Chapter 3- Conceptual Framework

3.1 Overview
The previous 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 measurement instrument. It also addressed leadership in information technology environment and highlighted the critical success factors for IT projects by taking into consideration the ten factor model of Project Implementation Profile (PIP).

Along with presenting the concepts of leadership the chapter also defined information technology, software, classification of software and briefed the evolution of information technology industry of India, software development industry of India and software development industry of Pune followed by the concepts of project management, software project management, process improvement methodology for quality assurance and establishment of relationship between PMLC and SDLC. It had thrown light on managerial aspects of software project management and leadership in project management and identified the research gaps which led to development of the research framework.

The purpose of this chapter is to explore the variables (independent and dependent), build the conceptual framework for the study and develop the hypotheses based upon the research objectives, the gaps identified in the current literature: research questions and develop the overall research framework for this dissertation.

This chapter begins with an overview of the chapter in Section 3.1. Section 3.2 presents the outline of the research study and Section 3.3 highlights the development of conceptual model/framework. Hypotheses development and development of overall research framework is shown in Section 3.4 and Section 3.5. This is followed by the summary of this chapter in Section 3.6.

The diagrammatic presentation of Chapter Three is shown in figure 3.1.

Figure 3.1: Structure of Chapter 3

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3.2 Outline of the Research Study

After understanding the literature related with various leadership styles and project management, in this chapter the researcher tries to develop the conceptual framework for the research study. Transactional leadership, represents the contractual agreement between the leader and the subordinates on expected performance in return for certain rewards. It is a cost-benefit exchange process leading to ordinary project outcomes.

In today's complex business environment, it is expected that subordinates perform beyond ordinary expectations and that is possible only through transformational leadership. A transactional leader indicates how current needs of the followers can be fulfilled; the transformational leader however, sharply focuses on the long term need of the followers like self-esteem and self-actualisation. However, they are not the opposite end of each other. A transformational leader 'augments' the leadership effectiveness of a transactional leader.

The 'full range of leadership model' given by Bass and Avolio clearly identifies different components of transformational and transactional leadership and provides a well-tested measurement instrument, that has produced considerable findings across a wide variety of organisations, cultures and levels within organisations.

The Multifactor Leadership Questionnaire-MLQ (Short Form 5X), has identified five transformational factors: idealised influence (attributed), idealised influence (behaviour), intellectual stimulation, inspirational motivation and individualised consideration, two transactional leadership factors: contingent reward, management-by-exception: active (MBEA) and two Passive/Avoidant leadership factors: management-by-exception: passive (MBEP) and laissez-faire.
Bass and Avolio's model has been tested with generally positive results in sports, banking, construction, research & development and hospital industry. Considering the dearth of empirical research on technical leadership, particularly in relation to IT professionals, it made sense to test the applicability of a generic leadership model in an IT project environment.

The objectives of the study were to explore the best possible leadership styles to successfully execute IT projects in India, find out the most effective leadership style and the dominant critical success factors of the Project Implementation Profile (PIP) at each phase of project life cycle, along with verifying the augmentation effects of transformational leadership on outcomes considering remaining leadership styles, exploring whether transformational leadership style of the project manager encourages project team members to perform beyond expectations, confirming whether there is robust presence of critical success factors in successful projects rather than challenged and failed projects and to implement Bass and Avolio’s (1990) model on transactional and transformational leadership behaviours to software development projects, in order to test its relevance to information technology projects. However, to make the model more pertinent to information technology environment components of technical leadership were also added.

The additional thirteen items, named as Technical factors added to the scale proposed by Thite (1997) are: encouraging to freely explore the solution to the problem, implementation of the upper management's decisions with the same enthusiasm, ability to satisfy the subordinate's desire for autonomy, extending help towards career development of the subordinates, aligning of the goals of the subordinates to organisational goals, preventing organisational bureaucracy, managing the process of change by involving project team members, encouraging champion to act as catalyst, remaining open minded while evaluating the ideas of team members, taking timely and effective steps to achieve desired quality standards, securing resources to support creative endeavours, ensuring that the organisation rewards the project team members and encourages addressing problems by using reasoning and evidence. These additions were made to the Multi factor Leadership Questionnaire (MLQ) to specifically assess the leadership behaviours of IT project managers and were derived from the existing literature on technical leadership.

Apart from establishing the relationship between leadership styles (transformational, transactional, technical and passive/avoidant) and project outcomes like effectiveness,
satisfaction and extra effort, the researcher tries to find out the most effective leadership style
to be executed by the project manager at each phase of the project life cycle, like: initiation,
planning, execution, monitoring & control and closure. Therefore the phases of project life
cycle and the four leadership styles under study were introduced in the questionnaire.

The research also tries to find out the dominant critical success factors of the Project
Implementation Profile (PIP) at each phase of the project life cycle. To explore this objective,
the ten critical success factors of the PIP model like: Project Mission, Top Management
Support, Project Schedule/Plans, Client Consultation, Personnel, Technical Tasks, Client
Acceptance, Monitoring & Feedback, Communication and Trouble Shooting were also added
to the MLQ.

All the variables identified and developed for this research are segregated into two categories:
independent and dependent.

The independent variables also called the predictor variables comprised of leadership styles
and their components, like: Transformational Leadership-Idealized Influence (attributed),
Idealized Influence (behaviour), Inspirational Motivation, Intellectual Stimulation and
Individualized Consideration; Transactional Leadership-Contingent Reward and
Management-By-Exception (Active) and Passive/Avoidant Leadership-Management-By-
Exception (Passive) and Laissez-Faire. Also the components of technical leadership were
added.

The dependent variables or the criterion variables includes: project team member’s
willingness to exert extra effort, project manager’s effectiveness and satisfaction with the
project manager. It also includes the five different phases of the project life cycle: initiation,
planning, execution, monitoring & control and closure.

The auxiliary or supporting variables includes the ten critical success factors of the Project
Implementation Profile (PIP): Project Mission, Top Management Support, Project Schedule/
Plans, Client Consultation, Personnel, Technical Tasks, Client Acceptance, Monitoring &
Feedback, Communication and Trouble Shooting.

The independent and dependent variables which are the basis for the entire research can be
understood with the help of figure 3.2 and figure 3.3 as shown below:
Figure 3.2: Diagrammatic Presentation of Independent and Dependent Variables of the Research Study

**Independent Variables**
- **Transformational Leadership**
  - Idealized Attributes
  - Idealized Behaviour
  - Individualized Consideration
  - Intellectual Stimulation
  - Inspirational Motivation
- **Transactional Leadership**
  - Contingent Reward
  - Management by Exception (Active)
- **Passive/Avoidant Leadership**
  - Management by Exception (Passive)
  - Laissez Faire
- **Technical Leadership**
  - Autonomy, Change, alignment of goals, encouraging innovations, career development, achieving desired quality standards, use of reasoning and evidence etc.

**Dependent Variables**
- **Leadership Outcomes**
  - Willingness to exert extra effort
  - Project Manager’s Effectiveness
  - Satisfaction with the Project Manager
- **Phases of Project Life Cycle**
  - Initiation
  - Planning
  - Execution
  - Monitoring and Control
  - Closure

**Auxiliary Variables/Ten Critical Success Factors of the Project Implementation Profile (PIP):**
- Project mission, Top management support, Project schedule/plans, Client consultation, Personnel (High touch leadership & management), Technical tasks, Client acceptance, Monitoring and feedback, Communication, Trouble shooting

**Source:** Developed for this research

**Interpretation:** Figure 3.2, shows, that the current research tries to explore the relationship between the independent and dependent variables and tries to find out whether this relationship affects project performance together with the support of the auxiliary/supporting variables, leading towards project success.
Figure 3.3: Diagrammatic Presentation showing End Result of Enhanced Relationship between Independent and Dependent Variables

Source: Developed for this research

Interpretation: Figure 3.3, reflects the outcomes of better relationship between independent and dependent variables. It explains that appropriate leadership behaviour displayed by the project manager, would lead to better leadership outcomes and improved project life cycle together with the support of the critical success factors. This will lead to high project performance outcomes like: meeting deadlines, cost efficiency, technical efficiency, scope effectiveness and overall satisfaction which would increase the chances of project success.
3.3 Development of Conceptual Framework/Model

After observing the variables used in the study a conceptual framework/model was formulated by the researcher. The conceptual framework postulates that there is a difference in the leadership styles executed by the project managers of successful, challenged and failed projects. It shows that there is a relationship between leadership styles executed by the project manager and the leadership outcomes and also that there is a growth in these outcomes due to introduction of transformational leadership style. It is further explored that transformational leadership when executed by project managers encourages the team members towards extra outcomes and this would further increase the chances of project success.

This model reflects that different leadership styles should be executed by a project manager at different phases of the project life cycle and also that different phases of the project life cycle are dominant by different set of critical success factors. It is further verified that there is a robust presence of critical success factors of the project implementation profile in successful rather than challenged and failed projects.

The diagrammatic presentation of the conceptual framework is shown in Figure 3.4.
3.4 Development of Hypotheses

Based upon the research objectives, the gaps identified in the current literature: research questions and the conceptual framework, the following hypotheses are formulated for examination in this study:

**Hypothesis No.1**

**Ho1:** Leadership Styles (Transformational, Transactional, Passive/Avoidant and Technical) of the project managers (both self-perceived and subordinates-perceived) do not differ in magnitude with respect to successful projects.

**Ha1:** Leadership Styles (Transformational, Transactional, Passive/Avoidant and Technical) of the project managers (both self-perceived and subordinates-perceived) differ in magnitude with respect to successful projects.

**Hypothesis No.2**

**Ho2:** Leadership Styles (Transformational, Transactional, Passive/Avoidant and Technical) of the project managers (both self-perceived and subordinates-perceived) do not differ in magnitude with respect to challenged projects.

**Ha2:** Leadership Styles (Transformational, Transactional, Passive/Avoidant and Technical) of the project managers (both self-perceived and subordinates-perceived) differ in magnitude with respect to challenged projects.

**Hypothesis No.3**

**Ho3:** Leadership Styles (Transformational, Transactional, Passive/Avoidant and Technical) of the project managers (both self-perceived and subordinates-perceived) do not differ in magnitude with respect to failed projects.

**Ha3:** Leadership Styles (Transformational, Transactional, Passive/Avoidant and Technical) of the project managers (both self-perceived and subordinates-perceived) differ in magnitude with respect to failed projects.

**Hypothesis No.4**

**Ho4:** There is no 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.

**Ha4:** There is 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.

**Hypothesis No.5**
This hypothesis seeks to establish the augmentation effect. It is further divided into three sub-hypotheses; 5a, 5b and 5c.

**Hypothesis-5a**

**Ho5a:** There is no improvement in the predictive ability of the model (Transactional, Passive/Avoidant and Technical leadership predicting project team members’ willingness to exert extra effort) for successful, challenged and failed projects after Transformational leadership is added to the model.

**Ha5a:** There is an improvement in the predictive ability of the model (Transactional, Passive/Avoidant and Technical leadership predicting project team members’ willingness to exert extra effort) for successful, challenged and failed projects after Transformational leadership is added to the model.

**Hypothesis-5b**

**Ho5b:** There is no improvement in the predictive ability of the model (Transactional, Passive/Avoidant and Technical leadership predicting effectiveness of the project manager) for successful, challenged and failed projects after Transformational leadership is added to the model.

**Ha5b:** There is an improvement in the predictive ability of the model (Transactional, Passive/Avoidant and Technical leadership predicting effectiveness of the project manager) for successful, challenged and failed projects after Transformational leadership is added to the model.
**Hypothesis-5c**

**Ho5c**: There is no improvement in the predictive ability of the (Transactional, Passive/Avoidant and Technical leadership predicting satisfaction with the project manager) for successful, challenged and failed projects after Transformational leadership is added to the model.

**Ha5c**: There is an improvement in the predictive ability of the model (Transactional, Passive/Avoidant and Technical leadership predicting satisfaction with the project manager) for successful, challenged and failed projects after Transformational leadership is added to the model.

**Hypothesis No.6**

**Ho6**: Mean values of project leadership outcomes (project team members’ willingness to exert extra effort, project manager’s effectiveness and satisfaction with the project manager) do not differ across high, medium and low Transformational leadership.

**Ha6**: Mean values of project leadership outcomes (project team members’ willingness to exert extra effort, project manager’s effectiveness and satisfaction with the project manager) differ across high, medium and low Transformational leadership.

**Hypothesis No.7**

This hypothesis seeks to find out the most effective leadership style at various phases of the project life cycle. It is further divided into five sub-hypotheses; 7a, 7b, 7c, 7d and 7e.

**Hypothesis-7a**

**Ho7a**: Leadership Styles (Transformational, Transactional, Passive/Avoidant and Technical) do not differ in effectiveness (both self-perceived and subordinates-perceived) during initiation phase of the project life cycle (leadership styles have equal weights during initiation phase).

**Ha7a**: Leadership Styles (Transformational, Transactional, Passive/Avoidant and Technical) differ in effectiveness (both self-perceived and subordinates-perceived) during initiation phase of the project life cycle (leadership styles have different weights during initiation phase).

**Hypothesis-7b**

**Ho7b**: Leadership Styles (Transformational, Transactional, Passive/Avoidant and Technical) do not differ in effectiveness (both self-perceived and subordinates-perceived) during
planning phase of the project life cycle (leadership styles have equal weights during planning phase).

**Ha7b:** Leadership Styles (Transformational, Transactional, Passive/Avoidant and Technical) differ in effectiveness (both self-perceived and subordinates-perceived) during planning phase of the project life cycle (leadership styles have different weights during planning phase).

**Hypothesis-7c**

**Ho7c:** Leadership Styles (Transformational, Transactional, Passive/Avoidant and Technical) do not differ in effectiveness (both self-perceived and subordinates-perceived) during execution phase of the project life cycle (leadership styles have equal weights during execution phase).

**Ha7c:** Leadership Styles (Transformational, Transactional, Passive/Avoidant and Technical) differ in effectiveness (both self-perceived and subordinates-perceived) during execution phase of the project life cycle (leadership styles have different weights during execution phase).

**Hypothesis-7d**

**Ho7d:** Leadership Styles (Transformational, Transactional, Passive/Avoidant and Technical) do not differ in effectiveness (both self-perceived and subordinates-perceived) during monitoring and control phase of the project life cycle (leadership styles have equal weights during monitoring and control phase).

**Ha7d:** Leadership Styles (Transformational, Transactional, Passive/Avoidant and Technical) differ in effectiveness (both self-perceived and subordinates-perceived) during monitoring and control phase of the project life cycle (leadership styles have different weights during monitoring and control phase).

**Hypothesis-7e**

**Ho7e:** Leadership Styles (Transformational, Transactional, Passive/Avoidant and Technical) do not differ in effectiveness (both self-perceived and subordinates-perceived) during closure phase of the project life cycle (leadership styles have equal weights during closure phase).

**Ha7e:** Leadership Styles (Transformational, Transactional, Passive/Avoidant and Technical) differ in effectiveness (both self-perceived and subordinates-perceived) during closure
phase of the project life cycle (leadership styles have different weights during closure phase).

**Hypothesis No.8**

This hypothesis seeks to find out the dominant critical success factors of the Project Implementation Profile (PIP) at various phases of the project life cycle. It is further divided into five sub-hypotheses; 8a, 8b, 8c, 8d and 8e.

**Hypothesis-8a**

**Ho8a**: Factors of Project Implementation Profile (PIP) do not differ in criticality (both self-perceived and subordinates-perceived) during initiation phase of the project life cycle (factors have equal weights during initiation phase).

**Ha8a**: Factors of Project Implementation Profile (PIP) differ in criticality (both self-perceived and subordinates-perceived) during initiation phase of the project life cycle (factors have different weights during initiation phase).

**Hypothesis-8b**

**Ho8b**: Factors of Project Implementation Profile (PIP) do not differ in criticality (both self-perceived and subordinates-perceived) during planning phase of the project life cycle (factors have equal weights during planning phase).

**Ha8b**: Factors of Project Implementation Profile (PIP) differ in criticality (both self-perceived and subordinates-perceived) during planning phase of the project life cycle (factors have different weights during planning phase).

**Hypothesis-8c**

**Ho8c**: Factors of Project Implementation Profile (PIP) do not differ in criticality (both self-perceived and subordinates-perceived) during execution phase of the project life cycle (factors have equal weights during execution phase).

**Ha8c**: Factors of Project Implementation Profile (PIP) differ in criticality (both self-perceived and subordinates-perceived) during execution phase of the project life cycle (factors have different weights during execution phase).

**Hypothesis-8d**

**Ho8d**: Factors of Project Implementation Profile (PIP) do not differ in criticality (both self-perceived and subordinates-perceived) during monitoring & control phase of the project life cycle (factors have equal weights during monitoring & control phase).
**Ha8d:** Factors of Project Implementation Profile (PIP) differ in criticality (both self-perceived and subordinates-perceived) during monitoring & control phase of the project life cycle (factors have different weights during monitoring & control phase).

**Hypothesis-8e**

**Ho8e:** Factors of Project Implementation Profile (PIP) do not differ in criticality (both self-perceived and subordinates-perceived) during closure phase of the project life cycle (factors have equal weights during closure phase).

**Ha8e:** Factors of Project Implementation Profile (PIP) differ in criticality (both self-perceived and subordinates-perceived) during closure phase of the project life cycle (factors have different weights during closure phase).

**Hypothesis No.9**

**Ho9:** $\mu_1 = \mu_2 = \mu_3$

**Ha9:** One of the mean values is different from the rest.

### 3.5 Development of Overall Research Framework

The project managers of software development projects are the main target of this research study. In order to undertake consent to conduct the survey, the senior/delivery managers will be approached, to whom the project managers report in the hierarchy. First of all, the senior/delivery managers will be asked to identify three projects from their organisation as successful, challenged and failed based upon the parameters like: quality, cost, satisfaction, scope, followed by an interview in which he/she will be asked to describe the organisational hierarchy, roles and responsibilities of the project manager, average duration of a project, criteria for selection of the appropriate software development life cycle etc.

The current study will be followed by the survey, in which the extended version of MLQ (5X Short Form) will be used to gather information about the project managers, from their project team members. The project managers will also be asked to fill the questionnaire to record their self-perceived leadership style.

The questionnaire will gather information related with various leadership styles included, like: transformational, transactional, passive/avoidant and technical along with the outcomes, like: project team members’ willingness to exert extra effort, project manager’s effectiveness and satisfaction with the project manager. It will also gather data related with effectiveness of
various leadership style: transformational, transactional, passive/avoidant, technical and also dominate critical success factors at various phases of the project life cycle.

The augmentation effect of transformational leadership and the verification of robust presence of critical success factors of PIP in successful projects will be measured through application of requisite statistical tools on the same data gathered through the questionnaire.

Figure 3.5, offers an overall research framework for this dissertation developed and henceforth previews the methodology which appear in the following chapter.
Figure 3.5: Overall Research Framework

Software Project Managers

Target of this research

Their level in organisational hierarchy, defined roles and responsibilities, segregation of projects as successful, challenged and failed and the project managers of respective projects.

Measurement of their leadership style

Survey and Interviews with Senior/Delivery Managers

Extended version of Multi factor Leadership Questionnaire MLQ (5X Short Form)

Survey Research

Transformational, Transactional, Passive/Avoidant and Technical

Difference in the dominance of leadership style in successful, challenged and failed projects.

Outcomes: extra effort, effectiveness and satisfaction

Relationship with leadership styles and difference in the three projects: successful, challenged and failed projects

Effectiveness of leadership styles: Transformational, Transactional, Passive/Avoidant and Technical

At various phases of project life cycle which include: initiation, planning, execution, monitoring & control and closure.

Dominance of critical success factors of PIP

Conclusions

Source: Developed for this research
3.6 Summary
A major purpose of this study was to replicate Bass and Avolio’s (1990) model on transactional and transformational leadership and to test its relevance to information technology projects. To make the model more situation specific, a set of behaviours representing technical leadership were derived from the literature and tested as supplementary component to transformational leadership. Project leadership is assumed to be a major critical success factor having bearing on the outcome of IT projects and different phase of the project life cycle requires different leadership style to be executed by the project manager. Also there is a difference in dominance of critical success factors at various phases of the project life cycle. After development of the conceptual framework of the study, hypotheses are been formulated based upon the framework, research gaps identified through literature review: research questions and objectives of this study. Further an overall research framework has been formulated for this dissertation and henceforth previews the methodology which appear in the following chapter.

The following chapter discusses the methodology used for the research, the type of research, sample size, research design of the study and various statistical tools to be used to test the hypotheses and interpret the results.