perform the task. The team members must be motivated to work together rather than alone and should abide by the team’s norms. Project teams develop norms to regulate and guide member behaviour. A degree of cohesiveness should be present in project team members, so that they are motivated to remain members which also increases with homogeneity, smaller team size, higher degree of interaction, team success and external challenges. High cohesive units have higher task performance only when their norms do not conflict with the project objectives. It is essential to develop the project team’s performance norms to enable effective cohesiveness leading to efficient productivity.
Project managers play supporting roles serving as resource persons, facilitators and motivators. Reward systems should be so designed to make team realize the importance of group achievement by allowing members to share the rewards of group actions. In a project team environment, every individual, should have the freedom to take a new step, to try a new idea, or to suggest the obsolescence of an old custom. The team members should be ready to change, improve and augment the productivity of individuals and processes.

Before the Standish Group surveys of 1994, project failure was not discussed. According to Johnson (1999), the group’s researchers identified that technology was neither the problem nor the solution to the successful outcome of projects. Since then the factors affecting the success or failure of a project became the concern for several researchers. The earlier researchers suggested that factors that affect project outcomes change depending on the changes in the project life cycle. Gannon (1994) suggested that the problems in projects usually occur in the hard or measurable elements of scope, schedule, cost and procurement. He further stated that the root cause emerge from the inefficient or improper managing of the soft integrative elements of staffing, communication, quality, and risk. These soft elements, with the exception of risks are behavioural elements that require active and attentive leadership from project managers in order to achieve desired project outcomes.

Research studies suggest that ability to manage people, stress and communication are the essential features of a successful project manager. The applicability of the transformational leadership model developed by Bass & Avolio (1997), tested by Thite (1999) and his findings revealed that the more successful project managers exhibited greater degree of leadership behaviour than less successful project managers. This is because of role conflict and ambiguity of the project team, leadership is considered as a critical success factor. According to Schmid & Adams (2008), the success of a project depends upon the ability of the project manager to ensure timely delivery, adhere to budget constraints, manage scope and quality specifications and meet stakeholder expectations (Project Management Institute, 2008).

The project managers must display the requisite leadership skills that are essential for the implementation of a successful project, which is in addition to the requisite skills to guide a project team through the various phases and project cycles. The project managers use management skills like defining problems, planning work, allocating resources and controlling tasks. But, these skills are not adequate for building the human relations,
encouraging innovation and empowering the project team to perform creatively and effectively throughout the project life cycle.

According to Ravichandran (2000), the general observation is that most project managers come from technical background and exhibit an engineering mentality with limited consideration for leadership skills. Thus, with the absence of the proper leadership skills highly standardized project management approaches of planning, establishing standard methodologies, or software are not likely to achieve successful project outcomes.

The project management literature suggests that projects usually fail not because of technical matters, but on matters related to personnel issues. As, project management practitioners usually concentrate on technical skills ignoring the aspect related to leadership skills, this would counter serious threat to the project. Project managers have to combine technical knowledge and expertise with effective leadership behaviours to bring the best out of their team and achieve successful project outcomes.

2.15 Summary
Thus, project management research has revealed that leadership is a critical success factor for successful project outcomes as the application of only project management tools does not assure successful project outcomes. The empirical evidences regarding leadership influence on project success have not provided much guidance in terms of specific leadership styles that are associated with successful project outcomes. The principles and methodology of project management are defined by the Project Management Body of Knowledge, issued by the Project Management Institute, but this body does not provide guidelines pertaining to the type of leadership style best suitable for technical projects. Hence an effort has been made by the researcher in this regard.

Based upon the literature review the next section, presents the gaps identified after reviewing both parts of the chapter followed by the next chapter which presents the conceptual framework, the hypotheses formulated and the overall framework for research.

2.16 Identification of Research Gaps
After presenting and examining the literature from both the segments, the following major issues have emerged which will be explored in this dissertation:

- **Research Question 1**: Is there a difference in the leadership styles (Transformational,
Research Question 2: Is there a difference in the leadership styles (Transformational, Transactional, Passive/Avoidant and Technical) of the project managers (both self-perceived and subordinates-perceived) with respect to challenged projects?

Research Question 3: Is there a difference in the leadership styles (Transformational, Transactional, Passive/Avoidant and Technical) of the project managers (both self-perceived and subordinates-perceived) with respect to failed projects?

Research Question 4: Is there a significant relationship between (both self-perceived and subordinates-perceived) integrated leadership styles (Transformational, Transactional, Passive/Avoidant and Technical) of project manager and combined project leadership outcomes (project team member’s willingness to exert extra effort, project manager’s effectiveness and satisfaction with the project manager) in successful, challenged and failed projects?

Research Question 5: Is there an improvement in the predictive ability of the model (Transactional, Passive/Avoidant and Technical leadership predicting all three project leadership outcomes: project team member’s willingness to exert extra effort, effectiveness of the project manager and satisfaction with the project manager) for successful, challenged and failed projects after Transformational leadership is added to the model?

Research Question 6: Do Project Managers who scored higher on Transformational leadership style get better/extra outcomes from their project team members in comparison to those who scored lower on Transformational leadership style?

Research Question 7: Is there a difference in the effectiveness (both self-perceived and subordinates-perceived) of the leadership styles (Transformational, Transactional, Passive/Avoidant and Technical) of the project manager at various phases (initiation, planning, execution, monitoring & control and closure) of the project life cycle?

Research Question 8: Is there a difference in the criticality (both self-perceived and subordinates-perceived) of the success factors of the Project Implementation Profile...
(PIP) at various phases (initiation, planning, execution, monitoring & control and closure) of the project life cycle?

❖ **Research Question 9:** Do successful projects exhibit robust presence of the composite ten critical success factors of the Project Implementation Profile (PIP) in comparison to challenged and failed projects?

There is dearth of research focusing on significant leadership style in software project management. Software project managers play a very vital role in software development industry and this led the researcher to investigate the most commonly used leadership styles of Indian software project managers. Each of the leadership styles in the MLQ (5X-Short Form) instrument involves the use of different leadership techniques by managers to make or encourage their subordinates achieve the organisational goals. This led the researcher to investigate the leadership techniques of each leadership style. The MLQ (5X-Short Form) can also measure the extra effort, effectiveness and satisfaction of each leadership style.

Furthermore, the researcher also investigated the influence of technical factors on project outcomes, augmentation effect of transformational leadership as well as tries to find out the significant leadership style to be executed by the project manager at each phase of the project life cycle and also the dominant critical success factor of the Project Implementation Profile (PIP) which must be focused at each phase along with verifying the robust presence of critical success factors of PIP in successful projects which adds something new to the existing literature of project management.