COMPARING MOTIVATION IN COLLOCATED AND VIRTUAL PROJECT TEAMS

by

Venkata Sesha Ravikiran DWIVEDULA

A thesis

submitted for the degree of

Doctor of Philosophy in Strategy, Programme & Project Management

ESC Lille, Lille

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Venkata Sesha Ravikiran DWIVEDULA

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in partial fulfilment of the requirements for the degree of

Doctor of Philosophy
in the subject of
Strategy, Programme & Project Management

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CERTIFICATE OF AUTHORSHIP/ ORIGINALITY

I certify that the work in this thesis has not previously been submitted for a degree not has it been submitte as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

Venkata Sesha Ravikiran DWIVEDULA

ACKNOWLEDGEMENTS

I sincerely thank my Thesis Supervisors Professor Christophe BREDILLET, Dean- Post Graduate Programmes; ESC Lille and Dr. Philippe RUIZ for their constant guidance, support and for painstakingly reviewing my progress during the course of this study. They made this research possible. I came to appreciate the value of *continuous learning* through them.

I thank the anonymous reviewers of our research papers. Their comments and feedback helped me to refine my study.

I thank the entire team of ESC Lille Mediatheque and Department Informatique for their fanstastic support services

Thank You Mehran for teaching me *patience* and *perseverance*. I cherish our friendship.

Thank You Sarah for being so kind.

Thank you Nadine, Feryel, Justine and Hongyi for being great colleagues.

Back home, Thank You Dr. Uma SivaPrasad for giving me strength and courage.

Finally, I wish to Thank my Parents for all their Love and for having confidence in me. Words fail me here and I can only say they are *The Best I Know!*

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ABSTRACT

The current research study explores motivation compares motivation in collocated and virtual project environments. The literature review of key theories of motivation reveals that motivation is closely related to team performance. Drawing upon this review, it is theoretically argued that the commonalities pertaining to motivation and team performance may be categorized into three dimensions- *Nature of Work, Rewards,* and *Communication*. Thirteen variables called 'Project Team Member Motivators' are proposed. These variables, which are related to *Nature of Work, Rewards,* and *Communication* are used as scale to compare the collocated and virtual project teams in terms of expectations of the team members (referred to as 'Want') and characteristics of the project environment in terms of presence of these expectations (referred to as 'Get').

The respondents were a random sample of 132 respondents working in a project environment. 66 respondents belonged to collocated environment and an equal number were drawn from a virtual project environment. A two pronged approach first employing t-test for 'within the group' and 'between the group' comparisons was followed by using a Principle Component Analysis to bring to fore underlying factors which explain the motivation of project team members (Want), the characteristics of the environment in terms of support to the members expectations (Get) and the discrepancy between these two factor structures.

'Overall, significant discrepancies between 'Want' and 'Get' were observed with the highest discrepancies pertaining to financial rewards followed by understanding of the end-user requirements and enjoyable nature of work; in that order. In case of collocated project teams, the highest discrepancies were reported with respect to financial rewards, understanding of user requirements and opportunities for training, in that order. However, in case of virtual teams, the highest discrepancies noted pertained to communication and nature of work with understanding of user requirements, easy access to project information and feedback on performance showing the highest discrepancies. The between the group comparison revealed close affinities between the expectations of the team members and the characteristics of the project environment for the two groups. In case of expectations of team members,

communication related to task emerged as a distinct factor which explains motivation of the team members. In case of project environment's characteristic, it was clearly dichotomized into *internal* and *external* factors which contribute to motivation. The discrepancy between the two factor structures (expectations of the team members and project characteristics) was explained by a lack of top management's support in terms of providing training opportunities, performance feedback, not communicating user requirements and not creating task significance

INTRODUCTION

The acronym TEAM stands for Toghether Everyone Achieves More (Delisle, 2004). They have been defined " groups of two or more people who interact and influence each other, are mutually accountable for achieving common objectives, and perceive themselves as a social entity within an organization" (Cohen and Bailey, 1997; West, 1996; Mohrman, Cohen and Mohrman Jr, 1995; Katzenbach and Smith, 1993; Shaw, 1981). By replacing individuals as the basic building blocks of the organizations, team generates a positive synergy through coordinated effort of the people involved in the team. Their individual efforts results in the level of performance that is greater than the sum of those individual inputs (Robbins, 2003). This seems to suggest that teams, by definition, involves two facets- performance and individual effort. In this direction, the present study discusses these synergistic facets of the teams- team performance coupled with motivation. This relation between performance and motivation is especially conspicuous and inextricable in a project set-up as projects are bound by pre defined performance objectives, and the achievement of these objectives is one of the measures to assess project performance. Further, the development of the people skills is critical to project performance (Harrison, 1994).

In the discussion of teams operating in the organizations, businesses themselves are riding the waves of globalization. By adopting a global perspective, the companies are trying to achieve a competitive advantage essentially with respect to three key resources (Carrell, Elbert, and Hatfield, 2000)- physical (land, capital, technology), organizational (structure, processes), and human (knowledge, skills). Further focussing on the organizational and human issues, it has been seen that the complex and the turbulent competitive environment of information based economy has lead to work designs within and across the organizations which overcome temporal, spatial, and geographic boundaries (D'Aveni, 1995; Davidow and Malone, 1992; Jarvenpaa and Ives, 1994). It has lead the work to be highly 'informated' where the typical corporate employees have been into 'knowledge workers' whose tasks are increasingly computer mediated (Zuboff, 1984). This change has lead to the emergence of virtual or distributed teams (Maruping and Agarwal, 2004). Members working in a virtual team collaborate electronically with each other, using extensively Information and Communication Technology (Lipnack and Stamps, 1997; Mark, 2001). Working across multiple geographical areas simultaneously, they may never meet each other face-to-face but still form effective

teams (Orlikowski, 2002). In the wake of the fact that virtual or distributed teams are fast becoming a dominant work form of the future, their understanding, especially in terms of 'people' and performance' may be relevant and wanting more so, if the study compares these aspects in virtual (distributed) and the conventional face-to-face or collocated teams (Potter and Balthazard, 2002).

Reflecting on the literature, though there have been studies which compared collocated and virtual teams, these studies have either been strictly from a 'performance' perspective (Sambamurthy et al, 1993; Straus and McGrath, 1994) or from a team dynamics perspective (Cramton, 2001; Jarvenpaa and Leidner, 1999; Maznevski and Chudoba, 2000). The research study in question addresses these issues by integrating the concepts of people motivation and performance, and further, comparing these aspects in the conventional collocated and virtual set-ups.

The key issues addressed in this study first relate to present the theoretical concepts of motivation and the behavioural implications of team performance in terms of employee motivation. Then, the underlying variables contributing to motivation and team performance are compared in collocated and virtual environments from the team members' perspective. The study first explores the relative importance of these variables (argued to be contributing to motivation and team performance) to the collocated and the virtual project team members. Then, the collocated and the virtual project team environments are compared in terms of how characteristic these variables of the two project environments as perceived by the team members. Thus, this study comprehensively explains and compares motivation in collocated and virtual project environments. The nature of variables identified and the underlying premise for the present research study are explained in the section 'About the Research Study'.

It is to be noted here that as this study concerns exploring the motivational drives of project team members, the performance aspects are restricted to the measures at the team level, and only to the 'people' aspects, which draw an analogy with the motivation aspects in a project set-up (Thamhain, 1998). Thus, this study starts with a discussion on teams, and shows

theoretically how the concept of teams, integrates by definition, and in purpose motivation, and performance aspects.

Overview of the Research Study

Progressing within the framework of motivation, and team performance in a project environment, the research study presents a set of variables, which are theoretically argued to be contributing to motivation and team performance. These variables, which are related to 'Nature of Work', 'Rewards', and 'Communication' are called 'The Project Team Member Motivators' for the purpose of the present study.

The current study is a longitudinal study, which explores within and between the group discrepancies in the collocated and the virtual teams. Thus, at one level, the discrepancies between the expectations of the team members (hereafter referred to as 'Want') and the ability of the project team environments to support those expectations (hereafter referred to as 'Get') are compared in the collocated and the virtual teams. This is followed by a comparative analysis of the expectations (Want) of the collocated and virtual project team members. Similarly, the abilities of the collocated and virtual project environments to support those expectations (Get) are also presented. These analyses are done using the 'Project Team Member Motivators' as a scale.

Having established the differences between and within the groups, the study then reveals the underlying factors which are argued to be contributing to the expectations of the team members (Want) and the project environment characteristics (Get) as perceived by the team members. The study concludes with an explanation of the difference between the two factor structures of 'Want' and 'Get'; thus making contributions to academia and professional world.

Premise for the Study

The premise for this study has its roots in the concept of 'Psychological Contract' (Rousseaue, Wade-Benzoni, 1994, Katz, Kahn, 1996, Spindler, 1994, Guest et al, 1996). In a study which focuses on the motivation of the employees, and explores the impact of the work environment on employee's morale, a deeper understanding of the dynamics between the employee's motivation and the employer's position with respect to it may be important.

Further, it is to be understood that employee motivation is itself an expression of the individual's beliefs and expectations, with respect to their work environment.

Seconding the contentions of the Psychological Contract, is Kaliprasad (2006) who suggests that the climate (which is the collective mind of the people in the organization) in which the people work is important issue, influencing people motivation. Further, Nel et al (2001) suggest that employees have expectations with respect to issues such as amount of challenging work, salary, and promotion. Thus, this sets the platform for a discussion on the motivation of project team members in relation to their work environment.

Definition of Psychological Contract

Psychological contract has been put forth as the combination of beliefs held by an individual and his employer, about what they expect from each other. These expectations are unwritten and are operational at all the times between every member of an organization and the various managers and others in that organization. Thus, Rousseau and Wade-Benzoni (1994) define Psychological Contract as "beliefs that individuals hold regarding promises made, accepted, and relied upon between themselves and another. (In case of organizations, these parties include an employee, client, manager, and/or organization as a whole). Because psychological contracts represent how people interpret promises and commitments, both parties in the same employment relationship (employer and employee) can have different views regarding specific terms."

The above definition on psychological contracts suggests that there may be discrepancies in the expectations of the employees and employer. Seconding these observations, Robinson and Rousseau (1994) opine that a majority of the employees believe that there has been a violation of their contract on part of their organizations suggesting that there may be discrepancies between the expectations of the employees and the ability of their organization to support or provide these expectations. These differences would be evaluated by the employees with respect to the motivational drives and achievement of the performance outcomes such as opportunities of training, rewards, job satisfaction (Thomson and Heron, 2005). These would be discussed further in detail in "nature of psychological contract" next.

Nature of Psychological Contract

Commenting on the nature of psychological contracts, Katz and Kahn (1966) suggest that every role in an organization is a set of behavioural expectations, which are implicit and are not defined in the employment contract. The explanation for these expectations are grounded in the various theories of motivation such as expectancy theory (Vroom, 1964), and operant conditioning theory (Skinner, 1974), which posit that employees behave in ways they expect will produce positive outcomes, or in other words, the employees' actions are contingent upon their anticipation of satisfaction of their expectations. Seconding these observations on employees' expectations, Armstrong (2003) puts forth that employees have the following expectations from their employers:

1. To be treated fairly as human beings
2. To be provide with work that utilizes their abilities
3. to be rewarded equitable in accordance with their contribution
4. to be able to display competence
5. to have opportunities for further growth
6. to know what is expected of them and to be given feedback on how they are performing

Mirroring the above observations, Guest et al (1996) present the following aspects of the employee relationship covered by the psychological contract, from the employee's standpoint:

1. How the employees are treated in terms of fairness, equity, and consistency
2. Security of employment
3. Scope to demonstrate competence
4. Career expectations and opportunities to develop skills
5. Involvement and influence
6. Trust in the management of the organization to keep their promises
7. Safe working environment

From the employers' standpoint, Armstrong (2003) puts forth the following expectations:

1. To do their best on behalf of the organization
2. To be fully committed to the values of the company
3. To be compliant and loyal and
4. To enhance the image of the organization with its customers and suppliers

Further, Rousseau (2004), and Nordhaug (1989) suggest that employees expect their work environment and their employers to present opportunities to collaborate with co-workers, training and development, and career development However, it may be reiterated here that the current study aims to understand motivation from the project team members' perspective, only the employee expectations are considered, while the employer expectations are beyond the scope of the present study.

Psychological Contracts in Projects

In case of project set-up, project stakeholders in general, and the employees in particular, are identified by their interests, have a legitimate claim over the project resources , and have an interest in understanding how those resources affect their well being. These claims may relate to economic, social, and psychological satisfaction in the place of employment. Specifically, the employee expectations may be related to just behaviour on part of the company officials, sharing of fringe benefits, freedom to voice their opinion through channels such as collective bargaining, freedom in offering services through employment, and adequate working conditions (Cleland, 1998). This seems to suggest that employees expect their management to satisfy their claims (understood as being Obligations in the context of Psychological Contracts) and these may be related to performance based financial rewards such as the fringe benefits, congenial work and work environment, and opportunities to voice their opinion.

Significance of Psychological Contracts-Motivation

A study of psychological contracts in the context of motivation has been presented by Rousseau (2004) who states that managers use psychological contracts as a tool to motivate the employees. Underscoring the importance of psychological contracts in fostering motivation, Fiest and Gorman (1998) cite the example of knowledge workers and posit that as these workers draw motivation from their work itself, the extent to which their organizations provide these knowledge workers opportunities for professional growth is pivotal for motivation. Further, Schein (1965) presents the significance of psychological contracts by putting forth the employee expectations of the employers and the complimentary employer expectations. He states that the extent to which people work effectively and are committed to the organization depends on:

1. The degree to which their own expectations of what the organization will provide to them and what they owe the organization in return match that organization's expectations of what it will give and get in return; which is to say that the employees need to have clarity of organization's expectations of them and also have clarity of expected rewards
2. The nature of what is actually to be exchanged-money in exchange for time at work, satisfaction of social needs, and security in exchange for hard work and loyalty, opportunities to achieve self-actualization and challenging work in exchange for high productivity, high-quality work, and creative effort in the service of organizational goals.

These observations mirror the various theories of motivation (McClelland Theory of Needs (1961), Goal Setting Theory (Locke, 1968) Vroom's Expectancy Theory (1964)) which present the dynamics between rewards- expected outcomes, and the varying level of employee effort towards achieving the expected outcomes, with respect to the employee's clarity of rewards and his achievement of the rewards. These would be discussed at length in Section- "Motivation in a Project Setting".

Arguing in favor of maintaining psychological contracts and underscoring their importance in terms of employee-employer relation, Sims (1994) posits that a balanced psychological contract is necessary for a continuing, harmonious relationship between the employee and the organization. However, the violation of the psychological contract can indicate to the participants that the parties (employee and the employers) no longer share a common set of values of goals. This statement merits attention in the context of the project environments, as projects are goal directed and are built on the synergy between diverse set of skill sets and individuals who have expectations, even while working towards a common project goal.

Further, the significance of maintaining positive psychological contract is underscored by Guest et al (1996), when they state that a positive psychological contract is linked to higher commitment to the organization, higher employee satisfaction, and better employment relations. This is achieved through progressive and pragmatic human resource management (HRM) practices such as

1. providing opportunities for learning
2. training and development
3. focus on job security

4. promotion and career
5. Fair reward systems
6. Comprehensive communication and Involvement process

The above discussed interventions, which predominantly pertain to the employee expectations, are revisited in the sections on Literature review of this thesis and are their influences on project team member motivation is further discussed.

To summarize, Psychological contract is defined as a contract that refers to the beliefs that individuals hold regarding promises made, accepted, and relied upon between themselves and another. Further, Rousseau and Wade-Benzoni (1994) posit that employees may have expectations with respect to equitable rewards in accordance with their contribution, opportunities for growth, and to be provided with work that leverages their abilities, from their employers (Katz ,Kahn, 1996). These expectations are specifically emphasised in the models of motivation proposed by Vroom (1964) and in the Operant conditioning theory (Skinner, 1974). These would be discussed later in the section 'motivation in a project setting' and 'motivation concepts' respectively.

Objectives of the Research Study

Using the concept of Psychological contract as the framework, the present research study identifies the expectations of the project team members by drawing from the various theories on motivation which are relevant in the project environment. It is reiterated here that this is referred to as 'Want' in this study. Then, the ability of the project team environment to support those expectations of the team members or in other words, how characteristic are those expectations of the team members work environment is identified (referred to as 'Get' in this research study). These trends are compared in two kinds of project teams- collocated and virtual or distributed project teams.

Thus, the objectives of the present research study are to

1. Explore if there is a discrepancy between the 'Want' and 'Get' with respect to the project team members' expectations and to measure these discrepancy in collocated and virtual project teams
2. To compare the motivational drives ('Want') of the project team members working in collocated and distributed teams

3. To compare the ability of the project team environment to support the motivational drives of the project team members ('Get') in collocated and distributed teams
4. To understand the latent factors which may explain the motivational drives of the project team members ('Want')
5. To understand the underlying factors which profile the ability of the project team environment to support the project team members' expectations ('Get')
6. To explain the difference in the two abstracted factor structures ('Want' and 'Get') in terms of specific factors which contribute most to this discrepancy

Organization of the Research Study

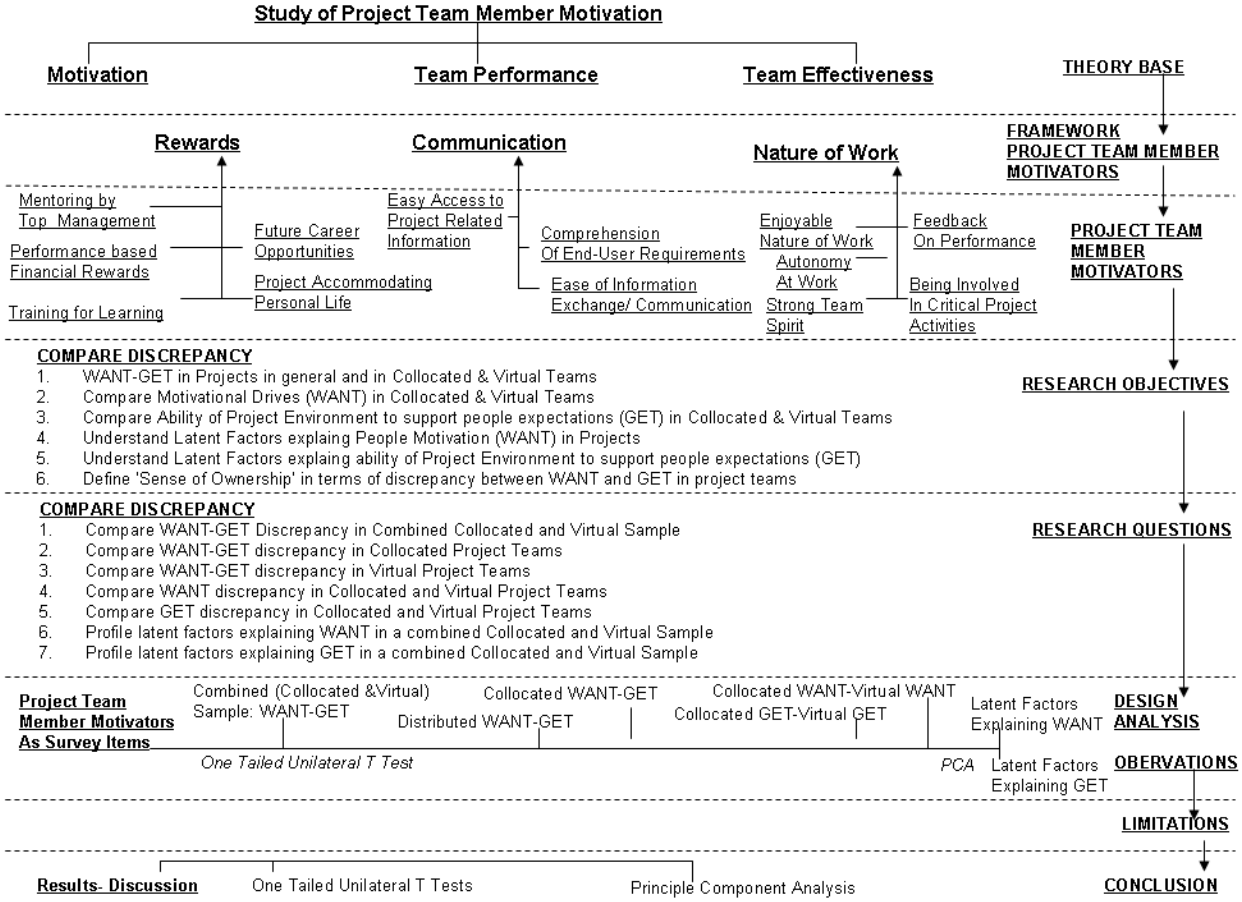
The present thesis is a longitudinal research study which compares the discrepancies in collocated and distributed project teams. In the part I of this thesis, the literature review for the current research study are presented, discussing in detail the people aspects and performance aspects through theories of Motivation, Team Performance and the behavioural implications of team performance in terms of motivation. These theories are pertinent to a project set up. An abstraction of these studies is presented next in Part II of this study as 'Framework for Project Team Member Motivators'. It is argued that motivation in the project context includes 3 facets- Nature of Work, Rewards, and Communication. Thus, research questions and hypothesis are formulated to specifically explore each of these aspects within the framework of the research objectives. Next to be presented in part III are the 'Project Team Member Motivators'. These variables relate to Nature of Work, Rewards, and Communication. These are used as survey items to explore the above mentioned 6 research objectives. A literature review on virtual (distributed) project teams, focussing on motivation is presented in part IV. The Methodology for the research study is described in part V. Part VI of this study presents the observations of the empirical tests, which test each of the hypotheses followed by a Discussion of these observations in part VII. The limitations of the study are discussed in part VIII. Part IX of this study presents an overall conclusion, summarizing the discussion of the results . Directions for Future Research are suggested in Part X.

Nine Appendices support the text of this thesis. Appendices 1-6 are the detailed MS EXCEL output of the one tail t-test analysis pertaining to the research questions 1-5. Appendices 7, and 8 are the SPSS output of the Principle Component Analysis related to research questions

6, 7, and 8. The survey instrument used for the purpose of this study- 'Sense of Ownership in Project Teams' is presented as Appendix 9 at the end of this thesis

An overall organization of the thesis, highlighting the key issues addressed in this research is presented in Figure 1-Overview of the Research Study below

Figure 1. Overview of the Research Study



Rationale, Significance and Expected Contributions of the Study

Although the concepts of team development, team formation and team performance have been well researched, there is dearth of research which focuses on team development issues in projects. Vis-à-vis the other areas of project management, where the research has been substantiated by experience, and scrutiny, the study of human variables seem to be lacking from rigorous definition and analysis (Hoffman, et al., 2002). Although empirical research on the impact of environment on the performance of the team has been presented in project management (Thamhain, 1998), a study which compares the expectations of the project team members with respect to the project environment may have been wanting. This assumes significance because, motivation in project teams is intricately related to performance, as well as to the project environment, as we would discuss later in this thesis in Part II.
On the other hand, although internet technology and its applications have increasing influence on new forms of work and organizations such as tele-work or remote working, research on the organizational aspects of remote work is limited (Baruch, 2001; Konradt, Schmook and Malecke, 2000a; McCloskey and Igbaria, 1998).

From the Academic perspective, it is expected that this research study paves way for further empirical research, which compares collocated and virtual project teams from different dimensions such as Leadership and Culture. From the industry perspective, the results of this study may be most relevant to the management of virtual and hybrid teams (which include collocated and virtual project teams), especially when interventions aiming to motivate the project team members, and enhancing team performance are planned.

The study would now focuson literature review on Motivation. A snapshot of various definitions and the concepts of motivation are first introduced. Then, motivation is discussed in the context of a project set up. It is here that the concepts of Intrinsic and Extrinsic Motivation are introduced. An attempt is made to retrace the key issues discussed in these concepts to the theories of motivation, especially as seen in a project set-up. The key theories of motivation, which are relevant to projects (as presented by Thorns (1998)) are discussed- McClelland's Theory of Needs (McClelland et al, 1961, 1974, 1975, 1986), Goal Setting Theory (Locke, 1968), Expectancy Theory (Vroom, 1964), Equity Theory (Adams, 1963), and finally Control Theory (Klein, 1989).

I. LITERATURE REVIEW

Theory Base-Motivation

A key contextual issue to be addressed in this thesis is to understand how does motivation operate in a project environment. To foreshadow this discussion, the definition and the concepts integral to motivation are first discussed. Drawing from this literature, the intricate relation between the performance aspects and motivation are presented, which is a characteristic feature of motivation in projects.

Definition and Introduction to the concepts of Motivation

Motivation has been defined as the process that account for an individual's intensity, direction, and persistence of effort towards attaining a goal (Mitchell, 1997). It has also been described as goal-directed behaviour (Armstrong, 2003). Further emphasising on the relation between individual efforts and orientation towards the goals, Hellreiger et al (1998) define motivation as 'the forces acting on or within a person that cause the person to behave in a specific goal-directed manner'. Based on the above definitions of Motivation, Robbins (2003) posits that the key aspects which constitute motivation are the intensity with which a person strives to achieve his goal, directing this effort to achieve the organizational goals, and the persistence of that person to maintain this effort. These facets of motivation assume significance because the emphasis seems to be on the individual self as much as it is on the objectives to be achieved, which is to say that motivation has to be goal specific. Thus, in a study which concerns motivation in a project context, these notions become relevant because projects are bound by time, space, money, materials, equipment, information, and people constraints (Lock, 1994) and have an identifiable goal (Young, 1994).

Apart from the individual effort and the performance orientation of motivation, it may also be important to know that Organization, as a whole, can provide a context within which high levels of motivation may be achieved (Armstrong, 2003). This forms the premise for the present research study, which juxtaposes individual expectations and the ability of the project environment to meet those expectations. This has already been seen in the discussion on Psychological Contracts, which serves as the conceptual premise for the present research study and the methodology.

Motivation in the Project Context

Motivation in a project environment has been extensively presented in the studies by Harrison (1994), when he emphasised on the role of 'people system' to achieve project performance. Underscoring the importance of motivation, he further stated that though performance is dependent on the ability of the people, motivation has an important bearing on the people performance and it impacts performance either positively or negatively. While questioning the appropriateness of the various schools of motivation, which are grounded in the behavioural perspective-advocating openness, consideration, and participation as the only way of motivating the personnel, Harrison (1994) argues that a strict adherence to the behavioural school to motivate the employees may not be effective in a project context nor does it elicit the required level of performance as this perspective on motivation gives priority to the 'needs, aspirations, satisfaction, and personal growth of people', rather than focussing on profit, performance, completing the project on time, within cost and achievement of technical objectives.

Mirroring the above observation on motivation that Organization may be equally influential by providing a context for motivation and thus supporting it (Armstrong, 2003), Harrison (1994) observes that the two situational factors that may determine the effectiveness or the applicability of any action aimed at motivating people in a project setting are:

- The characteristics of the people involved
- The characteristics of their environment (House and Mitchell, 1974)

These observations substantiate the contention that, in a project environment, a study which explores the motivational aspects of project teams, may also need to consider the performance aspects, as it is intricately entwined with motivation (as had been seen above in the definition of motivation),and the project environment itself.

Exploring further the relationship between the characteristics of the people involved and motivation, Miner (1980) states that individuals vary in their response to the following sources of motivation, based on their characteristics:

- Consideration
- Achievement Opportunities
- Extrinsic Rewards (such as pay and promotion)

- Autonomy and
- Authoritarianism

On the perceptual difference of the people with respect to motivations in relation with the characteristics of their environment, he states that people may react differently to the following environmental conditions:

- The task being structured or unstructured
- High or low degree of formalization
- Work being interesting, stressful, tedious, routine or difficult
- The structure of the organization being mechanistic/bureaucratic or organic/loose-tight
- Organization morale being low or high
- Relationships approach teamwork or conflict
- The situation being static or dynamic

As a conclusion to the study of motivation in a project setting, Harrison (1994) suggests that to be able to motivate the people, the following may be effective motivation interventions:

1. Managerial Motivation
2. Extrinsic Rewards
3. Goal Setting
4. Job Enrichment

Further, as has been mentioned earlier, participation as a tool for motivation has been suggested as being unsuitable to a project context.

A popular school of thought which identifies and categorizes the different motivational drives of the individuals is the Intrinsic and Extrinsic motivation. A discussion of what characterizes the intrinsic motivation and what constitutes Extrinsic motivation here is important because the different issues of motivation to be discussed in the following sections on theories of motivation relevant to the project context are drawn from the intrinsic and extrinsic motives of the individuals.

Concepts of Motivation

Intrinsic Motivation

The concept of Intrinsic motivation can be traced back to the studies of White (1959) when he proposed his theory of 'effectance motivation', stating that individuals felt motivated when they influenced their environment. The modern day definition and understanding of intrinsic motivation find its roots in Deci's theory of Intrinsic Motivation (1975) which described

intrinsic motivation in terms of task autonomy and enjoyable work. Intrinsic motivation has been defined as motivation to work on something because it is interesting, involving, exciting, satisfying, and personally challenging (Mats, et. al, 2005). This definition of intrinsic motivation has been seconded by Ralph (2005) who stated that intrinsic motivation stems from interesting nature of work; and by Piccolo and Colquitt (2005) who related intrinsic motivation to challenging, important, and autonomous nature of work. Autonomy being a crucial aspect to intrinsic motivation has been supported by Hackman and Oldham (1980) and later by Richer and Vallerand (1995). Apart from the nature of work, Deci (1975) suggested that competence is a source of intrinsic motivation. This assumes significance in the present study because as would be discussed later in the section on team performance, in a project context, performance is intricately associated with motivation and ability to perform is facilitated by knowledge of project specific goals.

Extrinsic Motivation

Kwok and Gao (2006) state that extrinsic motivation refers to performance of activities in order to attain separable consequences. Actions prompted by extrinsic motivation are engaged as a mean to an end and not for their own sakes (Kruglanski, 1978; Ryan and Deci,2000; Vallerand and Bissonnette, 1992). Thus, this supports the views that extrinsic motivation is extraneous in nature and is prompted and mediated by the work environment rather than the individual's self. Extrinsic motivation has been brought to the fore in Skinner's theory of operant conditioning (1953) which emphasises on performance based financial rewards such as merit based pay plans, and annual performance reviews, and feedback programmes. These findings are supported by Strickler (2006) when she states that extrinsic motivation includes factors relating to financial benefits, security (of the job), and the working conditions. Further, Weitz et al (1986) suggest that extrinsic motivation relates to recognition, money, and growth.

Previous studies suggest intrinsic motivation to be more effective than extrinsic motivation as intrinsic motivation instils high level of commitment in the employees for task performance. However, in a project setting, as motivation theories related to both intrinsic and extrinsic motivation are discussed , it is observed that both these sources of motivation are relevant and effective.

Intrinsic and Extrinsic Motivation in Project Context

Garies (2005) identified intrinsic and extrinsic motives in a project environment, which correspond to task, relational, and reward needs discussed above.

Intrinsic motives have been defined as satisfaction achieved from the work itself and as being distinct from extrinsic motives. Intrinsic motives are related to –

- Performance motives
- Competence motives
- Relational motives

Performance motive is the satisfaction the individual derives by achieving the performance objectives he sets for himself. An example of performance motive can be an opportunity to perform difficult task. These motives reflect the The Achievement Needs, as discussed in the McClelland's Theory of Needs (McClelland et al, 1961, 1974, 1975, 1986) and the Goal setting theory (Locke, 1968). The competence motive stems from the ambition to achieve professional development, high performance, and the desire to influence future developments. This is to say that project team members who value competence motives, may value a high degree of autonomy at work and non financial rewards such as career advancement which offers them an opportunity for professional development. These motives of the individuals can be mapped to The Need for Power as discussed in the McClelland's Theory of Needs (McClelland et al, 1961, 1974, 1975, 1986), which posits that individuals are motivated when they are in charge of their work situation, and when are in a position of status by achieving career growth and being involved in important tasks.

The relational motive results from the desire to make contact with others. The project team members having a strong propensity for relational motives may either be team players, who enjoy working in teams, or can be workers who prefer to work alone. To be noted in here that as this study concerns project teams, and their motivational drives, relational motive from the perspective of workers who prefer to work alone, is not relevant to the study. The relational motives seem to be grounded in The Need for Affiliation of the McClelland's Theory (McClelland et al, 1961, 1974, 1975, 1986), which states that individuals are motivated when they are engaged in relationships which offer a high degree of understanding and friendship suggesting that team spirit may be motivating to the employees. On the other hand, extrinsic motives are dependent more on the environment and less on the job and may either be

material incentives such as financial rewards, or immaterial rewards such as opportunities for career growth, information, and communication (Guthof, 1995). These motives are explained as Valence- the ability of the organizational rewards (tangible rewards) to satisfy individual's needs in Vroom's Expectancy Theory (1964).

As the scope of the present study does not include Managerial Motivation, the focus of discussion is on extrinsic rewards, goal setting and nature of work. These aspects are discussed using various pertinent theories of motivation, starting with McClelland's theory of Needs (McClelland et al, 1961, 1974, 1975, 1986).

Having discussed the definition of motivation, and motivation in a project context which strongly establishes the link between motivation and the performance outcomes; and after introducing the two kinds of motivations- intrinsic motivation and extrinsic motivation, the issue to be focussed upon is the suitability of a motivation in a project setting? Though this has been partly answered in the discussion on intrinsic and extrinsic motivation, when intrinsic and extrinsic motivation in the project context has been discussed in this section, a more detailed literature review is warranted for a better understanding of the influence of these variables on motivation in a project set-up. Therefore, the study now focuses on motivation in a project set up by studying various theories of motivation which have been deemed pertinent to projects and where the above discussed aspects of motivation are implicitly or explicitly grounded in these theories. For the purpose of this study, work by Thorns (1998), who has discussed McClelland's Theory of Needs (McClelland et al, 1961, 1974, 1975, 1986), Goal Setting Theory (Locke, 1968), Expectancy Theory (Vroom, 1964), Equity Theory (Adams, 1963), Reinforcement theory (Ferster and Skinner, 1957), and Control Theory (Klein, 1989) as being relevant in a project context have alone been considered.

Motivation in a Project Setting

Thorns (1998) in his account on various theories of motivation relevant in a project contexts, suggests that motivation is intricately related to performance. The various aspects of team performance such as money, resources, scope, and time constraints are presented as being central to motivation in a project context. These would be touched upon in the literature review on Team Performance. The three reasons why motivation to perform appropriate

activities is particularly important in a project and therefore consideration of performance aspects in this study on motivation are:

1. Projects are bound by specific time frames during which the project has to be completed. Often, as the other departments are dependent on completion of the project, a lack of direction and effort in achieving the project objectives can negatively affect the other areas of the organization.
2. Projects have high financial commitments in terms of high labour costs of professionals who work on the projects, the special materials and resources used on the design and development of the product, and the high priority accorded to the project work. Hence, low levels of motivation may lead to wastage of resources and money.
3. Projects are vehicles to achieve the corporate strategy, which may be a response to anticipated or unanticipated trends in an organization's market or to potential or real problems. Project team members' lack of motivation may seriously undermine the operations of the organization in a dynamic environment.

As has been defined above, projects are characterized by achievement of goals. Therefore, a strict adherence to the behavioural approach to motivation (advocating openness, consideration and participation of the employees as the only way to motivate the people) may not necessarily stimulate a high level of performance (Harrison, 1994). This is to say that no one of the above mentioned factors as a "stand alone" may enhance performance. Further, in a project environment, people will vary in their response to various sources of motivation such as Consideration, Achievement opportunities, Extrinsic rewards, and Autonomy. Hence, to be able to motivate those involved in a project, the characteristic of the people and the project environment need be considered. While the 'need of achievement' (where individuals are given challenging goals to be achieved, given feedback on their performance, and are given the right degree of autonomy at work to take upon personal responsibility) coupled with 'goal setting' and 'reward system' has been found to be effective in the project environment (Harrison, 1994), these would be seen in greater detail in the theories of motivation which are discussed below.

McClelland's Theory of Needs (McClelland et al, 1961, 1974, 1975, 1986)

McClelland's Theory of Needs has been developed by McClelland and his associates (McClelland and Van Nostrand Reinhold, 1961; Akinson and Raynor, 1974, McClelland, 1975; Stahl, 1986). This theory focuses on three needs- Achievement, Power, and Affilitation. Each of these has been defined as follows:

Need for Achievement:

The drive to excel, to achieve in relation to a set of standards, to strive to succeed.

Need for Power:

The need to make others behave in a way that they would not have behaved otherwise.

Need for Affiliation

The desire for friendly, and close interpersonal relationships.

Further, this theory defines the personality types of personnel by categorizing them into one of the above mentioned 3 needs.

From the Need for Achievement standpoint, the theory posits that high achievers seek situations which offer them

- Personal responsibility
- Challenging Goals
- Rapid feedback on their performance

This seems to suggest that people who have a propensity for achievement, satisfy their motivational drives by seeking challenging work, which offers a high degree of task significance and personal accountability.

From the Need for Power Standpoint, this theory suggests that people tend to be motivated when they are:

- 'In Charge' of their work situation
- Exert influence over others with effective performance
- Are in a position of status-oriented situation

This seems to suggest that people, who are motivated by power, tend to greatly value their autonomy at work and satisfaction of their esteem needs, which is brought about by being involved with an important task, or a position, career advancement, and a strong performance orientation.

From the Need for Affiliation stand point, this theory posits that people tend to be motivated by:

- Cooperative situations
- Friendship and
- Relationships which offer a high degree of mutual understanding

This seems to suggest that people who value affiliation needs, would greatly value strong team spirit and a bonding with their colleagues at work.

Previous research has predominantly explored and proved the role of Need for Achievement – which includes challenging goals, feedback on performance, and personal responsibility and its positive impact on the job performance (Robbins, 2003). This observation is important and especially relevant to this study of motivation in project context as projects themselves are defined by strong performance objectives and hence, McClelland's theory of Need for Achievement may be relevant to and operational in a project team environment.
These observations proposed by McClelland have been seconded by Dalton and Thompson (1993) and by Katz (2005) when they state that challenging work which offers scope for a high degree of innovation and autonomy (intrinsic motivation) is highly motivating especially in case of project team members who are working in technology intensive projects. Further, they posit that the motivating potential of any job depends of the employee's perception towards task, information, rewards, and decision-making processes. This again strongly relates to Need for achievement and Need for Power motivations suggested by McClelland (McClelland et al, 1961, 1974, 1975, 1986).

The need for achievement may be traced back to McClelland's Theory of Needs (McClelland et al, 1961, 1974, 1975, 1986) when he defined "Need for Achievement" as "The drive to excel, to achieve in relation to a set of standards, to strive to succeed". Translating this to the project environment, Harrison (1994) observes that individuals working in project settings have are ambitious, have goals and hence would value incentives such as advancement, money, good assignment, and feedback. Also, the underlying belief in this situation is that a high level of personal or team performance will be recognized, actualize the results and would bring in the rewards. This discussion on individual's need to achieve his goals, now leads to the Goal-Setting Theory (Locke, 1968). This theory is of particular importance to this study as

projects are bound by goals and this theory offers insights into the relation between the importance of having specific goals and motivation.

Goal-Setting Theory (Locke, 1968)

The goal-setting theory suggests that when employees are given specific goals, the specificity of the goal acts as an internal stimulus which motivates the employees. The greater the complexity of the task, the greater would be the efforts exerted by the employees and hence, the higher would be the performance. The Goal-Setting Theory (Locke, 1968) suggests that specific goals produce a higher level of output and that this need be coupled with feedback on performance, to be able to motivate the person (Robbins, 2003). This relation between task complexity and motivation is further supported by (Kanfer, 1990; Kanfer and Ackerman, 1989; Kanfer, Ackerman and Heggestad, 1996), when they suggest that when the task is difficult, the individuals allocate higher level of effort towards their on-task activities, which is an indicator of motivation. In a project setting, when achievement and target setting are infused in the project planning and control systems, it may act as an effective motivator. Further, a feedback on performance, which would help a person know how well he has achieved his personal targets, may be motivating. However, it has to be ensured that the individual's targets are aligned with the overall project targets (Harrison, 1994), to be able to achieve the dual benefit of motivation and team performance.

As mentioned in the introduction to this section of thesis- motivation in a project context, both intrinsic and extrinsic motivation need be explored in a project team context while studying the motivational drives of the members of the project team, as both these sources of motivation seem to be valued by the project team members. McClelland's theory of needs, while explains the motivational drives, predominantly from the 'Nature of Work' perspective, which lie more in the realm of intrinsic motivation (Ralph, 2005; Piccollo and Colquitt, 2005), does not explore the role of tangible rewards and its impact on motivation. Hence, other theories of motivation, which explain these trends, and which may be relevant in a project context are given below, starting with Expectancy Theory (Vroom, 1964).

Expectancy Theory (Vroom, 1964)

The relevance of Expectancy theory to a project set-up, where it provides a conceptual base for the understanding of motivation has been presented by McFillen and Maloney (1986a). Expectancy theory brings to the fore the relationship between motivation and performance

through rewards or the expectations from the outcome. This theory argues that employees would be motivated to perform better when he/she believes that his/her efforts would lead to an effective performance appraisal and which in turn would lead to rewards-financial and career advancement, which would satisfy employees personal goals. This theory suggests a 3 step process starting from individual effort and culminating in the achievement of personal goals.

The 3 steps are:

1. Effort-Performance relationship (Expectancy): The probability perceived by the individual that exerting a given amount of effort will lead to performance.
2. Performance-Reward relationship (Instrumentality): The degree to which the individual believes that performing at a particular level will lead to the attainment of a desired outcome.
3. Rewards-Personal Goals relationship (Valence): The degree to which organizational rewards satisfy an individual's personal goals or needs and the attractiveness of those potential rewards for the individual.

It may be observed from this discussion on Expectancy theory that this theory brings to the fore, the role of extrinsic motivation factors or tangible rewards such as rewards being linked to performance and career advancement. Hence, this theory along with the other theories on motivation discussed earlier-McClelland's Theory of Needs (McClelland et al, 1961, 1974, 1975, 1986), Goal Setting Theory (Locke, 1968) explains the motivation of project team members (in terms of being intrinsic and extrinsic in nature).

Further, when putting forward the concepts of 'Expectancy' and 'Instrumentality', this theory suggests that the strength of the relationships – 'Performance-Reward' and 'Rewards-Personal Goals' depends on the individual's perception of his work environment and his expectations from the work environment to support his personal goals leading to motivation. This while subscribing to the observations of House and Mitchell (1974), who state that motivation is contingent upon the work environment, also provides the conceptual framework for the current research study, which explores motivation in a project context at two levels-individual expectations and the role of project team environment to satisfy those expectations. The role of environment in influencing motivation is further substantiated by the studies of Peters, O'Connor, and Rudolph (1980), Blumberg, and Pringle (1982), Wademan, and

Spangler (1989), and Hall (1994) through the concept of 'Opportunity to Perform' which argues that even though the individual is willing to perform, there may be many obstacles in the work environment such as lack of favourable work conditions, work rules, uncooperative co-workers, insufficient information to make job related decisions, and adequate time to do a good job.

Thus, it can be seen that Expectancy theory on motivation has brought to the fore the dynamics between the individual's motivation and his/her project environment, where the motivation is measured with respect to the project environment's ability to satisfy his motivational needs, given that the individual exerts a level of effort to achieve the organization's goal, and has a certain level of expectations in terms of rewards from the project environment for his efforts. Mirroring the observations of the Expectancy theory is the Reinforcement theory (Ferster and Skinner, 1975). As in the case of Expectancy theory, this theory brings to the fore the relation between motivation and rewards. However, the emphasis of this theory is on financial rewards. This is discussed next.

Reinforcement theory (Ferster and Skinner, 1975)

Reinforcement theory posits that people tend to repeat behaviour for which they are rewarded and stop behaviour for which they are not rewarded. Further, people need to have their performance reinforced regularly. In this direction, the theory states that variable pay on variable schedules is more effective than the fixed interval, fixed-schedules type of performance. This concurs closely with the notion of Instrumentality discussed earlier in the context of the Expectancy theory (Locke, 1964), where the individual varies his performance efforts in consonance with the probability of attainment of the outcomes or in other words, satisfaction of his expectations.

An extension to the Expectancy theory is the Equity Theory (Adams, 1963) and Reinforcement theory (Ferster and Skinner, 1975) which discusses the team member's motivation in relation to his environment and also with respect to his peers. As in the case of Equity theory and the Reinforcement theory, this theory suggests that the individuals vary their performance effort in relation to the achievement of the satisfaction of their needs, which may be intrinsic (related to work) or extrinsic (related to financial and non-financial benefits). This theory is presented next.

Equity Theory (Adams, 1963)

Equity theory suggests that individuals think about the time and effort they put into their work and compare that with the outcomes of the work- recognition, pay, benefits, opportunities for the development of technical expertise, collegiality, a good working environment, job (and therefore, financial) security, and job satisfaction. When the individual perceives the comparison to be equal, the same effort is continued to be exerted. If the individual perceive that the level of effort expended is more than what the project team environment is offering, there may be a slack in the level of effort exerted to accomplish an objective. If the individual perceives that his motivational drives are more than adequately being met by the project team environment vis-à-vis his efforts, there would be renewed interest in the individual to enhance his level of effort towards an objective.

While the individual compares the accomplishment of his motivational drives in relation to his work environment, he also constantly compares himself with the other team members, people with similar training and similar nature of work, and external professionals who work in their field. These comparisons again are with respect to the level of efforts exerted to the rewards obtained. When they perceive an imbalance, the Equity theory predicts that the individual will make an adjustment to his efforts. In case of professionals, such as the ones working in project environments, comparisons with respect to pay fairness are most common (Peg Thorns, 1998).

It has been observed in this discussion on motivation theories in a project context that the emphasis seems to be on the intrinsic motivation factors, such as interesting nature of work or a challenging task, and also on the extrinsic motivation factors such as career advancement, and financial rewards which are linked to the performance. Further, these theories tend to suggest that individual motivation is 'relative' and is contingent upon:

1. The project environment, where the individual's motivation is understood as the extent to which the individual's needs are satisfied by the project team environment and
2. The extent to which the individual's needs are satisfied by his efforts as compared to his peer (as seen in the Equity theory). These needs again may either be intrinsic or extrinsic.

The next theory to be discussed, called the Control Theory (Klein, 1989), builds on the and the Equity Theory (Adams, 1963), and further supports the argument that motivation is dependent on the ability of the individual to satisfy his needs vis-à-vis his peers, and is also in consonance with the Goal Setting Theory (Locke, 1968) discussed earlier in this section- Motivation in a Project Setting, when it states that individuals constantly compare their motivation against set standards and are thus motivated when they achieve them. This is explained in detail below.

Control Theory (Klein, 1989)

The control theory is a meta cognitive theory of motivation. This theory suggests that individuals constantly compare their performance against standards (represented by goals). These comparisons are essentially with respect to nature of work itself and are done by eliciting feedback from the co-workers and the managers. Based on this feedback, the individuals observe the discrepancy between the expected level of performances (as set by the goals) and their actual performance on the job. Accordingly, the level of effort exerted by the individual is adjusted depending on the actual performance of the individuals and the expected performance.

It may be observed from this theory that as seen in the McClelland's theory of Needs (Need for Achievement) and Goal Setting theory, individual's tend to evaluate their performance constantly based on the feedback from their coworkers. While the McClelland's theory of motivation and the Goal Setting theory extend the parameters for feedback of performance to extrinsic and intrinsic motivation factors, i.e., when the individual evaluates the effort exerted to the outcomes achieved in terms of task significance, career growth opportunities, and the financial rewards, the Control theory posits only the nature of work as being a parameter to measure the individual's motivation.

Further, extending on the Equity theory, where the individual compares the satisfaction of his needs (intrinsic and extrinsic) vis-à-vis to his peers, the Control theory also suggests that individual's compare the satisfaction of their needs in terms of interesting work with their peers.

Summary: Literature review of Motivation in Project set up

To summarize the discussion on motivation in a project environment, the discussion starts with the definition on Motivation, which defined motivation in terms of individual effort, effort exerted towards a performance outcome, and which is contingent upon the environment in which the individual works. This definition suggests that performance is intricately related to motivation. Moving to the relevant studies on motivation in a project environment, the literature suggested that rather than a behavioural approach, a more pragmatic approach, focussing on the project outcomes is effective in a project context. Further, the characteristic of the individuals and that of the environment need be considered when planning and implementing a motivation intervention in a project set-up. Further, the individuals may have propensity for intrinsic and extrinsic motivation factors.

The study then focuses on understanding intrinsic and extrinsic motivation, first tracing them back to their theories of origin and defining them; Intrinsic motivation being related to nature of work, and Extrinsic motivation as being related to the financial and the non-financial rewards. Next, intrinsic and extrinsic motivation are discussed in a project context, where they are referenced to theories of motivation relevant in a project context. These theories are discussed next starting with the McClelland's theory of needs, which states that people can be motivated in relation to set standards, challenging goals and nature of work, feedback, autonomy at work, and with opportunities to foster congenial relation with their peers working on the project; thus focussing on the 'nature of work' as being a motivator.

The next theory to be discussed, the goal setting theory, which further supports one if the contentions of the McClelland's theory of needs-challenging goals and work being motivating to the project team members, stating that specific goals increase the performance of the project team members and when this is coupled with feedback on their performance, is motivating to the people. The next theory to be presented is the Expectancy theory, which shows the relation between the individual's motivational drives, performance outcomes, and rewards. This theory states that individuals vary their performance efforts in relation to the realization of their rewards.

The Reinforcement theory discussed next contends similar views, which states that individuals vary their performance effort in relation to the realization of the tangible rewards. Equity theory of motivation echoes similar views and states that individuals vary their performance effort in comparison to the realization of the rewards with their peers. Further ushering the role of peers and their influence on the individual varying his performance effort, the control theory states that individuals seek feedback from their peers and the managers on their performance, in terms of expected performance and actual performance, and vary their performance effort accordingly to minimize the discrepancy between the expected and the actual performance levels. It may be inferred that expectancy theory, reinforcement theory, and equity theory bring to the fore the role of environment (nature of work, management support or peers) and their influence on motivation through team performance.

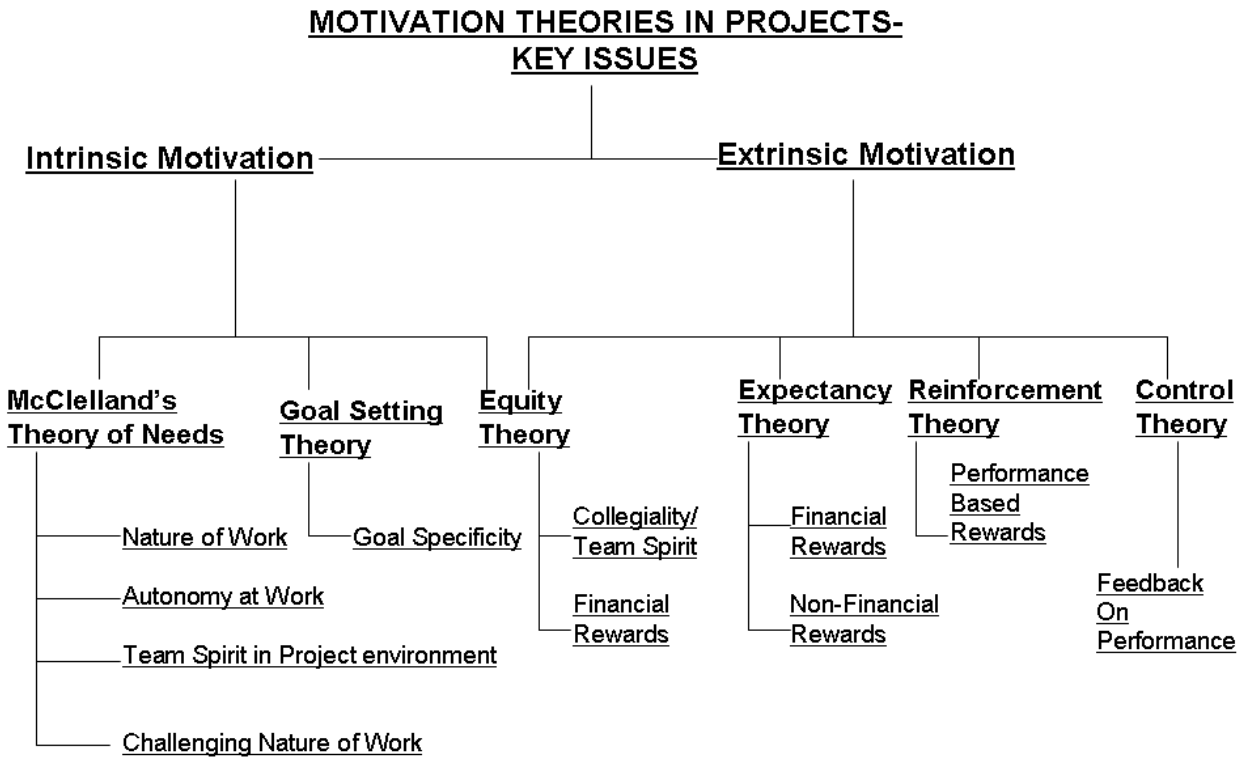
It is reiterated here that the underlying theme running parallel to motivation is team performance. The discussion on team performance is vital as it has been observed in the discussion of the various theories on motivation that the emphasis has been on achieving expected performance levels. As this present study is about team member's motivation in a project environment, the project goals, which are expressed as team performance measures, need be discussed. While the more direct measures of team performance such as the ability of the project team to adhere to the time, scope, cost, and quality constraints are briefly touched upon, the bhehavioral implications for the team members upon the achievement of these goals in terms of motivation is extensively discussed. Also of particular interest to this study are the 'people oriented characteristics' of the teams, which are critical to achieve team performance.

Further, these critical success factors for team performance, which are related to work, financial and non financial rewards, and communication, mirror the contention of the various theories of motivation discussed earlier. Thus, having focused on two aspects of the teams- the individual effort and the role of project work environment in fostering motivation, the other facet- performance orientation is presented next through a discussion of Team Performance.

Figure 2. below summarizes the key issues which were brought forward through the various theories of motivation. These issues foreshadow the discussion on variables pertaining to

motivation in a project environment which would be discussed later in the section of the thesis 'Project Team Member Motivators'.

Figure 2. Motivation Theories in Projects



Theory Base- Team Performance

Introduction

From the above discussion of motivation in a project set up, it may be inferred that there is a strong 'performance' orientation to the various factors contributing to motivation. These factors, may be intrinsic, or in other words, being related to nature of work, or may be extrinsic, related to financial and the non-financial rewards. It is to be recalled here that, because this study focuses on the motivation in project teams, explored from a team members' perspective, the study of performance aspects is restricted to people issues at the project team level (Thamhain, 1998).

The purpose of this section is to theoretically show the relationship between motivation and team performance in a project environment. This is done through a discussion of the behavioural implications in terms of motivation, upon the achievement of team performance. While the key issues pertaining to motivation in terms of nature of work, rewards (financial and non financial) have been touched upon in the previous discussion on motivation, this section brings forward the importance of communication in a project environment and its role in motivation.

The section first presents the definitions and concepts of teams n general and project teams in particular. Then the metrics for team performance and characteristics of successful project teams in terms of performance are discussed. These performance measures are related to project-oriented and people-oriented results (Thamhain, 1998). The behavioural implications in terms of motivation are discussed upon the achievement of project oriented characteristics of team performance. This discussion forms the link between team performance and motivation.

A further literature review on team performance, studying factors which led to team performance underscores the role of communication in enhancing team performance and also fostering motivation in project teams As a conclusion to this section, an attempt is made to theoretically show the relation between factors contributing to team performance, and factors contributing to motivation in project teams.

Concepts and Definition

Team and its Characteristics

A Team is defined as 'A distinguishable set of two or more people who interact dynamically, interdependently, and adaptively toward a common and valued goal/ objective/ mission, who have been assigned specific roles or functions to perform, and who have a limited life-span membership' (Salas et al, 1992). Further, Dyer 1984, Modrick 1986, Morgan et al. 1986, Salas and Cannon-Bowers (1997) state that teams are characterized by common values and goals, intensive communication among the members, task relevant knowledge, common values and goals, and specialized member roles. However, to define as to what is a project team, the lack of literature on the definition of the term project team and further, similarities in the characteristics of 'teams' and 'project teams' seem to suggest that the definition of project teams may be similar to the definition of teams, reflecting the characteristics of a project.

Project Team and its Characteristics

Hoffman, Kinlaw, and Kinlaw (2002) observe that the term project team has been used in reference to the group of people assigned to a project; this being the popular thought among most of the writers (Catledge and Potts, 1996; Kerzner, 1995; Kinney and Panko, 1996; Lock, 1996). However, they add that the qualitative differences that exist between the groups, teams, and superior teams, which have been presented above, have not been addressed adequately while proposing the definition of the project teams (Kinlaw, 1981, 1989). However, drawing upon the definition of project teams, as given by Rosenau and Moran (1993), who have defined project teams as "The project team is people who work on the project and report administratively to the project manager", Hoffman, Kinlaw, and Kinlaw (2002) conclude that the term project team is used to denote collectively the people in a project, and not to denote the qualitative aspects of a project group". From the performance standpoint, which brings to fore the typical characteristics of the project teams such as time constraints, quality requirements, and directed at implementing a change, Ericken and Dyer (2004) define a project team as "Project teams consist of members who are brought together usually on short notice and from disparate functions, units, and geographical locations, and charged with analyzing issues and producing and sometimes implementing recommendations under fixed and often tight deadlines. Those involved are expected to find ways to work together effectively, structure and execute unfamiliar tasks, obtain essential resources, deal with

multiple stakeholders, manage time, and ultimately produce high-quality outcomes (Keller, 2001)".

On the question of, what are the characteristics of the project team, similarities are observed between the characteristics of the team, as had been given by Salas and Cannon-Bowers (1997), and the characteristics of superior project teams (Hoffman Kinlaw, and Kinlaw, 2002). It may be summarized from their work that project teams are characterized by individuals, with clear understanding of the project requirements (reflecting the team characteristic of common values and goals), sharing of information and communication (reflecting the team characteristic intensive communication among the members), competence-having the knowledge and skills to perform the technical tasks (which may refer to the team characteristic of task relevant knowledge), and finally, are characterized by individuals who have specialized competencies and are fully aware of each others competencies, understanding the boundaries of their jobs and the relation between them and achieve synergy between each others competencies and jobs, to meet the larger needs of the project (may refer to the team characteristics specialized member role).

From the behavioural influence stand point, the characteristics of a project team and its ultimate performance depend on many factors related to people, task and organization. Further, motivation is assumed to affect performance by the way individuals allocate efforts to tasks (Blau, 1993; Kanfer, 1990; Katzell and Thompson, 1990). Though there may be difficulties in defining, and measuring effort (Ambrose and Kukil, 1999; Kanfer, 1990), there exist specific criteria to measure effort in terms of performance in project management. Typically, Team performance can be defined as the extent to which a team is able to meet the established objectives.

On the question of what are the parameters to measure team performance, Thamhain (1998) and Wang et al (2004) suggest variables related to the specific objectives of the project and to those of the team members performing the project (Thamhain, 1998); the achievement of which translates to a performing team. These characteristics have been classified as being 'Project Oriented', and 'People Oriented'.

Project-Oriented Characteristics

The performance of a project team depends on factors related to people, task, and organizational issues. Though there seem to be numerous measures of project team performance, there seem to be consensus on the following characteristics of project team performance. Coming to the question of high-performing project teams, Thamhain [1998] and Thamhain and Wilemon [1998] have suggested the following as the characteristics of successful project teams:

- Technical project success according to agreed-on plans
- On-time performance
- On-budget performance
- Responsiveness and flexibility to customer requirements and changes
- Strategic positioning of the project for future business
- Ability to stretch beyond planned goals
- Organizational learning benefiting future projects.

These measures of team performance are seconded by the work of Wang et al (2004), when they presented the following characteristics as being measures of team performance:

- Going by the results, this project can be regarded as successful
- From the company's perspective, all project goals were achieved
- The project results was of high quality
- The product proved to be stable in operation
- From the company's perspective one could be satisfied with how the project progressed
- The project was within schedule
- The project was within budget.

Thamhain (1998) summarizes his discussion on the project oriented measures to judge team performance, by stating that these relate to the 'technical issues', pertinent to the project team performance and are tangible. These measures emphasize on result orientation in terms of achievement of customer needs, on-time, and on-budget performance, and technical and project success. Empirical field studies by Thamhain (1990) have shown that there exist a strong association between these team characteristics and project performance. The study now discusses the 'project oriented characteristics', describing the characteristics, and then focuses

on the behavioural implications of achieving these team performance measures, especially with respect to motivation.

Project Oriented Characteristics and Behavioural Implications

As has been described previously in this section, the project oriented characteristics, which guage the team performance, are the tangible measures. A literature review of the these team performance measures has revealed that the measures- 'The project results was of high quality', 'Strategic positioning of the project for future benefits', and 'Organizational learning benefiting future benefits' influence the behaviour of the project team members, and more specifically motivating them, upon successful achievement of these measures.

The project results was of high quality

Achieving quality is one of the parameters to judge project performance and success. Though the word 'quality' is more often than not, associated with being 'expensive', in a project context, good quality in projects refers to meeting the customer requirements, in terms of giving customer what they want, in conformity with their standards and specifications, a price that suits their needs, and with a predictable degree of reliability and uniformity (Deming, 1982). Supporting these views on quality in projects, Turner (1993) posits that the key elements which are centre to the concept of quality are- achieving the fit between good quality vs. high quality, fitness of purpose, and conformity to the customer's requirement. Further emphasising the importance of understanding the customer requirements, in terms of his quality expectations, Juran (1974), and, Cullen and Hollingum (1989) state that the product should be reliable to the customer, effectively satisfying his performance expectations. Formal documents such as Statement of User Requirements, parts of Project definition report or a Customer Requirements Documents should be produced (Juran, 1974; Crosby, 1979).

One of the tools to achieve quality on the projects is Total Quality Management (TQM), which is grounded in the works of Deming, Juran, Feigenbaum, Crosby, and Ishikawa (Turner, 1993). These studies suggest that achieving quality objectives is a top-bottom initiative; instilling commitment among the project team members to achieve the quality objectives.

Behavioural implications of Achieving Quality Objectives

Mathews (2006) states that implementation of the quality practices such as Total Quality Management (TQM) in the organization leads to a change in the attitude and behaviours of

the individuals working in the organization. At the project level, the behavioural implications, and more specifically motivation of the project team members upon the achievement of the quality objectives would be better understood through a discussion of How quality is achieved on the projects. Turner (1993) states that quality is achieved by:

- Quality of the product-meeting the customer's purpose through a quality facility
- Quality of the management process, by monitoring and ensuring the quality of the product throughout, at each stage and at every stage
- Quality assurance by aiming to prevent the happening of the defects
- Quality control, by taking steps to measure quality of the product and the management processes to eliminate variances from the expected standards
- An attitude, by instilling commitment in everybody in the organization to achieve quality

It may be inferred now that achievement of quality objectives by the project team is brought about by monitoring the team members at every stage of the project, and giving them feedback on their performance vis-à-vis the customer's expectations on the quality (which in this case are the quality goals to be achieved). This may be mapped back to the Goal Setting theory of Motivation (Locke, 1968), which emphasised on knowledge of clear project goals to motivate the project team members. Subscribing to these views, Mahaney and Lederer (2006) suggests that the presence of intrinsic rewards (pertaining to nature of work), leads to satisfaction of client in terms of perceived quality, which again is closely related the goals of the project and defined by the client as a project team performance, as had been discussed before. To further explore this aspect and for a better understanding, work of Turner (1993) is cited. He posits that the team needs to have specific knowledge stemming from the user defined standards, which are naturalized in a project environment over a period of time. An example of this can be information related to the project such as lessons learnt document or standards. Further, it is important that the project team members are given the training opportunities to meet the customer specifications on quality.

Summarizing Quality in Projects-The Behavioural Implications

To summarize this discussion on Quality management, in a project context, the definition of as to what constitutes acceptable quality is defined by the customer. While maintaining the

quality of the product is one of the objectives, maintaining the quality of the management process to produce quality products is an implied objective, the project team adheres to and which needs to have top management's commitment, and a right attitude of the entire team to assure quality. It is here that the people aspects set in, where having clear objectives, constant monitoring through regular feedback to the team, access to project related information such as lessons learnt document and the standards, qualified personnel (acquiring knowledge either by training or by previous experience), ensures quality. This contention, bringing to fore the importance of effective communication in the teams has been subscribed to by Thamhain (1998) and presented as people oriented characteristics in his discussion on team performance. While quality in projects, seem to be based on the TQM philosophy, various tools of TQM such as the fishbone diagram, Pareto analysis, and Taguchi methods are used to implement quality management in projects.

It may be drawn from the above discussion that having qualified and trained personnel is essential to achieve the end user requirements. An important intervention in this context can be learning. This project oriented characteristic is discussed next.

Organizational learning benefiting future projects

Projects, being the vehicles for organizations to implement their strategies, and knowledge being the ultimate source of competitive advantage, it is important to understand the relationship between knowledge, learning, and a project organization (Bredillet, 2004). In this sub section, first, the definition of learning is revisited, followed by an understanding of the relation between individual and organizational learning. It is here that the importance of competence development of the project team personnel and information exchange through communication networks to facilitate the learning process is brought to the foreground in the context of managing the teams. Then, learning in projects is discussed, where the importance of training of the project team members, especially with respect to the understanding of the end-user requirements is discussed. Finally, the behavioural implications of learning on the team performance, where the relation between learning in projects- team performance- motivation of the project team members is discussed by drawing an analogy between the factors which are pertinent to learning in projects and hence to achieve the performance, and factors discussed in the theories on motivation earlier (see section Theory Base- Motivation).

Learning-The relation between Individual and Organizational learning

Learning has been defined as "A relatively permanent change in behaviour that occurs as a result of a person's interaction with the environment" (Harris and DeSimone, 1994, Bass and Vaughn, 1966, McGehee and Thayer, 1961). Thamhain (1998) posits that the organization's ability to learn and position itself for future growth, is grounded in the concepts of team building (Senge,1994). Bredillet (2004) explains the relation between learning at the individual and the organizational level through performance, by stating when the project managers, teams or the organizations are more competent, they will perform more efficiently and effectively, and therefore, more effective will be the performance on the project, and more successful will be the organization (Crawford, 2002). This competence stems from knowledge, which may either relate to information, stored in the Information systems and other IT enabled data banks (Hayes-Roth et al, 1983) or may relate to the complex set of dynamic skills and know-how which aid in improving individual skills, and or behaviour. This idea of managing the learning process to improve individual skills and modifying the behaviour originates from the school of Kuhn (1970), Polanyi (1958, 1966), and Silberston (1967). This learning and the behavioural change flows through the network of people in the organization, who share the same work interests (Brown and Dunguid, 1991, Wenger, 1998) to contribute to the organization's learning, which is regarded as Communities of Practice. Further, organizational learning is facilitated when the learning systems are institutionalized through tools such as management information systems, informal communication channels, and communication networks (Duncan and Weiss, 1979; Walsh and Ungson, 1991; Unrich et al, 1993, Huber, 1991, Nonaka, 1991, Boisot, 1998) While exchange of information may facilitate learning, in case of projects, as they are bound by pre defined performance expectations, and a strong customer orientation, there may be a need to institutionalize this learning process. Training programmes are one of the ways to do so. Before, training is discussed in the context of projects, a brief discussion of the learning process in a project set-up follows

Learning in Projects

Projects, through the way the project team acts as a place for learning. As projects are bound by specific performance objectives (both 'technical' and 'people' oriented) and operate within the constraints of stipulated levels of efficiency and effectiveness, a project teams acts as a temporary structure. It first generates information, and knowledge, and then applies that

knowledge in the early stages of the project (Bredillet, 2004). The individuals learn by practicing their jobs. This exercise is bound by the task requirements the individual needs to fulfil as a part of the project.

In a project set-up, learning occurs through knowledge transfer or exchange of information as has been discussed earlier. Further learning occurs through the training and the education programmes, which are built on the information that is exchanged among the project team members. Though, on the job learning has been hitherto considered to be an effective learning tool, Kerzner (2004) contends that on the job learning, undermines the learning effort itself as the employees learn to make new mistakes. Further, he underscores the importance of formal training and education programmes in the organizations. The training programmes are designed, keeping in mind, the requirements of the end users, and also are customized to meet the specific task requirements of the project team members, working in that project (Kerzner, 2003).

Behavioural influences of Learning on Team Performance

In the context of the present study, which focuses on the behavioural aspects of the people, viz., motivation, and the performance aspects, which are closely related to this motivation, it may be important to note that learning influences the individual behaviour and enhances their competence by allowing people to acquire knowledge and skills, thus empowering them with the competencies to perform their tasks more effectively while contributing to their better understanding of tasks and relative importance of their work. Finally, learning motivates employees as learning generates feelings of accomplishment, and other forms of need fulfilment (McShane and Van Glinow, 2003).In the discussion of the influence of learning on the behavioural modification of the individuals, the concept of Operant Conditioning theory (1953), and Reinforcement theory (Ferster and Skinner, 1957) may be recalled as in the learning process, as the individual learns from the environment and alters his behaviour (which in this case is motivation) to maximise positive consequences, and minimises adverse consequences (Miltenberger, 1997, Komaki et al, 1996, Sims and Lorenzi, 1992) (which in this case is the level of team performance).

On the question of what influences learning at the team level (teams being the one of the focus areas of the present study), Zellmer-Bruhn and Gibson (2006) show that learning at the

team level is influenced by contextual factors such as leadership, training, feedback, and technology as teams are embedded in their organizational settings (Gibson and Vermeulen, 2003; Sole and Edmondson, 2002; Zellmer-Bruhn, 2003). Extending this further, Argote (1999), shows that team learning, especially if it involves the work processes, influences team performance, which includes task performance, which is the team meeting the goals and how well the team achieves the team's mission (Hackman, 1987) ,quality of their interpersonal relationships (Edmondson, 1999), and meeting the customer requirements (Lynn, Skov and Able (1999). Finally, a high level of learning in the team results in the members feeling engaged in the teams, and perceiving a sense of team effectiveness. (Earley and Gibson, 2002). This seems to suggest that when the team members are provided opportunities for learning, and more specifically opportunities for training, which has been argued to be effective in a project context (Kerzner, 2003), achieve their performance targets better. This is intrinsically motivating to the team members (Garies, 2005). This also translates to the satisfaction of the competence motives of the employee as was discussed in Mc Clelland's theory of needs (McClelland et al, 1961, 1974, 1975, 1986).

Summarizing organizational learning benefiting future projects

The focus of this sub section is on the ability of the organization to learn through projects and individuals. This has been posited as being a direct project oriented characteristic to measure team performance. The sub section starts with a definition of learning, and by understanding the relation between the individual and organizational learning, where the competence of the project team and the managers leads to better performance of the projects and to a more successful organization. Further, the learning process is dependent on the presence of the communication channels which facilitate learning through information exchange, and also on the training programmes. In the case of projects, the learning process is triggered by the information generated in the projects and then reinforced partly by 'on the job learning' experience and mostly by the formal training programmes. The learning process, especially the training, has a strong end-user orientation. On the question of behavioural influences of the learning process, recalling the Operant Conditioning theory and Reinforcement theory, a change in the behaviour of the individuals is affected when they learn from the environment, and motivates the project team members by empowering them with the competencies to achieve their tasks on the project effectively and rendering a sense of accomplishment in them; this again mapping back to Need for Achievement of the McClelland's theory of needs,

which states that individuals are motivated when they perform and excel against a set of pre-set standards.

It has been said earlier in this sub section on 'Organizational learning benefiting future projects' that projects act as vehicles to implement the strategies of the organization. Hence, the following section would discuss this facet of the 'project oriented characteristic' in detail, and also discusses the behavioural implications for the project team members (in terms of motivation) upon the achievement of this measure.

Strategic positioning of the project for future business

Projects and project management are an important means of implementing strategy (Jamieson and Morris, 2004). The Strategic Value of the project can be understood with a knowledge of concepts such as project-based management, programmes, and portfolios. In these settings, multiple projects are linked together to achieve the ultimate business purpose (Arrto, Dietrich, 2004). Shenhar et al (2002) classified the projects, which are positioned for operational purposes and which may be undertaken with the long term perspective in view. This kind of projects with a long range horizon relate to new product development or production processes, and may be Platform projects or Breakthrough projects. Typically, the strategic objectives of an organization relate to-Customer, Financial, Internal business process, and Learning & Growth (Kaplan and Norton, 1992). At the project level, these strategic objectives translate to project efficiency, impact on customer, business success, and preparing for the future (Shenhar et al, 1997). Further, Morris and Hough (1987), and Rouhnianen (1997) bring to fore measures of project success, which closely reflect the Team Performance measures of Thamhain (1998), and Wang et al (2004) which have been discussed earlier. They are: Technical performance of the project, Client satisfaction, Projects completed within budget, and on schedule, and the Learning that the project stakeholders acquire. To achieve these objectives, while corporate climate and technology are important, employee capabilities also play a vital role. It is here that the role of individuals and projects comes to fore. In projects such as product development, and internal development projects, which may serve as vehicles to achieve the strategic objectives of the organization, issues such as the mentoring and coaching available to the team from the project manager, and support of the top management are extremely important and need be addressed (Loch, 2000; Terwiesch et al; 1998; Brown and Eisenhardt, 1995; Eisenhardt and Tabrizi, 1995 and Mikkelsen et al, 1991). Another key

issue, which is important for the successful implementation of the strategy through projects is learning, which is essential for the long term survival of the organization (De Geus, 1988). This learning again, stems from the individual's intrinsic motivation (motivation embedded in the nature of work performed by the individual), feedback (Senge, 1990), communication (Eisenhardt, 1997), and coaching (Schoonhoven and Jelinek, 1996). A detailed discussion of learning in general and in projects, and its impact on fostering motivation and enhancing team performance has been discussed in the sub section- 'Organizational learning benefiting future projects' and hence, would be discussed here.

Behavioural influences of Strategic positioning of the project for future business

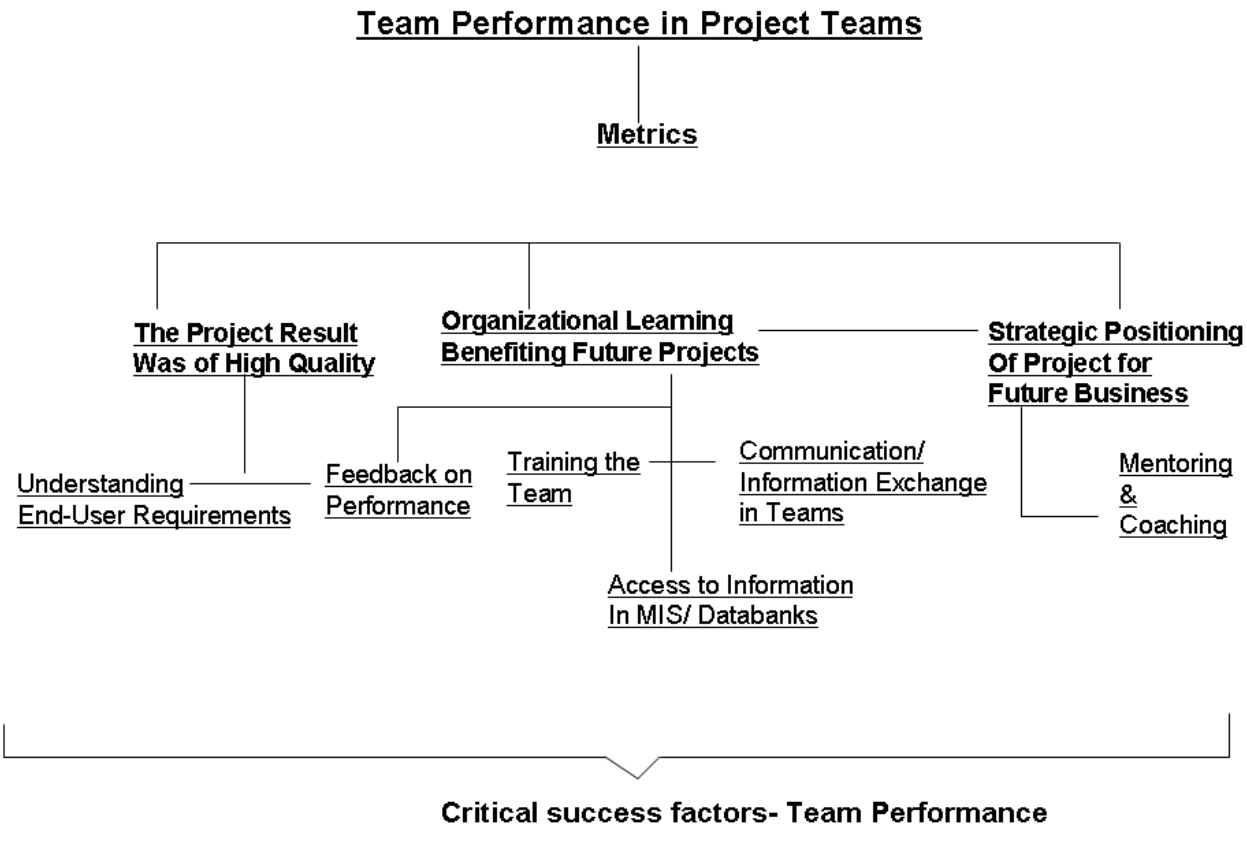
Capable and well-motivated people are essential to successfully implement a strategy (Lynch, 2003). The linkages between strategy and motivation have been suggested by Chaffee (1985), whose interpretative view of the strategy focuses on motivaton of the employees through corporate culture to favour the organizations. Specifically, as seen above, factors such as learning, coaching & mentoring, and the support of the top management, which are critical to the implementation of the strategy, are also discussed in the context of various theories on motivation. Similar views are presented by Galbraith and Kazanjian (1986) when they stated the importance of rewards in motivating the employees and thereby effectively implementing the organization's strategy. They state that rewards in this context not only include the financial rewards but also non financial rewards such as opportunities for career growth. This again relates to the growth needs of the individuals discussed in McClelland's theory of needs (McClelland et al, 1961, 1974, 1975, 1986). Apart from rewards, effective implementation of the strategy also calls for empowering the staff with new skills and new knowledge. Thus it would be imperative on the top management's part to introduce formal structures in the organization and train the employees in the skills to achieve this end.

Summary: Literature review of Team Performance

To summarize, the discussion on team performance begins with the definition of key conepts of this sub section- teams, performance, and project teams. The definitions of team and project team foreshadow the notion that goal orientation and achievement of objectives are as integral to project teams as the human dimensions. Specifically, the metrics of project team performance are discussed which highlight the importance of understanding of user requirements in terms of achievement of quality and scope requirements of the project. The

importance of project contributing to organization learning and strategy are also presented as measures of team performance. This sub section then discusses the motivation dimension of achieving these project team objectives. The importance of communication in the project team is especially highlighted in this context. Understanding of the end user requirements has been presented as a critical success factor to achieve the quality and scope objectives of the project. In the context of the other project team performance measure such as Organizational learning benefiting future projects, competence development of the personnel through informal information exchange among the project teams, giving the team members access to project information stored in data banks and then engaging the team members in a learning process through feedback on performance and training have been posited as being pivotal to facilitate organizational learning. Finally, in the context of the team performance measure 'Strategic positioning of the project for future business', managing the workforce through mentoring, coaching and providing non financial rewards such as opportunities for career growth were highlighted. The motivating potential of these variables –mentoring and coaching, future career opportunities and communication have earlier been discussed in the previous section of 'literature review-motivation'. Figure 3. below summarizes this discussion on team performance.

Figure 3. Key Studies on Team Performance



II.FRAMEWORK FOR PROJECT TEAM MEMBER MOTIVATORS AND THE RESEARCH QUESTIONS

Introduction

The current sub-section recapitulates the discussion on motivation and team performance discussed in the earlier sections in the literature review. It is contended that the issues or the critical success factors contributing to motivation in project team members, also contribute to team performance. This is in consonance with the premise of this research study. Further, it is contended that these issues are related to 'Nature of Work', 'Rewards', and 'Communication'. Each of these dimensions is discussed in detail while relating to the discussion on motivation and team performance. Next, the research questions which compare the collocated and the virtual project teams are presented. This juxtaposition is along the three dimensions of 'nature of work', 'rewards', and communication' and compares the expectations of the team members in these two environments and the ability of the project environments to provide or support those expectations. This is followed by a discussion of variables called the 'Project Team Member Motivators' which are used to compare the collocated and virtual project teams and explore the research questions. A detail discussion on these three facets to motivation in a project set up follows.

The relation between performance and motivation is better understood when the team performance measures are discussed. Thamhain (1998) cites that it is important that the project has the ability to contribute to the overall learning of the organization. To achieve this, it is important to impart the relevant training to the team members. It should be recalled here that training is one the aspects which makes the work motivating to the employees (Hackman and Oldham, 1980). Apart from training, it is also important that the project team has easy access to documented information pertaining to the projects and also communicates effectively, thus supplementing the formal learning interventions. Free exchange of information and communication (Kaliprasad, 2006) and having access to project related information makes the team members aware of the overall project organization, responsibilities, procedures, and reporting relationships (Kerzner, 1989) which is motivating and also enhances performance (Kerkfoot and Knight, 1992).

Continuing this discussion on communication, Thamhain (1998) and Turner (2003) underscore the importance of understanding the user requirements in terms of project goals such as expected level of quality. This is stipulated by the end users. Hence, it is imperative that the project team fully understands the end user requirements. This is often done by giving the project team a feedback on their performance. Such a feedback on performance is motivating (Hackman, 1987) and also contributes to team performance (Rasker et al, 2000).

Finally, Thamhain (1998) argues that the project should contribute to the strategic objectives of the organization. A critical factor which strategically places the organization for future business challenges is people management. In projects such as product development, and internal development projects, which may serve as vehicles to achieve the strategic objectives of the organization, issues such as the mentoring and coaching available to the team from the project manager, and support of the top management are extremely important and need be addressed (Loch, 2000; Terwiesch et al; 1998; Brown and Eisenhardt, 1995; Eisenhardt and Tabrizi, 1995 and Mikkelsen et al, 1991). Another key issue, which is important for the successful implementation of the strategy through projects is learning, which is essential for the long term survival of the organization (De Geus, 1988). This learning again, stems from the individual's intrinsic motivation (motivation embedded in the nature of work performed by the individual), feedback (Senge, 1990), communication (Eisenhardt, 1997), and coaching (Schoonhoven and Jelinek, 1996).

Thus, an integrated view of projects is presented where motivation and team performance are inextricable. It is inferred that the key issues which are common to motivation and team performance are related to nature of work, rewards, and communication. These three dimensions are further discussed below.

An Integrated View of Motivation in Projects

Having established the relation between motivation, and team performance theoretically, we summarize that nature of work is contributing to motivation (McClelland, 1961) and team performance (Thamhain, 1998; Thamhain and Wilemon, 1999). The financial and the non financial rewards are also important to foster motivation and team performance (Vroom, 1964; Loch, 2000; Kerzner, 2004). Finally, Communication among the project team members especially that related to the end-users and the project goals are contributing to motivation and

team performance (Turner, 1993). Thus we contend that in projects, there is a similarity between the variables contributing to motivation and team performance. Further, motivation and team performance have to be studied together by incorporating issues related to 'Nature of Work', 'Rewards', and 'Communication' to fully understand the people issues. This argument is supported by Guest et al (1996) and Kerzner (2003) who state that employees value interesting work, potential for growth, career expectations, and fairness for rewards. We discuss this further below.

Nature of Work

The importance of meaningful work as being motivating has been posited as early as Maslow (1971) who stated that 'individuals who do not perceive their work place as meaningful and purposeful, will not work up to their professional capacity". The need to consider the various facets to nature of work, which make it meaningful, may be attributed to the emergence of the empowered employee. Hitherto, when the focus was on efficiency , the nodes of decision making were the managers, and the jobs were broken down to tasks, mapped to the competencies of the personnel, and were measured by quantifiable outcomes. However, of late, there is greater dependence of the organizations on their workers to make the decisions. This necessitates giving the employees greater autonomy at work, creativity, and more opportunities to learn (Thomas, 2000).

The different facets to interesting work have been significant tasks, enjoyable nature of work (seconded by Jaeger, 1994), autonomy at work (which has also been subscribed to as being 'interesting work' (MOW, 1987) and feedback on performance (Hackman and Oldham, 1980). Futher, Alderfer (1972), Herzberg et al (1959), Maslow (1943, 1971), McGregor (1960), and Rogers (1959, 1961) suggest that having a work life, which the individuals believe is meaningful, is motivating to the individuals. Further, Deems (1997) suggests that opportunities for growth and to develop are related to work. Therefore, this seems to support the notion that work in itself, may be a reward; thus subscribing to the term 'intrinsic rewards'. This aspect of work, is further discussed in the following sub section 'Rewards', in the context of work-life balance. Interesting nature of work leads to motivation and enhances team performance (Kovach, 1987).

In the context of the projects, these observations are seconded by Kerzner (2003), when he states that interesting work and a stimulating environment is motivating and leads to team performance (Thamhain, 1998). A key aspect to enhance the performance of the project team is to impart the skills and the knowledge required to the project team to effectively perform the tasks (Baron, Kreps, 1999). As such integrating learning opportunities in work is important (Ardichvili, 2003) and the capacity to learn individually and collectively is important for the survival of the organization (Sambrook, 2005). This leads the discussion to training and mentoring opportunities at work which foster learning. Imparting skills may be through training or through coaching and mentoring (Kaliprasad, 2006). Pfeffer (1998) and further Thamhain (1998) suggest that interesting nature of work may also be associated with a high clarity of potential for professional rewards, which is discussed below.

Rewards

The link between motivation-performance-rewards is brought to fore by the expectancy theory on motivation (Vroom, 1964) which emphasises on the link between effort-performance-rewards, which in this case may be expected performance outcomes from the team members and the proportionate performance based financial rewards which the team member may get. Apart from the tangible rewards such as the financial benefits, intangible rewards such as security of advancement (Herzberg et al, 1959), good work-life balance (Huws, 1999), and mentoring (Armstrong, 2003) have been found to enhance motivation and team performance. Mentoring involves the protégé receiving continuous feedback on his performance from the mentor, which lends the protégé to view the job to be meaningful (Beech, Brochbank, 1999) which again maps to 'Nature of Work'. This notion of the financial and the non-financial rewards being complementary to each other can be seen in the concept of 'Total Reward'. WorldatWork (2000) adopt the view that 'total rewards can be defined as all of the employer's available tools that may be used to attract, retain, motivate and satisfy employees. This encompasses every single investment that an organization makes in its people and everything its employees value in the employment relationship'.

Drawing upon this concept, Murlis and Watson (2001) state that 'the monetary values in the reward package still matter but they are not the only factors'. The other factors in this context are creating a challenging and enjoyable work environment for the employees where they have an opportunity to display their abilities. Specifically autonomy, scope to develop skills,

training and opportunities for career development have been suggested as non financial rewards (Pfeffer, 1998). The motivating nature of each of these variables has been seen in the discussion on motivation and team performance.

The issue to be discussed now is What constitutes Effective Rewards in a project environment. Thorns (1998) suggests the following characteristics of Effective Rewards in a project environment.

1. An effective reward is the one which is available to use whenever the performance of the team member has to be reinforced or performance enhanced. As the financial rewards may not typically be available readily, non financial rewards such as recognition and feedback on performance may be used effectively to sustain the project team members' motivation and enhance the performance
2. The financial rewards should be retracted if the team member or the team stops performing. These financial incentives which are tied to the performance of the team member or the project team may be incentive bonuses, commissions, profit sharing, gain sharing, and recognition. Typically, these incentive bonuses motivate workers.
3. Further substantiating the need to relate rewards to performance, Thorns (1998) posits that the rewards should be given as close to the time of the performance as possible. The financial perks such as profit sharing and gain sharing may be most effective when they are paid quarterly rather than annually.

The above characteristics of effective rewards underscore the importance of linking rewards to work performance. Further, the role of non financial rewards such as nature of work and feedback on the performance has been brought to the fore. Nature of work as being a motivating factor has been discussed earlier in the various theories on motivation and the importance of feedback on performance making the work more interesting has been visited in the Job Characteristic Model (Hackman, Oldham, 1980) and earlier in the Goal Setting Theory (Locke, 1968).

To conclude this discussion on effective rewards in a project environment, though there is an excessive reliance on financial rewards as a motivator, other variables such as feedback on performance, incentive bonuses tied to performance and publicly acknowledging and recognizing the efforts of the team member can all be effective motivators

Communication

Communication has been defined as a process by which information is exchanged between the individuals through a common system of symbols, signs, or bahavior (Webster's New Collegiate Dictionary, 1977). The importance of communication has been underscored in the works of Peter Drucker when he stated that "one's effectiveness depends on the ability to reach others through the spoken or written word when working in large organizations, and this ability to communicate is perhaps the most important of all the skills an individual can possess" (Drucker, 1952).

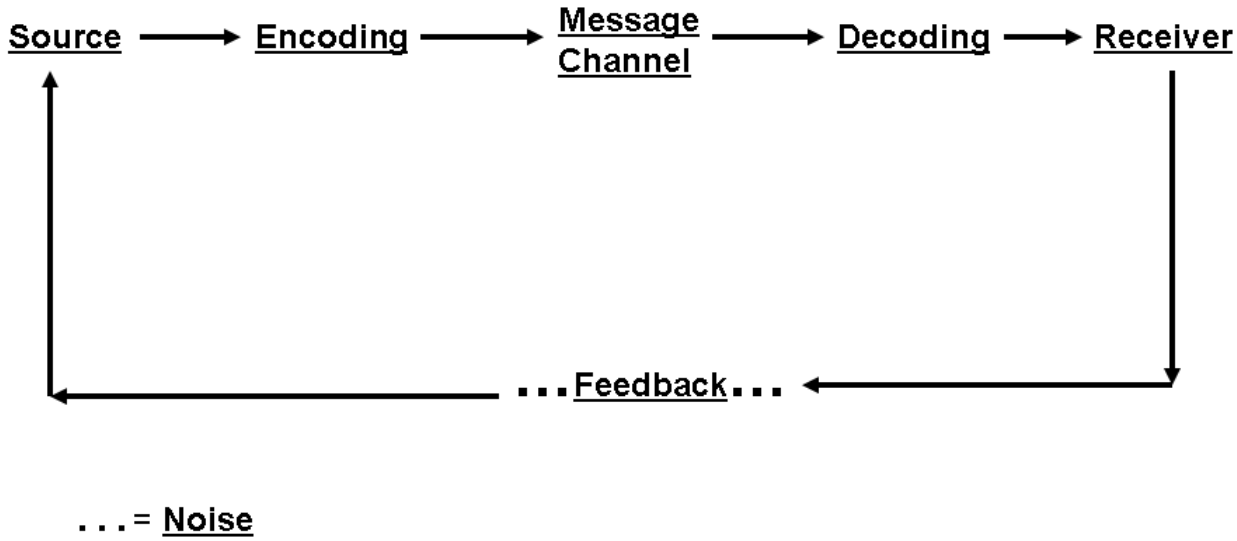
Definition and Introduction to the concepts

Communication is a two-way process between the sender and the receiver(s). Though the receiver may seem as a passive recipient of the information, it should be taken into consideration that he is likely to be impacted by the message and would be influenced by the perceptions and beliefs of those people who send the message. This aspect of communication, which brings to fore the 'social cues' involved in the communication process are to be noted. The challenge that this aspect of communication poses in a virtual environment, which is one of the focus areas of this thesis, would be discussed later in the sub- section 'Theory Base- Virtual Teams'.

Perhaps the most widely accepted model of the communication process has been given by Gibson, Ivancevich and Donnelly Jr (1973) where they put forth the following as being the elements in their communication model:

Source: The Originator of the communication
Encoder: The oral or written symbols used to transmit the message
Message: What the source hopes to communicate
Channel: The medium used to transmit the message
Decoder: Interpretation of the message by receiver
Receiver: Recipient for whom the message is intended
Feedback: Information used to determine the fidelity of the message
Noise: Anything that distorts, distracts, misunderstandings, or interferes with the communication process.
This model for communication process is given below in Figure 4.

Figure 4. Communication Process



Though the above model presents communication as a formal and a structured process that is delineated by functional responsibilities, there can also be informal communication which exists simultaneously with the formal communication process in the organization and which stems from the psychological and the social needs of the individuals-their desire to achieve the organizational objectives, need for companionship, emotional support, and social contact (Weber, 1975).

Having discussed the definition of communication, and the communication process, communication in a project context, and its role in motivation of the project team members and its link with the direct measures of team performance (Thamhain, 1998) presented earlier in the section- 'Literature review on Team Performance' is presented.

Communication in Projects-Motivation and links with Team Performance

"A Project is tied together by its system of communications" (Cleland, Ireland,2002).

Projects can include both formal and informal forms of communication. Examples of formal communication can be formal written communiqués (proposals, reports, procedures, memoranda), Project Meetings, and listening. Informal communication, as has been discussed in the context of McClellan's affiliation needs, arises more out of the people's propensity to socialize. An often ignored form of communication is the nonverbal communication which includes social cues such as facial expressions, movements of the eyes and the hands etc.

From the above discussion on communication, the following aspects are brought to the fore, which hold relevance for the present research study and which entail further discussion in the course of this study. They are:

1. The communication process and its effectiveness is merely dependent not only on the content of the communiqués but also on the context of the communication and the choice of communication channel
2. The role of individual's behaviour in influencing the effectiveness of the communication process is underscored by

a. The perception of the receiver, as explained by the element 'decoder' in the communication process, which is the interpretation of the message by the receiver

b. Presence of social cues in the communication process, especially the nonverbal communication, where they seem to influence the way in which the sender and the receiver of the communication judge the intent of the message.

The following is a suggested model for communication in a project environment. As is seen in the model, there are multiple stakeholders in a project and multiple directions of communication between these stakeholders. Also, the project manager is at the centre of the communication process, which seems to suggest that the onus of establishing, and maintaining the links for effective communication is on the project manager.

To be noted here is that as the scope of the study is restricted to project teams, and motivation, team performance, and team effectiveness from a team members' perspective, only the relevant communication links-lateral and the downward communication with the project team members, from a team members' stand point would be explored. The upward communication channel between the project manager and the senior management, and the lateral communication channel between the project manager and the other stakeholders are beyond the purview of this study.

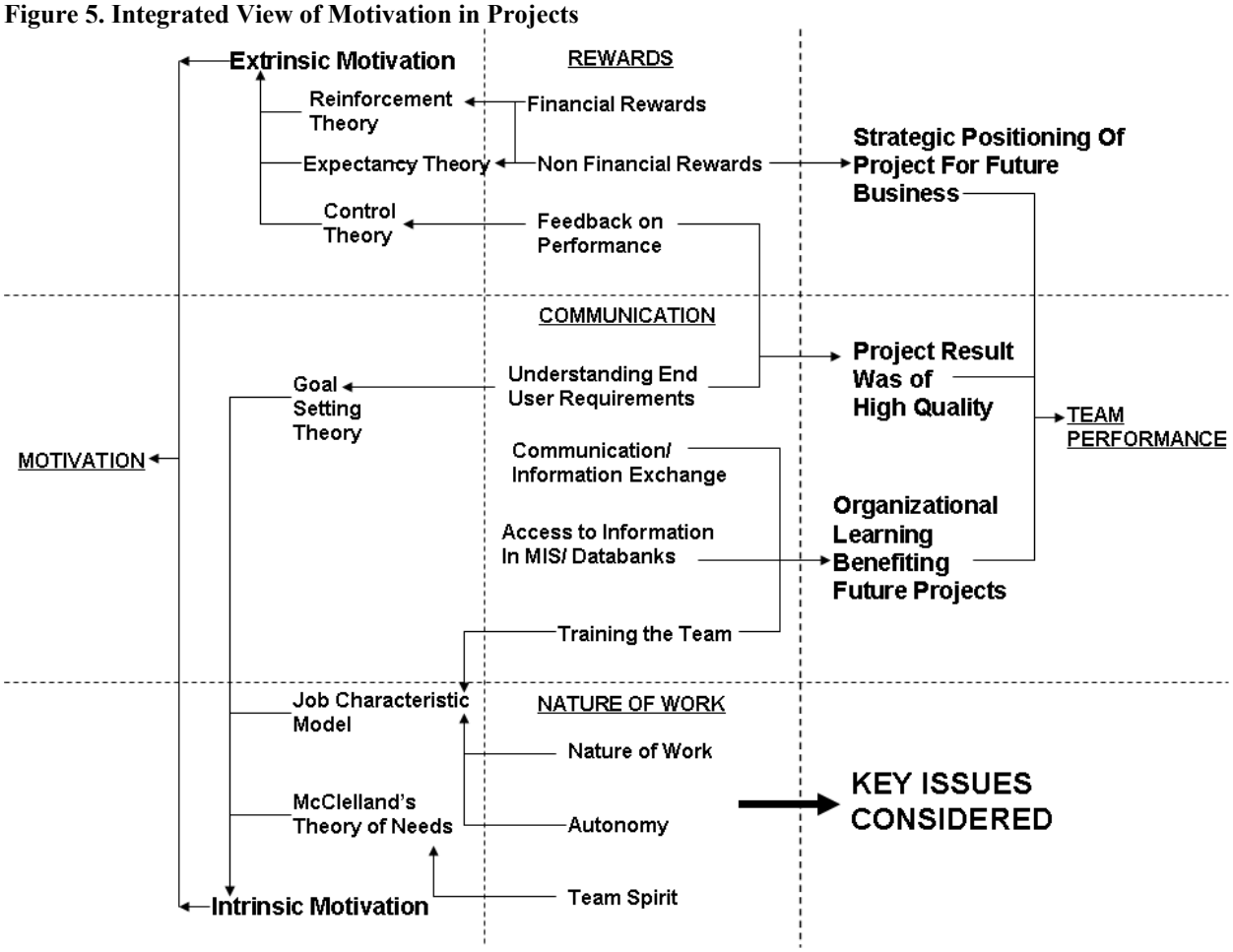
Further discussing communication in projects and its links with team performance and leading to motivation of project team members, Verma (1997) states that communication impacts team effectiveness and leads to increased job satisfaction and productivity. As seen in the definition of motivation, and in the McClelland's theory of needs (1961), knowledge of goals and job specific information motivates employees. In a project environment, this translates to

information exchange about scope definitions, quality, schedules and feedback apart from project objectives within the project teams, and with the project manager (Verma, 1997) fostering team spirit in project teams leading to motivation and performance (Kerkfoot, Knight, 1992). It may be recalled here that knowledge of project scope, quality, and schedules have been discussed as being 'direct measures of team performance' (Thamhain, 1998).

Thus, it may be inferred at this stage that variables to measure 'Communication', stem from the literature review on team performance. A key issue related to projects to be addressed here is that of the communication between the end-users and the project team. Knowledge of the end-user requirements would help the project team understand the bigger picture in terms of customer satisfaction and competitiveness of the organization, which is motivating (Kaplan, Norton, 2001) and enhances team performance (Wang et al, 2004).

The above discussion bringing out the key issues which bridge motivation and team performance, related to nature of work, rewards, and communication is summarized in figure 5 below. This presents an integrated view of motivation in projects

Figure 5. Integrated View of Motivation in Projects



Research Questions

It is to be recalled here that the objectives of the present study is to compare 'Motivation' in two kinds of project teams- Collocated and Virtual Project teams. Further, two dimensions of motivation- expectation of the project team members and the ability of the project team members to provide or support those expectations (the discrepancy between these two measures being measured) are identified. These research questions are explored with respect to the three dimensions- 'Nature of Work', 'Rewards', and 'Communication'. It is reiterated here that henceforth in this study, the expectations or the motivational drives of the project team members would be referred to as 'WANT' (as in the phrase- What the Project Team Members WANT?) and the ability of the project team environment to provide or support those expectations would be referred to as 'GET' (as in the phrase-What the Project Team Members GET?). The research questions are presented below:

1. What is the discrepancy between the 'WANT', and the 'GET' in case of the project teams in general, in a combined sample of collocated and distributed project teams (being referred to as 'All Want' and 'All Get') with respect to 'Nature of Work', 'Rewards', and 'Communication'?
2. What is the discrepancy between the 'WANT', and the 'GET' in case of the Collocated project teams (referred to as 'Collocated Want', and 'Collocated Get') with respect to 'Nature of Work', 'Rewards', and 'Communication'?
3. What is the discrepancy between the 'WANT', and the 'GET' in case of the distributed project teams (referred to as 'distributed Want' , and 'distributed Get') with respect to 'Nature of Work', 'Rewards', and 'Communication'?

The questions 2 and 3 are the part of this longitudinal study which explores 'within the group' discrepancies. Further, the motivational drives (WANT) and the ability of the project team environments to provide or support those drives (GET) are compared in collocated and virtual teams through the research questions 4, 5, and 6.

4. How do the motivational drives or the expectations of the project team members ('WANT') with respect to 'Nature of Work', 'Rewards', and 'Communication', vary in collocated and distributed project teams? collocated

5. How does the ability of the two project environments (collocated and distributed) to provide or support the motivational drives of the project team members with respect to 'Nature of Work', 'Rewards', and 'Communication', vary?

6. Are project team members working in collocated teams more satisfied than the project team members working in distributed project teams with respect to 'Nature of Work', 'Rewards', and 'Communication'?

Question 4, 5, and 6 are the part of this longitudinal study which explore the 'between the groups' discrepancy.

The results of the research questions 2-6 led to the combining of the collocated and distributed samples for a better understanding of motivation in a project set up. Thus, research questions 7 ,8 and 9 are proposed in this direction.

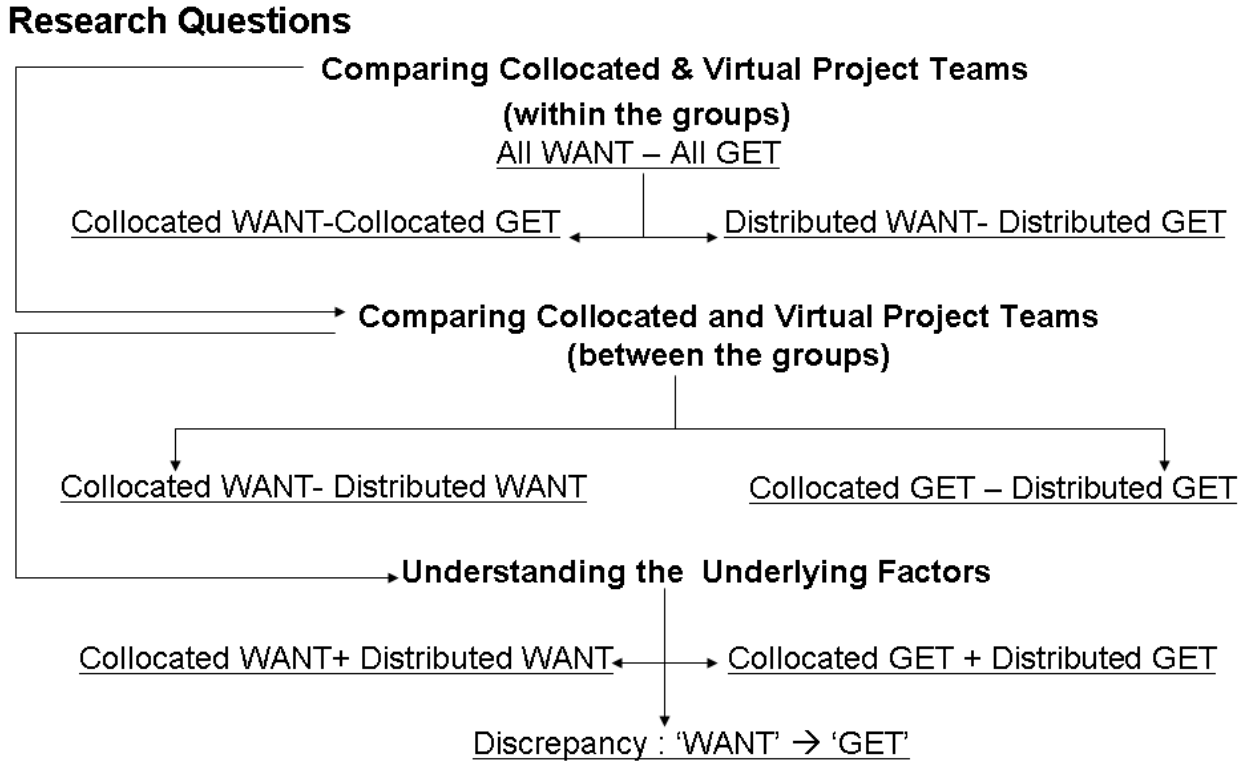
7. Are there latent factors, related to 'Nature of Work', 'Rewards', and 'Communication', which explain motivation of the project team members (WANT)?

8. Are there latent factors, related to 'Nature of Work', 'Rewards', and 'Communication', which explain the ability of the project team environment to support those expectations (GET)?

9. What are the underlying factor(s) which explain the discrepancy between the expectations of the team members ('Want') and the ability of the project team environment to support those expectations ('Get')?

The organization of the research questions, and their hierarchy in the research study, is summarized in figure 6 below:

Figure 6. Organization of Research Questions



III.'THE PROJECT TEAM MEMBER MOTIVATORS'

The literature review on motivation and team performance in the project context has led to the contention that motivation in a project set up is related to 'Nature of Work', 'Rewards', and 'Communication'. Accordingly, the research questions, to explore motivation in a project environment in these three dimensions have been presented at the end of the earlier section- The Framework for Project Team Member Motivators. Further, in this section, the variables, which are called 'The Project Team Member Motivators', are proposed. These variables, being related to 'Nature of Work', 'Rewards', and 'Communication', are used as survey items for the purpose of the present research study. These variables, while enhancing motivation of the project team members, also enhance performance at the project team level. A detailed explanation of each of these 'Project Team Member Motivators' is discussed below.

Project Team Member Motivators to explore 'Nature of Work'

Enjoying Nature of Work Itself

Pinder (1998) defines work motivation to be a set of energetic forces that originates both from within as well as beyond the individual's being, to initiate work-related behaviour, and to determine its form, direction, intensity, and duration". Annotating this definition, Meyer, Becker, and Vandenberghe (2004) posit that motivation has been defined as being a force that induces action in the employees and also explains the direction, intensity, and the duration of this behaviour. These facets to work motivation are reflected in the various theories of motivation such as Theory of Needs (McClelland ,1961), Equity theory (Adams, 1963), The Goal Setting Theory (Locke, 1968, 1991, 1997), Control Theory (Klein, 1989), and finally the Job Characteristic Model (Hackman and Oldham, 1976).

Apart from being interesting and enjoyable (Campion and Thayer, 1987), the nature of work has to be professionally interesting and stimulating to be able to enhance the team performance (Thamhain, 1998) and motivate the employees (Herzberg et. al.,1959). This may imply that work has to provide the employee with the opportunity to demonstrate his skill variety, should be enriching enough to enhance motivation and team performance. (Fried and Ferris, 1987) .

Autonomy at Work

Autonomy has been defined as 'the quality or state of being self-governing; especially: the right of self-government, self-directing freedom, and especially moral independence' (Merriam-Webster, 1995). Other elements of Autonomy have been presented as decision-making authority, discretion, and responsibility (Chase et al, 2001; Cheser, 1998; Rungtusanatham, 2001) which seem to closely reflect different facets of nature of work as defined in the job characteristic model (Hackman & Oldham, 1980).

In the context of the projects, with the nodes of decision making being distributed throughout the teams, away from the management, and towards the project team members, and where individuals and collectively the team members are taking higher levels of responsibility, authority, and control for the project results (Thamhain, 1998), providing the right degree of task autonomy to the individuals, seems to be relevant, right, and a priority action.

Autonomy leads to high quality work performance and higher satisfaction with the work (Hackman and, Oldham, 1980). This again relates to the interesting nature of the job, which provides a scope for the individual to demonstrate their skill set. This is to say that individuals may be provided with the right degree of autonomy to demonstrate their competence, by which they may perceive the job to be more interesting. To explore further how autonomy influences team performance and individual motivation, we revisit the Team Effectiveness Model (Campion et al., (1996), Hyatt and Ruddy (1997), Cohen and Bailey (1997), Neuman and Wright (1999), and Thompson (2000)), which suggests that freedom and autonomy amongst other factors, lead to increased team effectiveness and motivation. Finally, studies by Anderson (1984) revealed that autonomy and feedback significantly correlated with high level of performance.

Being Involved in Critical Project Activities

Thamhain (1998) observes that the top management making available the resources facilitates team building. Apart from this, the project team members need be assigned activities which are significant or in other words, critical, which again maps to the work being professionally stimulating. This contributes to motivation (Hackman and Oldham, 1980) and team performance (Thamhain, 1998). In a project set up, though the team work, by its nature, provides these job characteristics, it is important to acknowledge the significance of these

these issues at the individual level as well, as project team members need to feel that the work they do as individuals is important (Thorns, 1998). This can be done by involving the team members closely in the project and allowing them to share the responsibility for the whole project rather than a part of it. These of course, as had been discussed earlier, in the Job Characteristic Model (Hackman and Oldham, 1980), should be complimented with other facets of congenial nature of works such as autonomy, and feedback on performance.

Discussing the nature of work itself and its contribution to team performance and motivation, it may be inferred that the support of the top management plays an important role in ensuring the availability of the requisite resources (Thamhain, 1998) which may be inferred to be contributing to team building. The mention of team building now brings into focus the trust, interaction and openness present in the team members, which are in turn facets of team spirit. Therefore, we now focus our discussion on team spirit and see how it contributes to team performance and motivation.

Strong Team Spirit

As had been mentioned earlier, increasing openness and increasing employee participation and feedback, as a part of the two way communication flow helps build teams. This team building exercise, focussing on fostering team spirit, leads to motivation and higher commitment towards corporate and commercial objectives (Kerfoot and Knight, 1992) or in other words may be understood as translating to a congenial and a stimulating work environment for the project team to work. From the team performance stance, cohesiveness among the team members is important for the achievement of the project outcomes (Christenson and Walker, 2004).

Quickly recalling the context of this research study, which compares motivation in conventional face-to-face collocated teams, and virtual or distributed teams and in this direction, citing Adrianson and Hjelquist (1991), it is suggested in their work, which compares conventional face-to-face and virtual teams that as virtual teams relied extensively on computers for mediation, there was a lower conformity among the team members vis-à-vis the members working in collocated teams. This suggests that conformity among the team members and in this case, team spirit and bonding, is dependent on the nature of communication. This brings to the fore, the role of communication and its impact on fostering

cordial relations among the team members. In addition to the team building sessions, Thamhain (1998) posits that when the senior management communicates essential project related information such as the key parameters and the project objectives, unifies the team and minimizes dysfunctional conflict. This discussion seems to suggest that team spirit among the project team members, while stemming from a stimulating work environment, is also contingent upon the team members' access to project related communication, which would be seen in the discussion on Project Team Member Motivators related to 'Communication,', later in this section.

Feedback on Performance

Silverman et al (2005) observe that at the individual level feedback on performance is important to develop motivation, career planning, performance management and performance, which is seconded by Dessler (2005), who suggested that feedback motivates employees. This argument is further supported by Kirkman et al (2004), who state the works of Deci and Ryan (1980) and Hackman (1987) and posit that feedback received from customers and other organizational stakeholders is motivating. Rasker et al (2000) posit that feedback on performance leads to increased team performance.

However, it is important to note that feedback on performance is particularly motivating if it is with respect to pre defined goals set by the individuals as individuals evaluate their previous performance with respect to specific goal or standard (Ilies and Judge, 2005; Latham and Locke,1991). This again maps back to the goal setting theory (Locke, 1968). From the motivational perspective in projects, Thorns (1998) cites that providing feedback to the project team members, especially during the project development stage is motivating as it sustains the excitement of the team towards the project, and allows the team members to align their behaviour to achieve the project goals.

Apart from feedback on performance, the other key facet to nature of works, which lends the work to be perceived as being interesting by the incumbents is the learning opportunities. While on the job learning opportunities such as mentoring would be discussed in the section 'Project Team Member Motivators to explore Rewards', more formal learning methods such as Training are discussed next.

Training for Learning

The importance of learning in a team environment has been suggested by Moran (2005) when she states that team learning is the key to increase team effectiveness.

Training has been defined as 'a planned effort by a company to facilitate employees' learning of job-related competencies. These competencies include knowledge, skills, or behaviour that are critical for successful job performance (Noe, Hollenbeck and Wright, 2003). In this direction, from the employee's perspective, the relation between his motivation to upgrade his skills and therefore participate in a training programme has been presented by Noe (1986), Noe and Schmitt (1986), Hubbard (1999), Morris (1994), Fisher et al (1999) and Factean et al (1995).

To put training in the context of motivation, Noe et al (1997) take the discussion back to the Expectancy theory of motivation and state that the employees' propensity to participate in the training programme stems from the ability of the training programme to impart skills, knowledge, and ability that lead to outcomes of values (The target groups for the training and further education programmes in a project-oriented organization are not limited only to the project managers but also project teams members. Examples of other perspectives to explain the employee's propensity for the training programme include need to acquire knowledge (Waitley, 1995), opportunities available for learning (Cross, 1991; Farr, 1998), attitude of the employees' towards the training process (Fishbein and Ajzen, 1975), support from the top management and the supervisors and their feedback on the employee's performance (Facteau et al, 1995) and finally the employee's proclivity to achieve self efficacy (Mager, 1992). While the 'on the job' training interventions in a project environment can be internships, job rotations, and individual coaching given to the members, the 'off the job' may include lectures, seminars, and courses (Garies, 2005).

The relation between performance and training is emphasised by the goal of training which is to let the employees master the knowledge, skill, and behaviours emphasised in the training programmes and to apply them to their day-to-day activities. Further, there has been a shift in the intent of the training programme from the one which imparts basic skill development (Quinn and Finkelstein, 1996) to the one as being a tool for the creation of intellectual capital, which includes not only basic skills such as the one's which are needed to perform the job,

but also advanced skills such as understanding of customer or manufacturing system, self-motivated creativity, the use of technology, and increased sharing of knowledge with the other employees (Baldwin, Danielson, and Wiggenhorn ,1997; Martachio and Baldwin, 1997). Training also creates working conditions that encourage continuous learning that entails the employees to understand the work system-their jobs, work units ,and the company. Continuous learning, as has been discussed before, is a measure of team performance (Thamhain, 1998). From the motivation standpoint, Venkatesh (1999) and Venkatesh and Speier (2000) contend that training environments, especially if involving high level of social interaction, contribute to intrinsic motivation of the employees.

As an example, the importance of training and the need to educate employees continuously and thence to motivate them has been posited by the USA Malcolm Baldrige National Award Criteria (Baldrige National Quality Programme, 2003). Taking this point further, (Vora, 2004; Nelson (1997) and Vora (2002a) in their road map to manage knowledge workers suggest that the scope of the education programmes should be on team work and technical issues among other things. Therefore, it can now be understood how imparting project centric training and to people and learning is associated with performance excellence in teams and motivation.

In this discussion on 'nature of work', and its role in fostering motivation among the project team members, summarily, it may be seen that team performance and motivation stem from meaningful work and that the job should be challenging enough to encourage the employees to fully utilize their skill set. In the context of a project environment, project work itself can be an intrinsic motivation factor. Project are new and challenging, which require teamwork, offer autonomy, and stimulate creativity. Further, the team performance of the member with respect to the predefined project objectives can be assessed based on the feedback. Apart from this, opportunities to learn contribute towards the work being perceived as being interesting by the project team members. It may be observed here each of these facets discussed as a part of stimulating nature of work in projects-autonomy at work, feedback on performance, opportunities to learn, and challenging nature of work, relate to the facets of interesting and motivating nature of work as presented in the Job Characteristic Model (Hackman, Oldham, 1980).

Taking forward the discussion of the project team member motivators, 'Communication' is discussed next. Communication is perceived as a resource which is provided by the top management and which is important to foster motivation and enhance performance of the employees (Campion et al, 1996; Hyatt and Ruddy (1997); Cohen and Bailey (1997); Neuman and Wright (1999), and Thompson (2000). Also in the discussion on Team Performance seen earlier, communication finds a mention, where exchange of communication among project team members has been suggested as being one of the performance drivers of the team (Thamhain, 1998), which led to fostering of good interpersonal relations among the project team members. It has also been seen in the discussion on 'Organization Learning benefiting future projects' (presented as 'project oriented characteristic' to enhance team performance), where exchange of information and setting up of communication channel facilitating easy availability of information, and coordination of the teams is an important factor, which enhances team performance. The importance of communication, specifically pertaining to that of the end-users has been emphasised in the 'project oriented characteristics' of team performance (Thamhain, 1998). While the reference to understanding the end user requirements with respect to required level of product quality, adherence to time schedules is subtle, it is more explicit in other 'project oriented measures' such as 'Flexibility to meet customer requirements'. Thus, the discussion on 'Project Team Member Motivators' to explore Communication dimension of motivation in project teams first discusses the variable 'Comprehension of the End-User Requirements', followed by other variables, which measure communication ,and which are related to exchange of project related and informal communication among the team members.

Project Team Member Motivators to explore 'Communication'

Comprehension of End-User Requirements

The importance of understanding the customer (user) requirements has been underscored by Cleland (1998) in his discussion on Stakeholder management, of whom Customers (users) are a part along with the project team members; who have the authority to manage and commit resources according to schedule, cost, and technical performance objectives (along with the other primary stakeholders such as the share holders, senior organizational managers, project managers, and project team members at the appropriate varying levels of hierarchy. Charvat (2003) posits that eliciting the user-requirements may be the most important phase of any

project and that these requirements are formed into input for the selection of an appropriate project management methodology for the project to begin (especially in case of CIPOC- Client- Input-Process-Output-Client approach). At a higher level, an understanding of the customer requirements, in terms forms a part of the vision statement for the unit or the project team, when they envision What would the completed projects look like, and how will they be received by the end users? (Thorns, 1998); these vision statements containing the project goals and is motivating to the team members (Christenson and Walker, 2004).

In order to further elucidate the importance of knowledge of customer requirements in a project, the Eurotunnel project example may be cited here. In order to suffice the budget overruns and to transform itself from a project oriented company to an operating company, the top management of Eurotunnel organized its project activities around the customers where the customer inputs were solicited and incorporated in the project's activities (Day, 1999), thus suggesting that for the project team to understand the user requirements, top management support is pivotal. Further, the teams were engaged to meet the customer expectations by involving them early in the requirement development stage and by creating a vision for the team by the top management.

From the motivation stand point, a knowledge seeking activity such as understanding of the end user requirements may be related to the individual's extrinsic motivation. This is more true in case of technical professionals such as those working in a project oriented environment. People may seek technical knowledge as they have understood the importance of such knowledge and also as acquisition of such knowledge as it coincides with their own values (Saemundsson, 2004). It may be noted here that for the purpose of this research study, understanding the end-user requirements or the customer requirements by the project team has been considered from the motivation perspective, even though, understanding the needs of the other stakeholders in the project, may be motivating to the team because, as had been seen in the discussion on team performance, the focus is constantly on the end-users and their definition of what may constitute performance (in the case of 'Project Oriented Characteristics' of team performance). Hence, this group has been taken as a reference point.

Thus, project goals stemming from an understanding of their requirements, leads to goal congruence among the team members and is motivating (Christenson and Walker, 2004), leading the discussion to the understanding of the end-user requirements in the context of understanding organizational and project goals. The organizational goals and the project goals must be explicitly stated and communicated by the management (Thamhain, 1998). This may not only increase their morale but also increase their commitment towards the performance objectives. Lynn et al (1999) have observed an increase in the team performance when the team members were involved in the customer feedback review sessions. From the motivation standpoint, Mahaney and Lederer (2006) cite that the presence of intrinsic rewards (related to work) improves the likelihood of client satisfaction. In the context of virtual teams, this argument is further supported by Hackman (1987) who states that virtual team members would take care of the tasks related to the customers, because they find such tasks meaningful, and intrinsically important. An example of this may be seen in the case of United Parcel Service. The broader corporate objectives were converted to tangible goals at the region, district and the corporate levels. by drawing Balanced Scorecard business plan. These goals were measured and communicated to the employees in terms of customer satisfaction and competitive position of the organization. This knowledge of bigger picture amongst the employees led to motivation (Kaplan and Norton, 2001).

Easy Access to Project Information

The individual's propensity for access to task related communications maps back to the individual's motivation to achieve the targets (Andersons, 2003). Supporting this contention is the field studies done by Zao and Zeng (2004) in an educational setting; observing the preference of the distance graduate students for their use of electronic sources of information vis-à-vis conventional 'information in he books and other print media (n=154, employing exploratory factor analysis)', revealed that students frequently accessed the information available on-line rather than which was available in the books; citing ease of retrieval as a reason. The factor which explained this result included items which pertained to easy access to the system and the speed of information retrieval (in time and when needed), along with system's performance and system's ease of use. This example underscores the importance of having the information easily available to the people. This observation may be particularly significant in the context of this research study to understand the propensity of the distributed team members towards the use of available project information vis-à-vis their collocated

counterparts. Further, as was seen in the earlier discussion on communicating the end user requirements to the project team, it is important that the project plans, specific objectives and the results are made known to the team members (Thamhain,1998) through clearly defined communication channels and methods. The communication of clear project objectives, customer expectations, and review sessions may be inferred as information pertinent to the project. Baron and Kreps (1999) term this sharing of information as symbolic ownership. The individual's propensity to use such an information system has been mapped to individual's motivation, both extrinsic (Davis, 1989) and intrinsic (Venkatesh, 1999; Venkatesh and Speir, 2000). This leads us to the discussion on the importance of ease of information exchange and communication in project teams. Having access to such task related knowledge leads to enhanced team performance in projects (Ericksen and Dyer, 2004).

Ease of Information Exchange/ Communication

Pinto and Slevin (1998) underscore the importance of communication in project teams, by stating that it is important to establish adequate communication channels within the project teams and with the rest of the organization and its clients, to exchange information about goals, processes, status reports etc. Extending the importance of communication to team performance, Thamhain (1998) states that it is the responsibility of the management to facilitate free flow of the top management to facilitate free flow of horizontal and vertical information, through information sessions and review meetings.

Other ways of exchanging information have been discussed by Baron and Kreps (1999), when they state that employees must be trained to fill in general gaps in their knowledge and skills, to enhance their ability to work in teams, and to give them necessary background about their organization, its strategy, technology and so on. Cummings (2004) notes that knowledge sharing-task information, feedback about product or procedure (Hansen, 1999), implicit coordination of expertise (Faraj and Sproull, 2000), and know-how between the project manager, client (as a feedback) leads to high performance (Ancona and Caldwell, 1992a; Brown and Utterback, 1985). From the motivation standpoint, making the necessary information available to the employees at all the levels is motivating as it permits quicker decision making (Kaliprasad, 2006). As has been seen earlier, increased knowledge about the project would help the team members know the context of the project environment and thence about the significance of the work to the business, project and self, which fosters motivation.

To summarize this discussion on communication, and its influence on motivation in projects, the importance of communication in projects, is first brought to the fore in the context of the present research study, through an understanding of the end-user requirements. The project team understanding their user requirements, while being important to define goals for the team, is also important for the selection of a suitable project management methodology by which these goals are achieved. Once a suitable framework is adopted, the next step would be to have the information resources pertinent to the project in place. This is proposed to be measured using the variable 'easy access to project information'. Project information, for the purpose of the present study relates to project goals, information on specific schedules, customer expectations, and feedback from the review sessions. Further, it is also important to establish clear channels of communication for the project teams. While providing the project teams with the knowledge of customer expectations and the other pertinent project related information, it is important that this be complemented by a culture of knowledge sharing. People exchanging information freely in the teams facilitates better coordination of the teams. Further, the team members are empowered with information, knowledge, and skill sets, which enhance their performance of the project, while being motivating to them.

To be discussed next, is the set of 'Project Team Member Motivator' variables which are related to rewards, both non financial and financial. It is recalled here that the nature of rewards in the context of a project set up has been brought forward by studies of Vroom (1964), Herzberg et al (1959), Huws(1999), and Armstrong (2003). Further, though nature of work has been posited as being a motivating factor, Beech, and Brochbank (1999) posit work as being a reward, especially the aspects of work pertaining to obtaining feedback on performance, and the task being meaningful and important. These variables have already been discussed in the section 'Project Team Member Motivators to explore Nature of Work' (thus supporting the argument that 'nature of works', is an intangible intrinsic reward). In this section, a discussion on tangible financial rewards would be followed by a presentation of intangible rewards, which are related to learning opportunities or opportunities for career growth.

Project Team Member Motivators to explore 'Rewards'

Performance Based Financial Rewards

The relation between performance and motivation may be traced back to The Expectancy Theory of Motivation suggested by Vroom (1964), when he suggests that motivation and performance are influenced by the perceived link between effort, performance and outcome or in other words, there must be a link between effort and reward. Previous research (Armstrong, 2003) shows that performance related pay improves performance and it motivates as the achievement is recognized by tangible means when it is a Team-Based Pay. Advocating the merits of 1998 IDP survey (Armstrong, 2003) argues that PRP (Performance Related Pay) provides equitable reward to the people who perform well more than who perform badly. Thus, though Performance Related Pay may not be a direct powerful motivator, it is an indirect motivator because achievement is measured and recognized by tangible means. Also, this would be perceived by the employees as a direct recognition of high performance. This again maps to Vroom's expectancy theory (1964) and Goal Setting Theory (Locke, 1968), which stimulates motivation and enhances performance in relation to expectations of higher rewards. In the context of projects, the motivating potential of performance related pay, has been suggested as being extrinsically rewarding to the team members by Mahaney and Lederer (2006) in their study on the impact of intrinsic and extrinsic rewards on project success.

It may be noted here that for the purpose of the present study, no distinction has been made between contingent pay, Skill-based pay, and Performance based pay as they are all dependent on performance. (Armstrong, 2003).

Having discussed the performance related pay and their impact on motivation and team performance, we discuss yet another facet to performance management- Career opportunities for the project team members.

Future Career Opportunities

Performance management concerns employee development and therefore, our discussion of the presence of career paths for the employees – its impact on motivation and team performance becomes relevant. Studies by Thamhain (1998) suggest that poor job security is a barrier to team performance. So much so that The Two-Factor Motivation theory suggested

by Herzberg (Herzberg et al, 1959) shows that growth and advancement lead to extreme satisfaction. The mention of growth and advancement as motivating factors brings to the fore, Mentoring and coaching, which would be discussed now.

Mentoring by Top Management

Mentoring and coaching, may essentially be top management initiatives (Mathews, 2006), and may be present as a part of the environment to support growth and advancement of the employee. A mentoring relationship is the one in which a more experienced person (mentor) helps a less experienced organization member (protégé) to develop and advance at work (Hunt and Michael, 1983; Kram, 1985; Levinson et al, 1978). Specifically, mentoring and coaching involves protégés acquiring specific knowledge, skills with the help of their mentors (Armstrong, 2003). Recalling, the discussion on team performance, and specific facets to team performance as presented by Thamhain (1998), Mathews (2006) suggests that to achieve cost reductions, high quality standards, and efficiency, a Mentoring programme is useful. Further, seconding the observations of Armstrong, it is stated that mentoring programmes are an effective way to exchange knowledge and information within the organization and for the development of skills, which leads to high performance at the work place (Tovey, 1995), and motivation (Spencer, 1996; Certo & Peter, 1995). Mentors provide ongoing advice and feedback and give protégés more visible and meaningful work (Beech and Brochbank 1999; Van Collie, 1998). Meaningful work and feedback about performance, as had been discussed earlier, lead to motivation and team performance.

It may be recalled that the current research study is an attempt to compare the motivation in collocated and virtual project environments. Given that one of the driving forces for the emergence of the virtual teams has been an opportunity to work, overcoming the obstacles of collocation (geographic, and temporal boundaries), and an opportunity to achieve a healthy work-life balance, it may be important to explore this aspect when studying motivation in these two environments. Hence, the next variables 'Project Accommodating Personal Life' is presented below.

Project Accommodating Personal Life

With the emergence of information and communication technology, temporal and spatial boundaries between work and life have blurred (Lewis Suzan, 2003). A result of this trend is

telecommuting, which has been found to increase productivity and morale (Robbins, 2003). These observations are supported by Glaser and Glaser (1995), and Grantham and Paul (1995) who state that workers are motivated by remote working (tele-work) as they achieve balance between their professional work and familial issues such as child care and house work. As the current research studies the co-located and virtual teams, and telecommuting has been associated with knowledge related tasks (Huws, 1999), which extensively use computers and other telecommuting tools (Robbins, 2003), a discussion of this aspect may be pertinent. Also known as the work- life balance, it has an influence on the attitude of the employees towards their organization, and also towards their lives, particularly significant in case of highly skilled knowledge workers and technical workers (as may be in the case of projects), where the employers face the daunting task of sustaining the commitment and loyalty of such employees (Davenport, 1999; Scandura and Lankau, 1997).

Further, the ability of work life balance to be motivating to the employees is grounded in the concept of Psychological Contracts (Rousseaue and Wade-Benzoni, 1994; Katz and Kahn, 1996; Spindler, 1994; Guest et al, 1996), as it is observed that employees have an expectation from the employers with respect to work life balance, the satisfaction of which is perceived as being the employers giving priority to the well-being of the employees. The employees then reciprocate through positive attitudes and behaviours towards the organization (Scholarios and Abigail, 2004). These observations are seconded by Friedman and Lobel (2003), when they cite that employees, especially the younger work force value work, while providing them with opportunities to satisfy their personal goals. Further, Nieto (2003) suggests that the modern work force would have been more committed had there been a better balance between their work place and their other personal interests. In the context of projects, these observations on work-life balance having a positive influence on the motivation of the employees is supported by Mahaney, and Lederer (2006) when they found that project team members were motivated when they had flexible work schedule and opportunity to work from home.

To put the discussion on rewards, and their influence of project team member motivation, it has been seen that rewards in a project set up are both financial and non-financial. The key to management of rewards in the project is to relate rewards to performance. The financial

rewards have been argued as being impacting project team member motivation indirectly, while being important to enhance team performance. Also equally important are the non-financial rewards. In this context, it is important that the concerns of job security of the team members are mitigated and further, opportunities for career growth are provided by the employers. Also motivating are the horizontal growth opportunities provided to the team members which enhance their competence by increasing their knowledge and skills, by giving them feedback on their performance. This is facilitated through mentoring and coaching. Mentoring and coaching also provide a platform for exchange of information, which has been discussed previously in the section on 'Project Team Member Motivators to explore communication. While the financial rewards, opportunities for career growth and learning opportunities through coaching and mentoring are important, the employees having a healthy work-life balance, is equally important to motivate the employees.

It may be recalled here that the current research study presents a comparative account of motivation- from the team members' perspective, and in terms of the project team environment; and its ability to support the team members' motivation, in collocated and virtual (distributed project teams). While the key theories on motivation, team performance, and team effectiveness have been presented, which led to the contention that motivation in a project setting is to be explored in three dimensions- 'Nature of Work', 'Communication,' and 'Rewards' (the variables to explore each of these dimensions being presented in the section 'Project Team Member Motivators'), the next section presents a literature review of the virtual teams. The section first presents the various schools of definitions of virtual teams and highlights their characteristics, advantages and challenges vis-à-vis the conventional face-to-face collocated teams. More importantly, the section brings to the fore the lack of empirical research which compare collocated and virtual teams in project management. This is a key driver behind this research study and also proposes questions to be explored, which address the lack of empirical comparative research on virtual teams vis-à-vis collocated project teams. The 'Project Team Member Motivators' are summarized in the figure 7 below

Figure 7. Summary of Key Dimensions & Project Team Member Motivators

Dimension	Project Team Member Motivator
Nature of Work	Enjoying Nature of Work Itself Autonomy at Work Being Involved in Critical Project Activities Strong Team Spirit
Communication	Feedback on Performance Training for Learning Comprehension of End-User Requirements Easy Access to Project Information Ease of Information Exchange/ Communication
Rewards	Performance Based Financial Rewards Future Career Opportunities Mentoring by Top Management Project Accommodating Personal Life

IV. LITERATURE REVIEW- JUXTAPOSING COLLOCATED AND VIRTUAL TEAMS

Introduction

The phenomenal growth of technology created work designs that overcome temporal, and geographic boundaries (D'Aveni, 1995). With increasing globalization of project management, teams comprising of individuals who may never directly interact with each other are becoming common place (Slevin, Pinto, 2004). This growth has been catalyzed by the advancements in communication, and information technology (Kirkman et al, 2004). Further, the issues of cost and skill distribution have catalyzed the shift towards the virtual teams recently (Elkins, 2000). Guss (1997) and Mayer (1998) predicted that virtual organization, or the virtual corporation would be the model for future organizations. This was proved, when a survey by the Project Management Institute (2001) indicated that 21 % of the project management professionals worked on a project which involved multiple states or provinces, while 15 % of the respondents (project management professionals) worked on projects involving multiple continents. However, the limited research on virtual teams presents a situation, where the key issues pertaining to virtual team such as their definition and the degree of 'virtual ness' have not been investigated adequately. (Fiol, O'Connor, 2005) with very little being known about their social dynamics (Orlikowski and Barley, 2001).
A key issue to be addressed here is the distinction between collocated and virtual teams.

The purpose of this section is to present the researcher's standpoint on the definitions of collocation and virtual-ness for the purpose of the present study. In this direction, collocated teams are presented through a discussion of the traditional team based organizations which includes the conventional face-to-face project organization. It is argued that collocated teams are similar to the traditional teams. Then, virtual-ness is presented through a discussion of virtual organizations, electronic project management (ePM), and virtual teams- their definitions and characteristics. This section then focusses on motivation in virtual teams through a discussion of McClellaland's Theory of Needs which suggests that virtual team members may value greater autonomy at work and would have low affiliation needs. This is followed by addressing the notions of collocation and virtualness for the purpose of this study

where the literature suggests that physical displacement of the team members is a key factor which distinguishes virtual from collocated teams.

Need to understand Virtual Teams vis-à-vis Collocated Teams

Showing the lack of adequate research in case of virtual teams, Hunton (2005) and earlier Kirkman et al (2004) argue that most of the knowledge emanating has been from practitioner articles (Cascio, 2000; Coutu, 1998; Kirkman et al, 2002; Townsend, DeMarie and Henrickson, 1998) or from theoretical work (Armstrong and Cole, 1995; Bell and Kozlowski, 2002; Griffith and Neale, 2001; Griffith, Sawyer and Neale, 2003). This lack of adequate research on virtual team may be particularly a cause of concern for project management because with the growth of virtual teams, there has been a rapid and significant transformation in the project management culture as well, with the studies suggesting that more people will work in virtual teams, project management will have to make the necessary alignment with this change, and formulate new ways of managing projects (Project Management Institute, 1999). Also, research on virtual teams has been dominated by the technological aspects rather than the behavioural aspects of the team (Anawati, Annemieke, 2006). Further, as mentioned earlier in the Introduction of this thesis, a study of human dimensions in project management, with a team member's perspective, in these two different project environments- collocated and distributed project teams, may be important.

Thus, in this direction, an attempt is made to better understand virtual (distributed) teams. Definitions and characteristics of the virtual teams are discussed, which are preceded by a brief discussion on the virtual organizations. In this study, as virtual teams are compared to the collocated project teams, a discussion on the challenges of virtual teams within the realm of team members motivation vis-à-vis the collocated project teams is important. This section assumes significance as this discussion provides the frameworks for the proposition of the hypotheses, which explore the research objectives 1-3, presented in the section 'Objectives of the Research Study' at the beginning of this thesis. Finally, previous studies which compared collocated and virtual teams in terms of team members' propensity for information exchange and team-wide collaboration are reviewed.

A brief discussion of the traiditional team based structure of an organization is discussed which foreshadows the discussion on collocated teams.

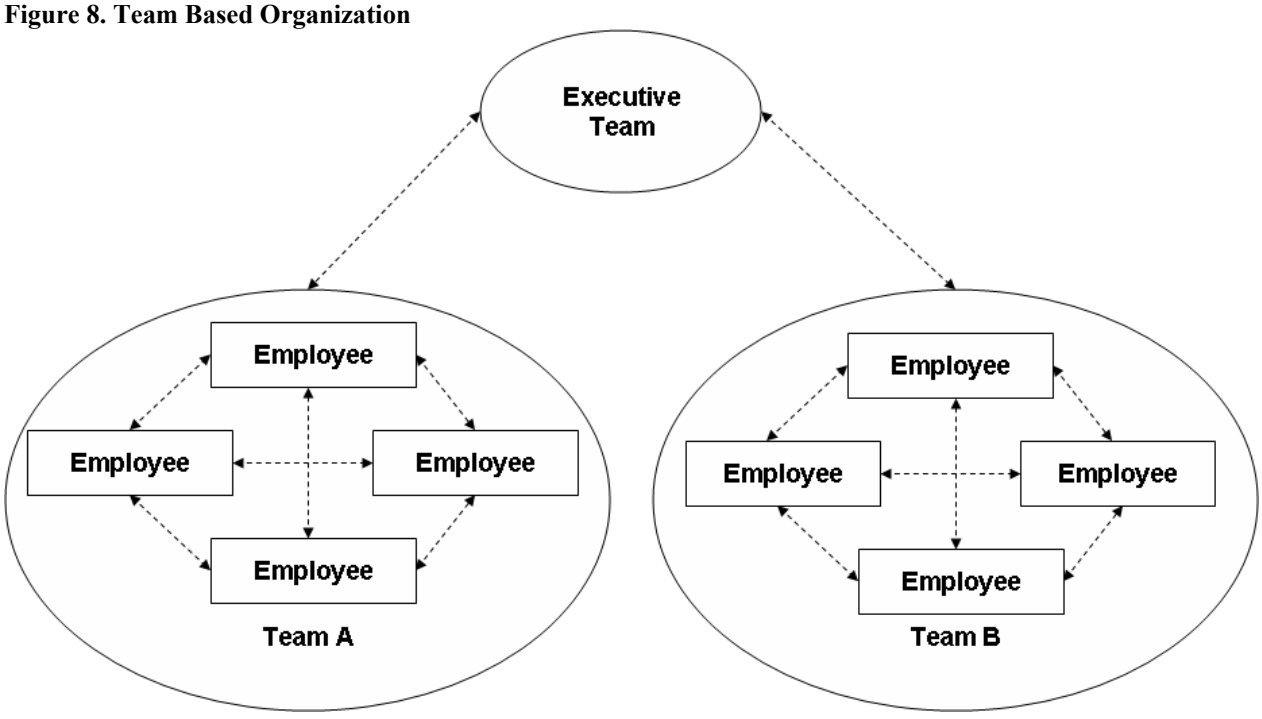
Collocated Teams

Collocated teams have often been discussed as traditional teams where the members communicate face-to-face, relying on technology to communicate. The other difference between the collocated and virtual teams has been given being distant from the team members (Hinds and Bailey, 2003). However, Hackman (1987) and later Cohen and Bailey (1997) suggest that virtual teams share a number of characteristics as that of the traditional teams such as individuals working together to accomplish a task, having a distinct social identity, and manage team boundaries. This concept is better understood when seen in the context of a traditional team based organization

Traditional Team Based Organization

A team –based organization is a type of departmentalization with a flat span of control and relatively little formalization, consisting of work teams responsible for arious work processes (McShane and Van Glinow, 2003). These team based organizations may be structured around formal permanent teams which are called self-directed work teams and temporary teams called Task Forces or Skunkworks or Project Teams. Figure 8 below shows a traditional team based organization (McShane and Van Glinow, 2003).

Figure 8. Team Based Organization



Specifically in case of project based organizations, which are related to this study, the organizational structure assumes a matrix organization which provides a focus for management. Projects are perceived as building blocks in the design and execution of organizational strategies. It has the commitment of the senior executives. Team work is a key characteristic of the project management experience and management of the stakeholders is a key task of the project team's endeavours (Clelland and Ireland, 2003). The discussion of teams in the organization leads to the discussion of teams themselves where the structure of the tradional face-to-face collocated teams would be seen.

Structure of Traditional Collocated Teams

The structure and the organization of the team is dependent on the purpose of the team itself. Broadly, based on their purpose and duration, teams may be classified into permanent and temporary teams. (McShane and Van Glinow, 2005).

The permanent work teams are responsible for specific tasks or processes in the organization. In this case, the employees directly interact and coordinate work activities with each other (Huszco, 1996; Likert, 1961). The other form of team which is the temporary team is also callsed task forces or project team (McShane and Van Glinow, 2005). These teams investigate a particular problem or opportunity and is disbanded when the decision is made. It is to be mentioned here that the scope of this study pertains to temporary project teams alone and hence a further discussion on permanent teams is not relevant.

Project teams also called as skunkworks team refer to innovative teams or work units that consist of an entrepreneurial team leader and who borrows people and resources. This team is usually independent of the corporate bureaucracy. These teams are often constituted to develop products or solve complex problems ((McShane and Van Glinow, 2005). A manager is put in charge of a core group of personnel from several functional areas who are in turn assigned to the project on a full time basis (Larson and Gobeli, 1989).

Two key features of a team which differentiates it from a group are suggested to be task dependence and affiliation. Teams are groups of people who while interacting and influencing each other, strive towards common goals and are accountable to each other. Further, they perceive themselves as a social entity within the organization (Cohen and Bailey, 1997; Katzenbach and Smith, 1981). These aspects of task dependence and affiliation

towards each other are reflected in the characteristics of a project teams where people holding identifiable responsibilities for direct contributions to the project are considered members of the project team.

Virtual Teams

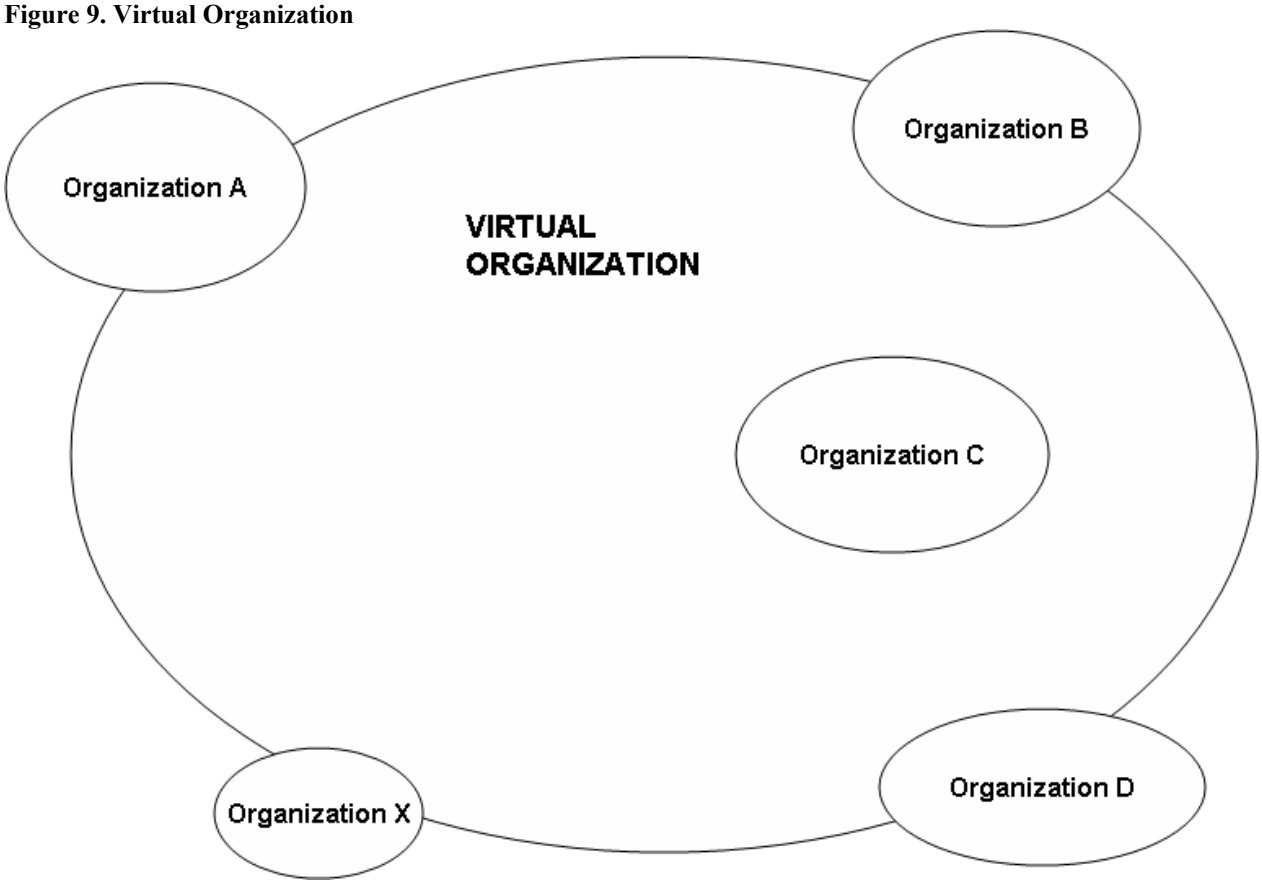
Prior to discussing the defitions and characteristics of the virtual teams, a note on the virtual organizations and electronic Project Management (ePM) is presented. This helps in a better understanding of the virtual teams in terms of definition, characteristics and the people issues.

The Virtual Organizations

Virtual organization has been defined as a goal-oriented cooperation between (legally independent) organizations. The organizations participate with their core competencies. To a third party, they appear to be a single organization (Gareis, 2005). Supporting this definition of a virtual organization, Goldman, Nagel and Preiss (2005) propose that virtual organizations are a situational alliance of complementary core competencies which are distributed over a number of organizational units of a company or a group of companies. Further support to this school of definition is given by Bullinger (1996) when he defined virtual organizations as being "temporary horizontal and/or vertical location-independent cooperations of different companies." This cooperation is facilitated by combining the core competencies of the different companies, which permeate the organizational boundaries.

Virtual organizations serve as vehicles to accelerate the business processes. Their structure imparts them the agility to react quickly to increase the chances of company's survival. Thus, the efficiency of their operations reduce the costs. The following is a representation of Virtual Organization (Linde, 1997).

Figure 9. Virtual Organization



The success of the virtual teams is based on the ability of the knowledgeable people to communicate. Also important is a simulated personal contact facilitated by the ICT of the teams (Mertens and Faisst, 1997) contend that ICT is a decisive success factor for the success of the virtual organizations. The ICT should be flexible with standardized interfaces that enable a quick and seamless transition to new products, processes, ICT system, with the information being decentralized. Further, the technology used by the virtual teams such as desktop videoconferencing equipment, multimedia, e-mail, shared chalkboards, groupware, and web browsers facilitate collaborative work, knowledge exchange, and simulate personal contact (Davenport and Prusak, 1998). These aspects, while contributing to the success of the teams, also pose unique challenges to the virtual team members. These would be discussed in detail in the section 'Challenges in Virtual Teams' later.

Before the virtual organizations, virtual teams and motivation in these set-ups is discussed, a brief note on eProject Management (ePM) is presented which intends to foreshadow the issues to be presented later in this section on virtual teams.

ePM Approach

ePM may be understood as being a collaborative effort towards a specific goal or accomplishment that is based on collective yet remote performance. In this approach, the emphasis is on communication and coordination among the team members. ePM and the conventional PM share their approach with issues pertaining to task definition, resource allocation, communication (design issues and status reporting), and the role of project manager in gauging the project performance through constant monitoring in principle. However, unlike in case of the conventional PM approach, the team members in a virtual PM environment rely extensively on technology such as e-mail, phone conferences, webcasts, and also use specialized software such as Computer Aided Design (CAD), Computer and Software Engineer (CASE), and other simulation software for sharing design information. Further, ePM approach offers the following advantages over the conventional PM approach (Goncalves, 2005):

- Attracting the best employees independent of the location
- Existing workers may not be relocated
- Cost reduction in terms of travel time and other associated expenses
- Shift towards service work
- Global work days, with the distributed team members working continuously from different global locations

However, in her observation of the ePM environment, Cooper (1998) opines that adoption of ePM has greatly changed the issues concerning Reengineering, System Integration, Process Design, Total Quality Management, and Team Work in the contemporary organizations with the changes in Team Work being most conspicuous. Thus, this now leads the discussion to virtual organizations, virtual teams, their characteristics and an account of motivation in the virtual set-up.

To take forward the discussion of virtual teams in a project context, it may be mentioned here that projects by definition, can be perceived as being virtual organizations. Supporting this argument, Gareis (2005) argues that the characteristics of a project such as having an adequate distribution of tasks between the cooperation partners which leads to the optimal use of core competencies, and the development of a common Information and Communication

Technology (ICT) infrastructure draw an analogy with the characteristics of a virtual team. These and other definitions of the virtual teams are discussed next.

Definition of Virtual Teams

Rad and Levin (2003) opine that there have been a number of names which are used to describe virtual organizations and virtual teams; examples of which are learning network, spider webs, boundaryless organizations, distributed global work teams, autonomous work groups outside existing organizational structures, and virtual factors (Guss, 1997). Though there is a controversy as to what might be a definition of virtual teams (Duarte and Snyder, 1999; Hinds and Kiesler, 2002; Lipnack and Stamps, 1997, Maznevski and Chudoba, 2000), Hertel, Konradt and Orlikowski (2004) define virtual teams as consisting of two or more persons, who collaborate to achieve common goals, while atleast (some) of the team members work at different locations (or times) so that communication and coordination is predominantly based on electronic communication media such as email, fax, phone, video conferences etc. Cleland and Ireland (2002) further define virtual teams as group of project team members, linked via the internet or the media channels to each other and various project partners (Cleland ,Ireland (2002)).

Maznevski and Chudoba (2000) define virtual teams, rather, the Global Virtual teams as internationally distributed groups of people with an organizational mandate to make or implement decisions with international components and implications. A similar definition, emphasising on the team members being distributed in the virtual teams has been given by Mayer (1998) who defines the virtual team as a team that is composed of people who are distributed across buildings, states, and countries, transcending distance, time zones, organizational boundaries, national borders, and continents (Rad and Levin, 2003).

Although physically separated, technology links these individuals so that they can share information and operate as a unified project team. The number of elements in a virtual team and their permanency can vary, depending on need and feasibility (Cleland and Ireland, 2002). This feature of the virtual team may be traced back to the definition of virtual team given by Delisle et al (2001), who describes virtual team as a team as a collection of task-driven members, behaving as a temporary group, whose members are separated by geographical or temporal space.

Other definitions of virtual teams have been as being culturally diverse and geographically dispersed (Geber, 1995; Melymuka, 1997b; Townsend et al, 1996), member diversity (Griffith and Meader, 2004) and absence of face-to-face contact among the team members (Griffith et al, 2003a) and the team members being tied together by technology such as groupware (Attaran and Attaran, 2003).

It can be inferred from the various definitions of virtual teams that the members of the team are geographically dispersed and may work in different time zones. While a strong analogy between the definition of the projects, and the virtual teams may be drawn, in terms of their temporary nature, virtual (distributed teams) are strategically important. Taking this discussion further is the following section- 'The Characteristics of Virtual Teams'.

The Characteristics of Virtual Teams

Maznevski and Chudoba (2000) have suggested the following characteristics of global virtual teams-

- Groups and members are identified by the Organization as a Team
- Are responsible for making and/or implementing decisions important to organization's global strategy
- Use technology-supported communication substantially more than face-face teams
- Work and live in different countries.

Supporting these features of the virtual teams, especially that of implementing crucial decisions pertaining to the organization's global strategy, Kayworth and Leidner (2001), and Montoya-Weiss et al (2001) contend that virtual teams are capable of responding rapidly to the global business challenges and therefore, there has been an exponential growth in their emergence (Kirkman et al, 2002). In this direction, Duarte and Snyder (1999), Lipnack and Stamps (2000a), Townsend et al (1998) posit that virtual teams are knowledge based teams which are directed at improving the organizational processes, and finding solutions to complex customer problems. The team members can be collocated at the customer's site or in proximity, thus having better access to the customer's markets and resources in their loca context (Gluessing et al, 2003; Maznevski and Athanassiou, 2003). This again seems to map

back to the feature of the virtual teams being highly responsive and being an important part of the organization's global strategy.

Seconding these characteristics of virtual teams, Lipnack and Stamps (1997) define virtual teams as a group of people who interact through interdependent tasks, are guided by a common purpose, and work across space, time, and organizational boundaries using communication technologies. Though it seems that virtual teams offer advantages over the conventional teams in terms of overcoming the spatial and temporal distances, the characteristics of the virtual teams may pose challenges, especially when compared with the collocated project environments. These are discussed in the following section.

Challenges in Virtual Teams

Sivunen and Valo (2003) contend that virtual teams face challenges arising from geographical distances, cultural differences, and differing modes of interaction. Further, Lipnack and Stamps (1997); McGrath and Berdahl (1998); Moore, Kurtzberg, Thompson, and Morris (1999); Valacich, Dennis, and Nunamaker (1992) contend that virtual teams encounter motivational challenges due to reduced face-to-face interactions among the team members as compared to their collocated counterparts. These may be expressed as lack of commitment to team goals (Hertel, Konradt and Orlikowski,2004) , feeling of anonymity, and low social control (Kiesler, Siegel, and McGuire, 1984; Spears, Lea and Lee, 1990; Briggs, Reinig, Yen, and Nunamaker, 1996), and low perceived instrumentality of own efforts (Kaurau and Williams, 1993), which seem to suggest that virtual team members may experience a lack of task significance (connoting to the Job characteristic model, (Hackman and Oldham, 1980), and which consequently may undermine their motivation.

Motivation in Virtual Teams

The behavioural standpoint in teleworkers has been presented earlier by Hartman et al (1991) who reported that having goal clarity and a robust feedback mechanism lead to satisfaction of remote working employees. Specifically, motivation in a virtual setting has been discussed by Rad and Levin (2003). The definition of motivation in their discussion supports the contention of this study, which is the inextricable relation between motivation, and team performance in the project set-up; motivation being related to the constraints of team performance. Thus, motivation here has been defined as "a process, action, or intervention that serves as an

incentive for a project team member to take the necessary action to complete a task within the appropriate confines, and scope of performance, time, and cost" (Flannes and Levin, 2001). It is suggested that this definition is drawn from the McClelland's theory of needs (McClelland et al, 1961, 1974, 1975, 1986), which characterizes the team member behaviour into achievement, affiliation, and power needs from the motivation stand point. As McClelland's Theory of Needs (McClelland et al, 1961, 1974, 1975, 1986) has already been discussed in detail in the section 'Motivation in a Project Setting', it will not be visited here again. However, McClelland's theory in the context of virtual project teams, characterizing the virtual team member motives would be presented.

McClelland's Theory of Needs-Virtual Team Member Motivation

Rad and Levin (2003) argue that virtual team members are motivated by the 'Achievement Need', which has been presented as one of the three sources of motivation (the other two being 'Need for Affiliation', and 'Need for Power') in the McClelland's Theory of Needs (McClelland et al, 1961, 1974, 1975, 1986). Quickly recalling the 'Need for Achievement', this has been defined as 'The drive to excel, to achieve in relation to a set of standards, to strive to succeed', and the employees with a preference for this source of motivation, showing a proclivity for being given personal responsibility for their actions, seeking challenging goals, and feedback on their performance, similar views have been presented by Rad and Levin (2003). They state that achievement-oriented individual would be interested in goal setting, would concentrate more on the technical tasks, and would want to participate in the development of the team charter. However, once being committed to the goals of the team through the charter, he shows a high preference for freedom and flexibility in performing his tasks. This makes him more suitable for the virtual team environment as he does not need extensive face-to-face interaction with the other team members in the project, to identify with the project. Further, they add that these individuals do not have a great desire to interfere with, or be involved or have knowledge of the specificities of tasks of other team members.

At this stage, these arguments seem to suggest two conclusions. The first one being is that virtual team members, because are driven by their personal goals (in consonance with the project goals as defined in the project charter), would value greater autonomy in their work environment.

The second conclusion refers to their lack of need to extensively interact with their peers on the project team, especially in the project execution stage, which suggests that virtual team members may show a low preference for team spirit and bonding. This aspect has been explained in 'Need for Affiliation', which has been defined as 'The desire for friendly, and close interpersonal relationships'- enjoying being a part of the team, seeking accepting and friendship from others, and showing a need for cooperative attitude from the other members of the team. It is suggested that team members with an inclination for Affiliation Needs, may not find the virtual environment suitable for their work style as the virtual project environments do not adequately support these motives. However, their skills may be particularly useful in the project execution stage for assimilating people and technology in the project (familiarizing the new team members to the team norms), ensuring personal and project goal alignment of the team members, ensuring communication flow in the virtual team, serving as an arbitrator in case of conflict among the team members, and fostering team spirit among the dispersed members of the virtual teams.

Finally, from the 'Need for Power' stand point, Rad and Levin (2003) suggest that people with the Power needs may not find the virtual team environment a best fit for their work as they are driven by a need to lead others, and have a strong need for public recognition of their contributions. These aspects may not be supported by the virtual team environment as virtual team members are dispersed and hence, it will be difficult to formally lead fellow project team members, and also to get their accomplishments noticed publicly in the team. Further, there is minimal interaction with the internal and external project stakeholders, and therefore, the virtual team members may feel that their contributions may not be significant and may not be recognized as frequently as compared to the recognition, which his collocated project team counterpart may get for a similar effort. This seems to suggest that the virtual team members driven by power needs, may experience a lack of perceived task significance. However, the behavioural skills of the team members, may be especially useful, when it comes to clarifying the project's purpose and critical success factors, while also with respect to identification of the project stakeholders, and making sure that their requirements are satisfied by the project. This observation is particularly significant as in a project set-up, understanding the end-user requirements is a key to team performance, which has earlier been

underscored in the section 'Literature review on Team Performance. Further, they can mentor other team members by showing more effective ways to complete their assigned tasks.

Metrics for 'Collocation' and 'Virtual-ness' in the context of this study

Hinds and Bailey (2003) in their study of conflict engendering in virtual teams, connote to the concepts of collocation and virtual-ness by bringing out the differences between the collocated and the virtual teams. They hold the view that physical distance among the team members is a characteristic which distinguishes the traditional collocated teams with the virtual teams.

'Distance' as a metric for collocation and virtualness

The geographical distance among the team members in case of virtual teams lead to a lack of shared context among the team members (Schober, 1998; Hinds and Bailey, 2003) which is present to a greater extent in case of teams which is physically collocated in a geographic location (Hinds and Bailey, 2003). Hence, distance may be understood as a metric for collocation and virtualness. This is discussed in detail below.

The geographically distances among the team members lend them to perceive the information about their work differently (Tyre and Von Hippel, 1997). These aspects of co-orientation of the team members towards perception of their task and the related information needs have been presented collectively as shared context (Hinds and Bailey, 2003). Taking further the discussion on sharing their perception of tasks and information, Ancona and Chong (1996) argue that teams establish a rhythm in terms of pacing and timing of the activities which may be absent in the virtual teams (Grinter et al, 1999). Further, the physical proximity among the team members lead to unplanned conversations (Kraut et al, 2002) and being aware of each others' feelings (Zajonc, 1968). This leads to familiarity among the team members as people are more aware of the personalities, concerns and work practices in the team (Hinds and Bailey, 2003). Similar views are subscribed to by Bourdieu (1977) and by Wenger (1998) when they suggest that teams 'community of practice' for work through shared understanding which is developed as a result of collocation. In reference to the geographic collocation of the team members, Mortensen and Hinds (2001) suggested that collocated teams are culturally more homogenous vis-à-vis the geographically distributed teams which again leads to task and information related perceptual differences among the team members (Williams and O'Reilly, 1998).

Another dimension which may define the degree of collocation and virtualness in teams is the extent of technology mediated communication, which is prevalent more in the virtual teams than in the traditional face-to-face collocated teams (Attaran and Attaran, 2003). The extensive use of technology in the virtual teams undermines the exchange of social cues among the team members. This in turn undermines the exchange of relational information such as attitudes, identity and cohesiveness (Short et al, 1976). This seems to suggest that though technology plays a major role in influencing the communication and thence the behaviour of the virtual team members, it may be mapped back to the physical dispersion among the team members. Other studies which undermine the extent of technology used as a direct measure of degree of virtualness and collocation have been given by Grifith and Neale (2001) and later supported by Fiol and O'Connor (2005). They posit that virtual teams may not necessarily use technology while face-to-face teams may extensively use technology. Hence,it may not be a dimension which differentiates collocated and virtual teams directly.

There are other dimensions such as culture (Duarte and Snyder, 1999), standard work practices (Wenger, 1998) and interorganizational teaming (Espinosa et al, 2003) which distinguish collocation and virtualness. However, Hinds and Bailey (2003) contend that all these other traits are associated with the extent of physical dispersion of the team members

Thus, based on these definitions and dimensions of collocation and virtualness, the notions of collocated and virtualness for the purpose of the current research study are presented next.

'Collocation' and 'Virtualness' in the context of the current research

Based on the above discussion, in addition to the conventional definition of the team and its characteristics (discussed in Team Performance: concepts and definitions), it is argued that a team may be termed as being collocated when the members of the team are working in physical proximity in face-to-face conditions. As the team members work in collocated conditions, there is exchange of social cues and consequently the team members perceive the task and information requirements similarly. While technology may mediate communication among them, their collocated status gives the team members opportunities for informal exchange of communication, which in turn leads to cohesion in team.

A team is argued to a virtual team if the team members are geographically distributed and hence do not engage in face-to-face contact This is an important feature which

distinguishes collocated from virtual teams (Rad and Levin, 2003; Bell and Kozlowski, 2002). This physical dispersion leds the team members leads to al lack of shared context among the team members which in turn affects their behaviour and cohesiveness.

A key issue in defining virtuality or the degree of virtual ness is an argument presented by Cohen and Gibson (2003), Griffith and Neale (2001) and Griffith et al (2003) who state that the distinction between teams as being absolutely collocated or absolutely virtual is unrealistic as virtuality lies on a continuum ranging from highly virtual to minimal virtual. This aspect has been considered in this study, where the questions pertaining to identifying whether the respondent is a member of collocated or virtual team has been rated on a five-point scale. The respondents scoring low on this virtuality scale have been categorized as being collocated-this being substantiated by other questions pertaining to virtualness. This has been detailed in the research methodology section. Further, drawing from the definitions of virtual team given by Maznevski and Chudoba (2000) and the above discussion on the metrics for collocation and virtualness, the terms 'virtual teams' and 'distributed teams' have been used synonymously in the current research study.

Previous Studies Comparing Collocated and Virtual Project Environments

Previous studies comparing the collocated and virtual project environments have been presented by Hartman (2000) and by Hayward (2006) who have studied the impact of collocation and virtual ness on team orientation, work load sharing, and proclivity to seek and exchange information in a face-to-face communication and communication by video conference situations. The key conclusions of the study suggest that virtual teams tend to collaborate better within their sub groups rather than with team wide members vis-à-vis to their collocated counterparts, who tend to establish a team wide collaboration, beyond their sub groups. Also, this greater team wide collective behaviour leads to greater information exchange among project team members. This seems to suggest that there is greater ease of information exchange and greater access to project related communication in collocated environments. Finally, this greater ease of information exchange was found to positively influence member satisfaction and productivity.

Other study comparing the collocated and virtual teams, from a motivation perspective, has been discussed in the sub section preceding this section-'McClelland's Theory of Needs- Virtual Team Member Motivation', where the three sources of motivation- 'Need for Achievement', 'Need for Power', and 'Need for Affiliation', have been discussed from the virtual team members' perspective, and the suitability of such team members to the virtual project set-up. It is suggested that people driven by Need for Achievement, would value greater autonomy at work, and therefore, virtual project environments better support autonomy at work vis-à-vis collocated project environment, and the team members preferring to work in virtual teams, may have a higher propensity for Need for Achievement and specifically for work autonomy as compared to collocated project team members. Further, as the virtual team environments do not offer much scope for socialization, virtual project team members may not be driven by 'Need for Affiliation', and consequently a sense of team spirit as much as their collocated counterparts. Finally, virtual project team environments may not adequately support the 'Power Needs' of the team members, which gives the virtual team members motivated by these needs, minimal opportunities to lead others in the teams. Further, the virtual team members may feel a higher perceived lack of task significance as compared to their collocated team members, as virtual team environments may not sufficiently acknowledge their contributions publicly within the teams nor do the team members get adequate feedback on their performance. These issues would be further discussed in the section on 'Research Methodology', when propositions comparing the motivational drives of the project team members in collocated and virtual project team environments, and the abilities of the collocated and virtual project team environments are presented.

Summary

To summarize, this section introduces collocated and virtual teams through a discussion of traiditional face-to-face team based organizations and virtual organizations. In case of the traiditional organizations, the team based organizations are discussed which based on their purpose and permanency, are divided into permanent and temporary teams. The temporary teams consitiute the project teams. The traditional collocated project teams are defined as problem solving teams. The team members are driven towards common goals and have a high perceived social identity. The limitations of collocated teams and the development of technology has lead to the emergence of virtual teams.

Virtual teams have emerged as a dominant work form, overcoming the limitations of the conventional face-to-face teams-temporal and spatial constraints. The definition of motivation, presented in the context of the virtual teams, shows the relation between motivation and the team performance (through the constraints of time, scope, cost, and quality). Further, the definition of virtual team draws an analogy with the definition of the projects, as they are defined as being 'temporary in nature'. However, virtual teams are strategically important, facilitating quick response to the end user's requirement on site. From the definitions and the characteristics of the virtual teams, it is inferred that virtual team members rely extensively on technology for information exchange among themselves. The importance of collaboration between the partners in a virtual team, open communications fostering trust among the virtual partners is further highlighted by Sydow (1996). Also important for coordination in this networked environment is the presence of common objectives, common terminology, and common programme - project management approach, which are agreeable to all the parties in the virtual setting. (Gareis, 2005). However, the characteristic of the virtual teams offer unique challenges to their effectiveness, vis-à-vis collocated project environments. These challenges relate to motivation of the team members, owing to lack of collocation), and perceived low instrumentality of own efforts by the team members.

Finally, an important issue for the purpose of this research which is to define collocation and virtualness is addressed. Through various definitions of virtual teams and previous studies, it is inferred that virtual teams are similar to collocated teams. However, it is the physical dispersion of the team members which distinguishes virtual teams from the collocated teams. A further discussion on the characteristics of the virtual teams, and the challenges in a virtual project environment, would be presented in the section on research methodology, when hypotheses related to 'nature of work', rewards', and communication' are presented.

Thus, the thesis presents literature on motivation in the context of projects which show a relation with aspects of team performance. Next, an integrated view of motivation in projects is presented where *nature of work,* communication, and *rewards* are discussed. The 'Project Team Member Motivators' are presented next which are used to explore the

dimensions of *nature of work, communication* and *rewards.* The study then focusses on the literature review of virtual teams. The definitions and characteristics of virtual teams are presented in this section. An important issue- identification of metrics for collocation and virtualness for the purpose of the present study is discussed where physical dispersion and thence lack of face-to-face contact among the team members emerged an a dimension which differentiates virtual teams from collocated teams..

With this background, the thesis now presents the Methodology section where the research questions, hypothesis, research procedure, sampling, measures, and the data treatment are described.

V. METHODOLOGY

It is to be recalled here that the objectives of the current research study are to compare the collocated and the virtual project set-ups *empirically*. Hence, the research methodology adopeted is Positivist in nature. This is explained further below.

Research Philosophy

Management research has been perceived as being objective and being concerned with methods which ensure efficiency and contol in the organizations (Alvesson and Deetz, 1999; Willmott, 1995). In this context, management research in general and Human Resource Development (HRD) research in particular have been designed to uncover facts using survey design and are in the idea of a neutral observational language (Johnson and Duberley, 2000). Such a research philosophy is called *Positivism* This approach detaches the researcher from the researched object and the focus is on *facts* and the intention of the research is to *know* and *explain* facts through testing of hypothesis (Valentin, 2006). The research method tends towards quantitative methodology which involves employing measurement and large samples to establish different views of the phenomena (Remenyi et al, 1998).

Thus, a quantitative research methodology which is grounded in this philosophy is adopted for this study.

Quantitative Research Method

Quantitative research method involves investigation of phenomena and their interrelationships. This is done by employing statistical methods to collect data based on hypotheses. Further, it is defined as collection of numerical and statistical data which is built on *positivism* paradigm which has been discussed earlier. Thus, in consonance with the objectives of this research and its underlying phiolosophy, a quantitative research method is adopted to understand motivation in collocated and virtual project teams. This is further highlighted through the research questions discussed below..

Research Questions

It is reiterated here that this is a longitudinal study pertaining to motivation in collocated and virtual project teams. These groups are compared for within the group differences and between the group differences. However, the study first sets out to discover if these discrepancies exist in project teams in general. This contention is supported by the theory of

Psychological Contracts, which aruge that employees have expectations with respect to nature of work from their employers and that a failure to meet these expectations has a negative impact on the employees' motivation. This is followed by the comparative study of collocated and virtual project teams.

With respect to the within the group differences, two research questions were posed which explored the motivational drives of the project team members and the ability of the project team environment to provide or support those expectations in collocated and virtual project teams respectively.

With respect to the Between the group differences, two research questions were posed which compared the motivational drives of the project team members working in collocated and virtual project teams; and the collocated and virtual project team environments' themselves in terms of their support to the team members' expectations. Thus, these research questions are presented below: Thus, the following research question is first posed:

1. What is the discrepancy between the expectations of the team members in project teams (referred to as 'All Want') and the ability of the project team environment (referred to as 'All Get') with respect to Nature of Work, Rewards, and Communication?
2. In case of collocated project teams, what is the discrepancy between the expectations of the team members (referred to as 'Collocated Want') and the ability of the project team environment (referred to as 'Collocated Get') with respect to Nature of Work, Rewards, and Communication?
3. In case of virtual project teams, what is the discrepancy between the expectations of the team members (referred to as 'Virtual Want') and the ability of the project team environment (referred to as 'Virtual Get') with respect to Nature of Work, Rewards, and Communication?
4. What is the discrepancy between the expectations of the team members working in collocated and virtual project teams (referred to as 'Collocated Want' and 'Virtual Want' respectively) with respect to Nature of Work, Rewards, and Communication?

5. What is the discrepancy between collocated and the virtual project team environments (referred to as 'Collocated Get' and 'Virtual Get') in terms of their support to the team members' expectations with respect to Nature of Work, Rewards, and Communication?

The results of question 5 show that there exist affinities between the expectations of the project team members working in collocated and virtual project team members. Likewise, the results of question 6 show that there exist minimal discrepancies between the abilities of the project team members in terms of their support to the team members' expectations. Thus this lead to the proposition of research questions 6, 7, and 8 which intended to explore the underlying factors which explain these trends. It is to be noted here that because there were affinities between the two groups, the collocated and the virtual samples were combined. The research questions 6, 7, and 8 are presented below:

6. What are the underlying factors related to Nature of Work, Rewards, and Communication which explore the motivation of project team members?

7. What are the underlying factors related to Nature of Work, Rewards, and Communication which characterize the project team environments?

8. What are the underlying factors which explain the difference between the expectations of the team members and the ability of the project team environments to support those expectations?

Hypotheses

It is to be reiterated here that the current research study explores motivation in collocated and virtual project teams at two levels. At the first level is the comparison of the two groups (*within the group* and *between the group* comparisons) where the research questions 1-5 are answered using the one tail t-test. The hypotheses presented for these questions relate to the three dimensions of 'nature of work', 'communication', and 'rewards'. At the second level are the research questions which have been formulated based on the results which have been obtained from the research questions 1-5. These questions, listed as research questions 6, 7, and 8 pertain to understanding the underlying factors which explain the motivational drives of the project team members, factors characterizing the project environment in terms its support to the team members finally bringing to fore factor(s) which are contributing to the discrepancy between the team members expectations and the characteristics of their project environment in terms of its support to the team members expectations.

Primary Hypotheses

Coming to the issue, what the team members 'Want', the answer is explained by the various theories on motivation discussed earlier and which have been presented as being related to 'Nature of Work', 'Communication', and 'Rewards'. Thus, the hypotheses exploring the overall discrepancy between the 'Want' and 'Get' in project teams with respect to these three dimensions is presented below.

Communication

The Goal setting theory, suggested by Locke [1968] suggests that people need clear goals to enhance their performance. In the context of the present study, it has been discussed in the section 'Project Team Member Motivators' how understanding the requirement of the end-users, which translates to project goals (Charvat, 2003), enhances team performance and motivation. Hence, it may be assumed at this stage that the members working in project teams would expect their project environment to strongly support this variable. Hence, it is hypothesized that:

> H0 (1): Members working in project teams would not want more in terms of 'comprehension of the end-user requirements' than what their project environment is actually offering them

> H1 (1) : Members working in project teams would want more in terms of 'comprehension of the end-user requirements' than what their project environment is actually offering them

Apart from understanding the project objectives and understanding the requirements of the end-users, project team members would also highly value feedback on their performance. The same has been posited by the McClelland's Theory of Needs (McClelland et al, 1961, 1974, 1975, 1986), who further posits that feedback on performance makes the work interesting. Hence, at this stage, it can be assumed that project team members would highly value feedback based on their performance. Hence, the following hypothesis is presented:

> H0(2): Members working in project teams would not want more in terms of 'feedback on performance' than what their project environment is actually offering them

H1(2): Members working in project teams would want more in terms of 'feedback on performance' than what their project environment is actually offering them

Coming to the question of communication of project related information, Shea and Guzzo (1987), suggest that increasing the task related interaction among the project team members leads to enhanced motivation. Hence, it may be assumed that, team members would want to have increased access to the information related to their task in the project. Hence, we hypothesise that

H0(3): Members working in project teams would not want more in terms of 'easy access to project information' than what their project environment is actually offering them

H1(3): Members working in project teams would want more in terms of 'easy access to project information' than what their project environment is actually offering them

The discussion on task related information now leads to the discussion of 'nature of work' itself.

Nature of Work

As has been mentioned earlier in the discussion on 'Framework for Project Team Member Motivators', interesting work has been suggested as being highly motivating by (Kovach, 1995). The same has been suggested by Herzberg (1987) in his two factor model, where he mentioned work itself to be motivating. Hence, it may be supposed at this stage that members working in project teams would expect their work to be interesting.

H0(4): Members working in project teams would not want more enjoyable nature of work, than what their project environment is actually offering them

H1(4): Members working in project teams would want more enjoyable nature of work than what their project environment is actually offering them

The motivating potential of nature of work has been brought to the fore in the Job Characteristic Model (Hackman and Oldham; 1980) which presents specific job dimensions such as task significance (connoting to *being involved in critical project activities* in the

present study). Thus, it is assumed that members working in project teams highly value being involved in critical activities of the project

H0(5): Members working in project teams would not want more in terms of being involved in critical project activities than what their project environment is actually offering them

H1(5): Members working in project teams would want more in terms of being involved in critical project activities than what their project environment is actually offering them

Extending further our discussion on nature of work, Thamhain (1998) suggests that interesting nature of work may also be associated with a high clarity of potential for professional rewards. This leads to the discussion on rewards.

Rewards

The motivating potential of performance based financial rewards has been highlighted by the Expectancy theory of motivation, suggested by Vroom (1964), which has been discussed seen earlier in the 'Project Team Member Motivators' section as Performance based Financial Rewards. The expectancy theory emphasises on the link between effort-performance-reward, which in this case may be expected performance outcomes from the team members and the proportionate performance based financial rewards which the team member may get. Hence, this suggests that project team members may value highly performance based financial rewards and may want higher rewards than the project environment actually offers them. Hence, the following hypothesis is presented:

H0(6): Members working in project teams would not more in terms of performance based financial rewards than what their project environment is actually offering them

H1(6): Members working in project teams would want more in terms of performance based financial rewards than what their project environment is actually offering them

Based on the above discussion, we expect that members working in project teams would want more of the ''Project Team Member Motivators' than what their project environment is

providing them. Specifically, it is expected that high discrepancy would be observed with respect to understanding of end-user requirements, feedback on performance, access to project related information, enjoyable nature of work, task significance and performance based financial rewards.

Discrepancy in Collocated and Virtual Project set-ups

It is expected that the discrepancies which would be observed in case of expectations of the team members and the abilities of the project team environments to support those expectations would follow the trend discussed above in the context of overall discrepancy in project environments in general. Thus, the following two hypotheses are presented.

H0(7): There is no significant discrepancy between the expectations of the project team members (WANT) and the ability of the project team environment to provide or support those expectations (GET) in collocated project teams with respect to 'Nature of Work', 'Rewards', and 'Communication'.

H1(7): There is no significant discrepancy between the expectations of the project team members (WANT) and the ability of the project team environment to provide or support those expectations (GET) in collocated project teams with respect to 'Nature of Work', 'Rewards', and 'Communication'

H0(8): There is no significant discrepancy between the expectations of the project team members (WANT) and the ability of the project team environment to provide or support those expectations (GET) in distributed project teams with respect to the factors related to 'Nature of Work', 'Rewards' and 'Communication'

H1(8): There is significant discrepancy between the expectations of the project team members (WANT) and the ability of the project team environment to provide or support those expectations (GET) in distributed project teams with respect to the factors related to 'Nature of Work', 'Rewards' and 'Communication

Recalling the discussion on the characteristics of the virtual teams, Mortensen and Hinds (2001) state that as the virtual team members are geographically distributed, they may

be low mutual awareness among the project team members. Further, Galegher and Kraut (1994) cite that they may be low levels of information exchange among the team members owing to these spatial distances. Further extending the impact of low mutual awareness of the team members and the geographically displaced team members, Furst et al (2004) state that the low interpersonal contacts among the team members, hampers the development of quality relationships in the team. Seconding these observations, Warekentin, Sayeed, and Hightower (1997) suggest that as the virtual team excessively rely on technology for communication, overall, the virtual team members may be dissatisfied with respect to the interpersonal interaction as compared to their collocated counterparts. This seems to suggest that there is a greater exchange of information in the collocated project environments than in the virtual project environments. This in turn also leads to higher team spirit among the collocated team members as compared to the virtual team members. collocated project team members exchange more information and Thus, the following hypotheses are presented:

H0(9): The collocated project environments do not facilitate information exchange among the project team members better than the virtual project environments.

H1(9): The collocated project environments facilitate more exchange of information among the project team members than the virtual project environments.

H0(10): The collocated project environments do not foster higher strong team spirit among the team members than the virtual project environments.

H1(10): The collocated project environments foster higher strong team spirit among the team members than the virtual project environments

The excessive reliance on technology for interpersonal interaction, not only impacts the team bonding but also on the learning initiatives of the virtual teams. Straus (1996) suggests that virtual team environments may not be offering adequate opportunities for training and learning owing to low personal contact, dependence on technology and challenges of communication. Further, they may be little shared commonality among members. Computers may not be able to bridge these differences to facilitate a learning process (Alpay, Giboin, and

Dieng, 1998) and therefore may not offer a supportive training or a learning environment (Stahl, 2001). This seems to suggest that the collocated project environments better support the learning opportunities than the virtual project environments. Hence, the following hypothesis is presented:

H0(11): The collocated project environments do not better support training opportunities for learning than the virtual project environments

H1(11): The collocated project environments better support training opportunities for learning than the virtual project environments.

Secondary Hypotheses

The results from the one tail t-test (see page) suggest that there may be similarities in the expectations of the team members working in collocated and virtual project environments. Similarly the collocated and virtual project environments also may not differ in terms of their support to the team member expectations. Thus, the next set of hypotheses is presented starting with 'Nature of Work'.

Nature of Work

Previous work which adopted a factor analytical approach to study the nature of work from the motivation standpoint has been presented by Cherns (1976), and Hackman and Oldham (1976). These studies posit that work motivation is closely associated with job enrichment, job enlargement, intrinsic work motivation, and socio-technical systems. Extending this study, Edwards et al (1999) show that work motivation is closely associated with skills, feedback, rewards, and job enrichment. Further Dorfman, Walter and Loveland (1986) draw upon the research done by Vroom (1964) and suggest that when the employees have clarity of rewards and feedback on performance, it increases their motivation and enhances the team performance. This seems to suggest that from the motivational standpoint, nature of work, and rewards are closely associated with each other and are complementary. Hence, the following hypothesis is posited:

H0(12): From the motivation standpoint, project team members do not associate nature of work with rewards

H1(12): From the motivation standpoint, project team members associate nature of work with rewards.

Wood and LeBold (1970) show that the ability to use own skills and abilities, and the opportunity to work with interested colleagues are strongly related to the professionally challenging job. This seems to suggest that project team members strongly associate task autonomy and team spirit with a challenging job. Further, Garies (2005) suggests that nature of work itself is motivating when it is associated with high degree of task autonomy. Therefore, the following hypothesis is presented:

H0(13): The project team members do not associate high degree of task autonomy and strong team spirit with interesting nature of work

H1(13): The project team members associate high degree of task autonomy and strong team spirit with interesting nature of work

Rewards

In the project context, rewards have been studied by Huws (1999) and Armstrong (1999). The link between motivation, performance and rewards was explained in the expectancy theory on motivation (Vroom, 1964). In this case, this translates to understanding the relation between effort, the expected performance outcome and the proportionate rewards which the team member gets. Apart from the tangible rewards such as the financial benefits, intangible rewards such as nature of work in terms of the employees obtaining feedback on performance and the task being meaningful (Beech and Brochbank, 1999), security of advancement (Herzberg et al, 1959; Armstrong and Brown, 2001), good work-life balance (Huws, 1999), and mentoring (Armstrong, 2003) have been found to enhance motivation and team performance. Armstrong and Brown (2001) put forth that rewards may be financial (transactional) and non-financial (relational) and that the non-financial rewards are complementary to the financial rewards. Therefore, this leads to the next hypothesis that puts forth motivation as being explained by financial and non-financial rewards:

H0(14): From the team member's standpoint, project team members are not motivated by complementing financial and non financial rewards.

H1(14): From the team member's standpoint, project team members are motivated by complimenting financial and non financial rewards

Communication

A project is tied together by its system of communications (Cleland and Ireland, 2002). From the behavioural standpoint, communication leads to increased job satisfaction and productivity (Verma, 1997). Examples of different communiqués are formal proposals, reports, procedures, project meetings, and even informal communication among the team members. The team members' need to communicate can be seen McClelland's theory of needs (1961) where he put forth 'need for affiliation', where the team members are motivated when they socialize. Further, the team members exchanging task specific information (scope definitions, quality standards, schedules, feedback on their performance) leads to fostering of team spirit among the team members (Verma, 1997) and enhances performance (Kerkfoot and Knight, 1992). A key issue in the discussion of team performance seen earlier, is the emphasis on the understanding of the end-users' requirements in terms of quality, schedule, and time constraints. This again is task specific information. Drawing a relation between these two forms of communication, Chia-Chen Kuo (2004) states that the frequency of information exchange and interaction within the teams has a positive impact on the exchange of resources and information among the project team members. This seems to suggest that in a project environment, informal and formal project related information are closely linked with each other. Therefore, it may be reasonable to assume that project team members who value free flow of information exchange, would also value having easy access to project information. Hence, the following hypothesis is presented:

H0(15): Team members do not associate free flow of information exchange with easy access to project information from the motivation standpoint

H1(15): Team members associate free flow of information exchange with easy access to project information from the motivation standpoint

The hypotheses are summarized in figure 10 below:

Figure 10. Summary of Hypothesis

Primary Hypotheses (explored using one tail t-test)	**Hypotheses**
Overall Discrepancy (Want-Get)	**Communication** H0 (1): Members working in project teams would not want more in terms of 'comprehension of the end-user requirements' than what their project environment is actually offering them H1 (1) : Members working in project teams would want more in terms of 'comprehension of the end-user requirements' than what their project environment is actually offering them H0(2): Members working in project teams would not want more in terms of 'feedback on performance' than what their project environment is actually offering them H1(2): Members working in project teams would want more in terms of 'feedback on performance' than what their project environment is actually offering them H0(3): Members working in project teams would not want more in terms of 'easy access to project information' than what their project environment is actually offering them H1(3): Members working in project teams would want more in terms of 'easy access to project information' than what their project environment is actually offering them **Nature of Work** H0(4): Members working in project teams would not want more

	enjoyable nature of work, than what their project environment is actually offering them H1(4): Members working in project teams would want more enjoyable nature of work than what their project environment is actually offering them H0(5): Members working in project teams would not want more in terms of being involved in critical project activities than what their project environment is actually offering them H1(5): Members working in project teams would want more in terms of being involved in critical project activities than what their project environment is actually offering them **Rewards** H0(6): Members working in project teams would not more in terms of performance based financial rewards than what their project environment is actually offering them H1(6): Members working in project teams would want more in terms of performance based financial rewards than what their project environment is actually offering them
Discrepancy in Collocated and Virtual Project set-ups	**Within the Group Discrepancy (Collocated Projects)** H0(7): There is no significant discrepancy between the expectations of the project team members (WANT) and the ability of the project team environment to provide or support those expectations (GET) in collocated project teams with respect to 'Nature of Work', 'Rewards', and 'Communication'. H1(7): There is no significant discrepancy between the expectations of the project team members (WANT) and the ability of the project team

	environment to provide or support those expectations (GET) in collocated project teams with respect to 'Nature of Work', 'Rewards', and 'Communication' **Within the Group Discrepancy (Virtual Projects)** H0(8): There is no significant discrepancy between the expectations of the project team members (WANT) and the ability of the project team environment to provide or support those expectations (GET) in distributed project teams with respect to the factors related to 'Nature of Work', 'Rewards' and 'Communication' H1(8): There is significant discrepancy between the expectations of the project team members (WANT) and the ability of the project team environment to provide or support those expectations (GET) in distributed project teams with respect to the factors related to 'Nature of Work', 'Rewards' and 'Communication **Between the Group Discrepancy (Collocated and Virtual Project set-ups)** H0(9): The collocated project environments do not facilitate information exchange among the project team members better than the virtual project environments. H1(9): The collocated project environments facilitate more exchange of information among the project team members than the virtual project environments. H0(10): The collocated project environments do not foster higher strong team spirit among the team members than the virtual project environments. H1(10): The collocated project environments foster higher strong team spirit among the team members than the virtual project environments

	H0(11): The collocated project environments do not better support training opportunities for learning than the virtual project environments H1(11): The collocated project environments better support training opportunities for learning than the virtual project environments
Secondary Hypotheses (explored using PCA)	**Nature of Work** H0(12): From the motivation standpoint, project team members do not associate nature of work with rewards H1(12): From the motivation standpoint, project team members associate nature of work with rewards. H0(13): The project team members do not associate high degree of task autonomy and strong team spirit with interesting nature of work H1(13): The project team members associate high degree of task autonomy and strong team spirit with interesting nature of work **Rewards** H0(14): From the team member's standpoint, project team members are not motivated by complementing financial and non financial rewards. H1(14): From the team member's standpoint, project team members are motivated by complimenting financial and non financial rewards **Communication** H0(15): Team members do not associate free flow of information exchange with easy access to project information from the motivation standpoint

	H1(15): Team members associate free flow of information exchange with easy access to project information from the motivation standpoint

Procedure

The nature of the present research is exploratory in nature. Hence, a survey technique has been found to be best suited for the purpose. A survey has been defined as a measurement process used to collect information during a highly structured interview with or without the presence of the interviewer. The goal of the survey is to derive comparable data across sub sets of the chosen sample so that the similarities and the differences can be found (Cooper and Schindler, 2006). It is to be recalled here that the survey instrument aimed to compare the two data sets- collocated and the virtual samples for their affinities and discrepancies with respect to motivation. A two pronged approach was used to collect the responses for the present study. The first was to contact the potential respondents by email. These addresses were available in a centralized database with ESC Lille's centralized alumni database. Only those respondents who were working in project oriented organizations or in project teams were contacted. Along with the survey instrument, a cover letter with the explanation of this research study, outlining its purpose, and the expected outcomes of the research study was sent to the respondents. The variables themselves were explained in the survey instrument (this has been further detailed in the sub section 'survey instrument' of this section). The cover letter accompanying the survey instrument has been enclosed as Annexe N.

A second approach used was to elicit data from the potential respondents in a face-to-face interaction. In this case, the respondents were participants of the pm days' 05/ pmtage' 05 project management conference hosted by PROJECKMANAGEMENT Group, University of Business Administration and Economics, Vienna, Austria. All of the participants were either working in project-oriented organizations or on projects. They had significant interest in project management practice and research. The research objectives, methodology, and the expected outcomes of the research were explained by the researcher to the participants. A total of 200 questionnaires were sent by email and handed out to the participants, of which 132 responses were returned, giving a response rate of 56%.

Sample

The purpose of the current research study is to measure the affinities and the discrepancies between the collocated and the virtual project teams. Hence, a survey research method has been deemed to be most appropriate. As the purpose of the study was to compare motivation of project team members working in collocated and virtual project teams in general, a random sample was selected. The sampling technique and the appropriate precautions to ensure the objectivity and the validity of the sample are described in detail below.

Target Population

In the context of sampling, a population element is the individual participant or the object on which the measurement is taken. Thus, a population is the total collection of elements about which the inferences need be made (Cooper and Schindler, 2006). One of the key issues in the selection of the target population is to identify respondents who are competent to report the phenomenon under the study. To ensure the selection of such qualified respondents, a general measure of informant competency which may include position in a firm, tenure in a firm, and experience in a firm (Ketchen Jr. and Bergh, 2004). Thus, in this study, the responses were drawn from participants who were currently working in project oriented environment for more than ten years and therefore were competent to answer the questionnaire. The respondent profile is summarized in Figure 11 below.

Figure 11. Respondent Profile

Respondent Profile			
Location	Number of Respondents	Industry	Number of Respondents
		General Construction	4
North America	13	Oil & Energy	9
Central & South America	1	Telecommunications	3
		IS/IT	22
Europe	72	Pharmaceutical	3
Middle East	4	Management Services	7
Africa	3	Banking	4
Asia	17	Consultancy	22
Indian Sub Continent	22	Others	58

Sample Frame

For the purpose of this study, the respondents were required to consider as a reference their current project, or their most recent project they had completed.

Sample Size

Selection of an appropriate sample size is often one of the challenging issues in the survey research method. In case of probability sampling such as this one- where in the random selection process, a controlled procedure ensures that each population element is given a known nonzero chance of selection (Cooper and Schindler, 2006), the size of the population is a function of the variability in the population parameters under the study. In this case, the size of the sample has been justified with respect to the number of variables in question by using the principle of subject-to-variable ratio. This is further explained in the sub section 'validity of the factor structure' in the discussion on the results of the principle component analysis of the expectations of the project team members and the ability of the project team environment to support those expectations.

Measures

The survey instrument was based on an earlier instrument used by Marvick (1958). This research study explored what was who had identified the motivational drives of the employees, by inquiring what was most important to them, through a comprehensive survey instrument. The questions of the survey instrument were based on the variables, which were related to 'Nature of Work', 'Communication', and 'Rewards'. These variables are described later in this section. The questionnaire aimed to assess the motivational drives of the project team members by using 7-point Likert scales. A typical example of the question which inquired the motivational drives (expectations of the team members, 'Want') asked was:

> "How important to you on a scale of 1 to 7 are the following factors so that you feel that a Project is Yours (1- 'Not Important', 7- 'Very Important')."

Likewise, the question which explored the characteristic of the project environment in terms of its support to the expectations of the team members ('Get') asked was:

> "How important are/were the following factors in your current/latest projects (1-Strongly Disagree, 7-Strongly Agree)"

Every question was asked several times, but in a slightly different form, to build in reliability. Reliability means consistency of measurement and can be assessed by means of a holistic measure named the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO). This procedure is further described in the sub section 'Validity of the Factor Structure'. The reliability values for individual variables are reported in figure 11 (see page 110)

Further, questions related to the demographical information about the respondents such as Age, Professional experience, Industry, and Location of the Work. We obtained a measure of collocation vs. distribution using a combination of questions such as:

- "What percentage of time do you spend telecommuting (working from home) in a typical working week?"
- "On your current project, what percentage of the workforce is working from a distance?"
- "Would you say that your current project is collocated or distributed?"

Reliability of the Instrument

The use of Principal Component Analysis (PCA) above adequately supported all of the original hypotheses with the exception of H1, and we have extracted several factors that were accounting for a significant amount of the variation in our variables. However, PCA is usually employed for exploratory analysis, whereas other methods of factor analysis are typically used for confirmatory research. LISREL (an acronym for Linear Structural Equations) is a general-purpose program for estimating a variety of covariance structure models, with confirmatory factor analysis being one of them. We therefore applied Maximum Likelihood Factor Analysis, a typical confirmatory procedure to our dataset. With confirmatory factor analysis, it is not so much the amount of variance explained that matters, but rather the goodness of fit of the model as measured by several possible indicators, such as the Goodness of Fit Index (GFI) or the Root Mean-Square Residual (RMSR). The goodness of fit – whatever the indicator used – is basically a measure of how well the original correlations or covariances are accounted for by the model. In our study, we used the RMSR which is faster to compute and just as valid as the more complex methods, e.g., the ratio of chi-square to the degrees of freedom, or the GFI (adjusted or not). We obtained a value of .03 for the RMSR, which is well below the .05 value considered necessary to achieve goodness of fit (Byrne, 1998, p. 115). We can therefore conclude that our model is fully confirmed by the data that we have collected. The reliabilities of the variables are summarized in the Figure 12. below

Figure 12. Means, Standard Deviations, Correlations and Reliabilities

Variable Number	*Variable*	*Mean*	*s.d*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
1	Autonomy at Work (on a scale of 7)	5.88	1.07	(.80)												
2	Future Career Opportunities	5.60	1.27	.17	(.76)											
3	Feedback on Performance	5.70	1.06	.29	.26	(.83)										
4	Training for Learning	6.00	1.05	.29	.42	.52	(.82)									
5	Project Accommodating Personal Life	5.10	1.31	.03	.15	.20	.15	(.72)								
6	Enjoying Work Itself	6.37	.74	.24	.19	.07	.12	.09	(.74)							
7	Comprehension of End-User Requirements	6.15	.81	.30	.18	.43	.38	.14	.20	(.84)						
8	Performance based Financial Rewards	5.10	1.17	.07	.41	.20	.13	.30	.14	.22	(.67)					
9	Mentoring by Top Management	5.00	1.30	.04	.25	.32	.24	.24	.07	.16	.32	(.79)				
10	Being Involved in Critical Project Activities	5.96	1.00	.23	.16	.34	.33	.05	.20	.37	.22	.36	(.75)			
11	Ease of Information Exchange/Communication	6.10	.91	.22	.33	.25	.46	.04	.17	.31	.03	.19	.32	(.78)		
12	Easy Access to Project Information	5.90	1.01	.30	34	.32	.53	.09	.04	.39	.04	.11	.14	.60	(.74)	
13	Strong Team Spirit	5.90	1.11	.42	.21	.21	.19	.15	.25	.32	.26	.18	.40	.27	.25	(.78)

Data Treatment

A two pronged approach was employed to explore motivation in collocated and virtual project teams. With respect to the research questions 1-5, which expected to measure the discrepancies, if any, between the expectations of the team members and the ability of the project environments to support those expectations; and to further understand the differences or affinities between the expectations of the team members in collocated and virtual project teams and between the abilities of the project team environments to support those expectations, a one tail unilateral t-test was employed. It was intended to know if there existed a discrepancy between the motivational drives of the project team members and the ability of the project team environment to provide or support those expectations. Further, the discrepancies between the expectations of the team members and the abilities of the project team environments to support those expectations were also evaluated. Hence, a one-tailed unilateral t test was employed.

In additon, with respect to the research questions 6, 7, and 8 which expected to unearth the underlying factors explaining the motivational drives of the project team members, the characteristics of the project team environments, and the discrepancy between the expectations of the team members and the abilities of the project team environments to support those expectations, a principal component analysis (PCA) with Varimax rotation was used. Each of these tests is explained in detail below.

T-Test

A t test is used in case when the study observes two variables and one of the variables is manipulated to observe its effect on the other variable. Given that there are two data sets, which in this case are the subjects belonging to collocated and virtual project teams, each data set is characterized by its mean, standard deviation and a number of data points. The t test is used to determine the statistical significance between a sample distribution mean and a parameter. In other words, a t-Test is used to determine whether the means of these two data sets are distinct, given that the underlying distributions can be assumed to be normal. The t has more tail area than that found in the normal distribution. This is a compensation for the lack of information about the population standard deviation. (Cooper and Schlindler, 2003). A t test is most appropriate when the testing situation involves two samples, the samples maybe

independent or non-independent and the data must be interval or almost. The purpose of the t test is to compare means and more particularly, differences between means.

Field (2000) puts forth the rational behind the t-Test thus:

- Two samples of data are collected and the sample means are calculated. These samples may either differ negligibly or by lot.
- The t-Test compares the difference between the sample means that are collected to the difference between the sample means that could have been obtained by chance. A standard error is used as a scale of the variability between sample means. If the standard• error is small, it is expected that most samples have to have similar means.
- t-Test is given by the formula:

t= (observed difference between sample means)- (expected difference between population means)/ estimate of the standard error of the difference between two sample means

In this case, the independent means t-test is used. This test is used when there are two experimental conditions and different subjects are assigned to each condition. This test is also called independent measures or independent samples t-test (Field, 2000). Here, the motivational drives of two sets of subjects, belong to collocated project environment and virtual project environment was studied Thus, the experimental condition for the two respondents differed on the degree to which they were virtual. Also, as there is a difference in the characteristics of the people allocated to each of these two groups, in terms of their collocation or virtual ness, it was expected that this virtual ness would create considerable variation between the two groups. Here, this variation arises from two conditions:

a. the manipulation that was carried out on the subjects
b. difference between the characteristics of the people allocated to each of the groups

It is to be noted in the later case that people in different conditions will vary in their ability, IQ, motivation, and other such factors. Such a variation, which arises from random factors that exist between the experimental conditions are called Unsystematic variations. The random variables in which the difference is observed are often called confounding variables. Thus, in this case, when the motivational drives of the two groups: collocated and the virtual

project team members, are studied, the difference in their mean scores is impacted by two factors. The first factor may be the difference in their characteristics such as IQ, ability, and motivation. The second factor may be the difference in their status in the projects, in terms of the degree of collocation or virtual ness. Thus, it is expected that using an independent t-Test would bring to fore the difference in the characteristics of these two groups and also puts forth virtual ness as being an influencing factor on their motivation.

Going back to the point on confounding variables and unsystematic variation, for the independent variable to fully explain its influence on the dependent variable, which in this case, is the influence of virtual ness on the motivational drives of the project team members, it has to be ensured that the confounding variable contributes only to unsystematic variation. This is done by randomly allocating subjects to a particular condition. This ensures that these confounding variables are evenly distributed across conditions. Thus, this further justifies the researcher's decision to select a random sample of collocated and virtual project team members, who are spread across a wide range of industries, belong to different geographical regions, and differ in their age and length of professional experience in projects.

Independent t-Test Equation

As it has been explained above, the independent t-Test is used in situations that involve two experimental conditions and where different subjects have been used in each condition. In independent t-Test, because there is experimental manipulation of the subjects (with they being in different environments), the comparisons between the two groups are based on a per condition basis. Thus, in this case the comparisons between the two groups are based on their condition of degree of virtual ness. This is given by the following equation:

$$t = \frac{M_1 - M_2}{S_{DM}}$$

$$S_{DM} = \sqrt{\left[\frac{(N_1 - 1)(s_1^2) + (N_2 - 1)(s_2^2)}{N_1 + N_2 - 2}\right]\left[\frac{1}{N_1} + \frac{1}{N_2}\right]}$$

$$s = \sqrt{\frac{\sum x^2}{N}}$$

$$df = N_1 + N_2 - 2$$

M1: mean of the group with the higher mean

M2: mean of the group with the lower mean

SDM: Standard error of the difference between means

N1: number of cases in group 1

N2: number of cases in group 2

S1: Standard deviation of group 1 which is squared

S2: standard deviation of group2 which is squared

In most cases where independent t-Test is used, several pairs of samples, with each pair containing one sample from two different populations are considered and the means of these samples are compared. In the context of the current research, the mean scores ('Want' and 'Get') of each variable related to 'Nature of Work', 'Rewards', and 'Communication' has been compared in collocated and virtual samples. It is assumed in this case that the population is normal. When a sampling distribution curve is plotted between every pair of sample means taken from the two populations (in this case collocated and virtual samples), a normal distribution• curve would be obtained with a mean equal to the difference between population means (μ1- μ2). The sampling distribution would tell by how much the means of the two samples in the two groups would differ, in case of each variable. The t density curves, like the normal distribution curves are bell shaped and have a peak value of 0 and its spread is more than that of the normal distribution curve.

Key Values to be considered for Interpretation of the Results:
Mean: The Mean of the two samples

Observations: The total number of observations (n) in case of each of the two samples

df: Degrees of Freedom

t Stat: The difference between the means of the two groups

P(T<=t) Unilateral: This value indicates the probability of obtaining the t value by chance alone. The smaller the P value, the more significant is the difference between the means of the two samples. On the contrary, the larger the P value, more similar are the two samples with respect to that particular variable.

Factor Analysis

Introduction

The results from the one tailed unilateral t-test analysis of the motivational drives of the collocated and the virtual project team members (Want) has revealed that there exist minimal discrepancies between the two groups. The same has been seen in the one tailed-unilateral t-test analysis of the ability of the project team environment to support the motivational drives of the project team members (Get). This seems to suggest that there may be latent dimensions which seem to be influencing the behaviour of the variables in this manner. These dimensions are called factors (Field, 2000). Further, these factors seem to be common both to the collocated and the virtual project team environments. Therefore, for a better understanding of these factors in these two environments, the collocated and the virtual project team samples have been combined and the following research questions were posed:

1. What are the underlying factors related to 'Nature of Work', 'Rewards', and 'Communication' which explain the motivational drives of the project team members (Want)?
2. What are the underlying factors related to 'Nature of Work', 'Rewards', and 'Communication' which explain the ability of the project team environment to provide or support the motivational drives of the project team members (Get)?

Thus to explore the above two questions, the researcher employed a Principle Component Analysis (with varimax rotation). This method reduces the number of variables to factors by showing the correlations between the variables. A high correlation among a set of variables indicates that these variables might be measuring some common underlying dimension or in other words, might be measuring a Factor.

Key concepts

The relation between the variables and the factor to which the variables measure is explained by understanding the correlations among the variables and the propensities of these highly correlating variables to lie close to a factor. This is done by calculating the correlation coefficients for each set of variables and then generating an R-matrix. Variables which correlate or cluster together in a meaningful way are observed to interpret the results parsimoniously in terms of factors. An example of the R-matrix is given below:

Figure 13. Example of r-Matrix

Statistical Factor Analysis	**Factor Loadings (Varimax Normalized) Extraction : Principle Components**			
Variable	*Factor 1*	*Factor 2*	*Factor 3*	*Factor 4*
VAR00012	.85	.10	-.018	-.09
VAR00011	.74	.15	-.00	.18
VAR00004	.72	.36	.14	-.02
VAR00010	-.05	.71	-.07	.32
VAR00003	.37	.66	.16	-.01
VAR00009	-.03	.54	.51	-.09
VAR00007	.34	.52	.04	.30
VAR00008	-.03	.12	.78	.21
VAR00005	-.03	.12	.62	-.01
VAR00002	.54	-.11	.58	.18
VAR00006	.02	-.08	.18	.71
VAR00013	.10	.31	.12	.68
VAR00001	.27	.22	-.14	.62
% of Variance Explained	18.83	14.52	13.31	13.19
% of Total Variance Explained				**59.85**

In the above matrix, the variables are represented on the y-axis as VAR00012, VAR00011, VAR00004 and so on. The x-axis shows the factors 1, 2, 3, and 4 to which the variables are related. In the above matrix, it can be seen that the variables: VAR00012, VAR00011, and

VAR00004 correlate significantly with the group of variables in column 1 and show low correlations with group of variables in other columns. Therefore, it can be said that VAR00012, VAR00011, and VAR00004 cluster together to constitute Factor 1. Likewise, Factor 2 is explained by the variables: VAR00010, VAR00003, VAR00009, and VAR00007; Factor 3 constitutes the variables: VAR00008, VAR00005, and VAR00002. Finally, Factor 4 constitutes the variables: VAR00006, VAR00013, and VAR00001.

If the factors were to be the axis of a graph, then the variables can be plotted along these axes. The coordinates of variables along each axis represents the correlation between that variable and each factor. The range of the axis is from -1 to +1, which are the boundaries for the values of correlation coefficients. The position of a variable depends on its correlation with the different factors. In this case, from the figure above, VAR00012 has a significant correlation with Factor 1 but negligible correlations with Factors 2, 3, and 4. Thus, it can be inferred that VAR00012 is related to Factor 1 and not to other factors. The co-ordinate of VAR00012 with respect to Factor 1 is .85 and is called a factor loading.
The equation is given by:

□ = β1X1 + β2X2 + βnXn
Where
□ □Factor
β1, β2, βn □ Factor Loading of Variables on Factor
X1, X2, Xn □ Variables constituting the Factor

Thus, taking the example from the above Figure,
Factor 2 = 0.00VAR00012 + 0.14VAR00011 + 0.36VAR00004 + 0.71VAR00010 + 0.65VAR00003 + 0.54VAR00009 + 0.52VAR00007 + 0.12VAR00008 + 0.12VAR00005 – 0.12VAR00002 – 0.00VAR00006 + 0.31VAR00013 + 0.22VAR00001

It is reiterated here that the β values for the variables : VAR00010, VAR00003, VAR00009, and VAR00007 are very high. Hence, these are the variables which are very important to Factor 2. The other variables have lower β values and therefore, are not important to Factor 2.

The purpose of employing Factor Analysis is to calculate the variability in scores (or variance) for a given variable. The variance of a variable is a measure of its statistical dispersion, indicating how its possible values are spread around the expected value. The total variance for a particular variable has two components:

1. Common Variance: variance shared with other variables
2. Unique Variance: variance specific to only that variable

The proportion of common variance present in a variable is called Communality. In Factor Analysis, as the purpose is to find the common underlying dimensions within the variables, Communality is considered.

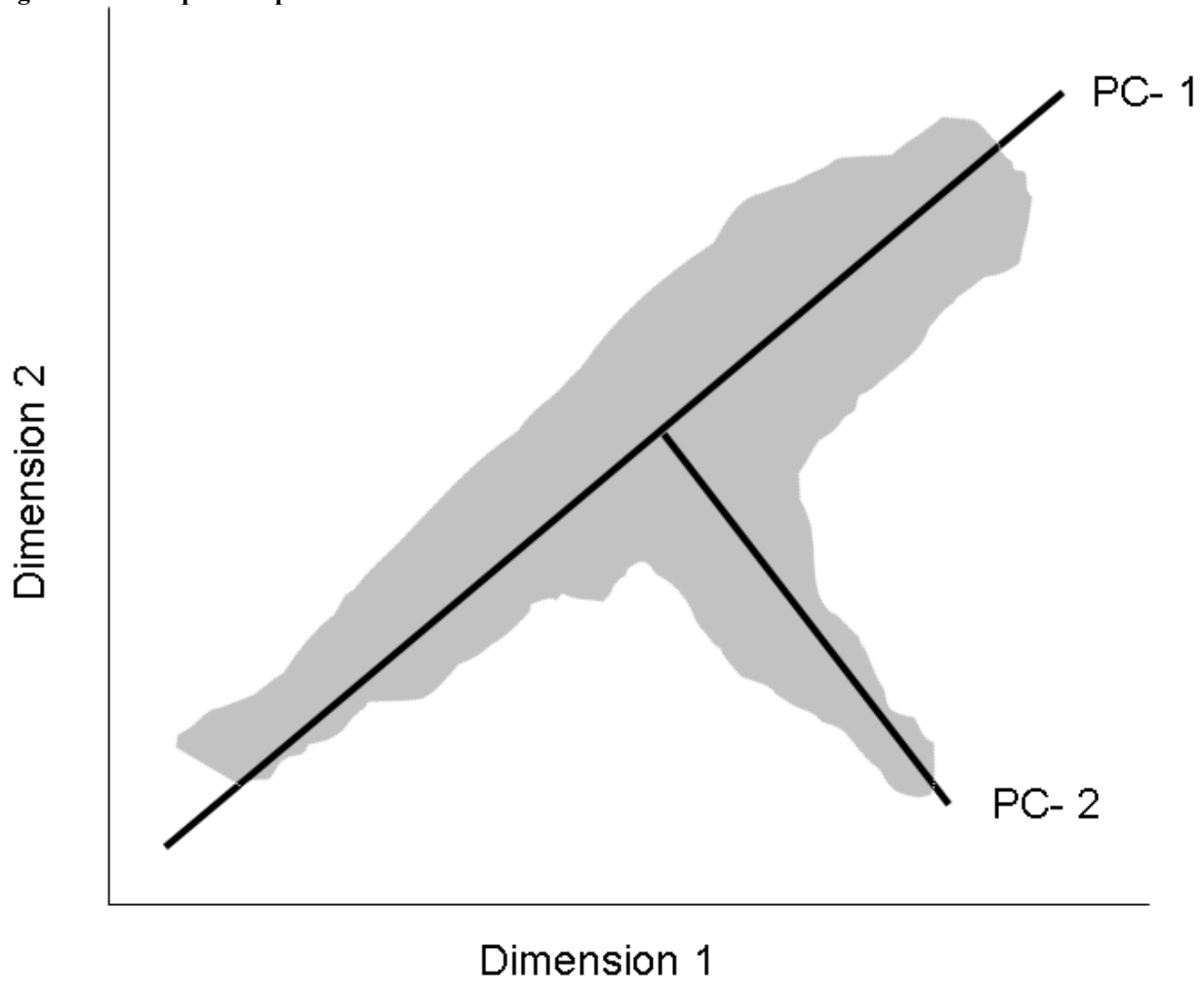
However, factor analysis merely estimates the underlying factors and this depends on various assumptions. Hence, its accuracy is undermined. However, when it is assumed that the communality of all the variables is 1, the original data is transposed into constituent linear components. This is called Principle Component Analysis. This would explain which linear components exist within the data and how a particular variable might contribute to that component. This is discussed in detail next.

Principle Component Analysis

Principal component analysis (PCA) is a statistical method that transforms a number of possibly correlated variables into a smaller number of uncorrelated variables called principal components or factors. In other words, PCA clusters a number of correlating variables to factors. The first principal component accounts for as much variability in the data as possible, followed by each succeeding principle component which accounts for as much as possible of the remaining variability. It is to be noted here that the Principal Components consider the unique variance of each of the variables.

Technically, a Principle Component is defined as " A set of variables that define a projection that encapsulates the maximum amount of variation in a dataset and is orthogonal (and therefore uncorrelated) to the previous component of the same dataset" (Yeung and Ruzzo, 2001). The same is represented in the figure below:

Figure 14. Principle Components



In the above figure, the two black lines, running perpendicular to each other represent the two principle components

The correlation between two or more variables can be shown in a scatterplot. A regression line can explain the best summary of the linear relationship between these variables. If a variable can be defined such that the variable would capture most of the essence of the items, to reduce the variables to a factor, this factor is a linear combination of the variables summarized. This factor is unique with the rest of the variables not being related to this factor. This is the principle behind Principle Component Analysis.

Each principal component is also called as an Eigenvector. The magnitude of the vector is indicated by the Eigenvalue, which in turn is the variance on the new factors that are successively extracted. The variance explained by each Eigenvector (or the principal component) in percentage is given as percentage of variance explained. It is to be noted here that the sum of all eigenvalues is equal to the number of variables. The largest eigenvalue associated with each of the eigenvectors provides a substantive importance of each variable and therefore of that principal component (with which the variable with the largest eigenvalue is associated). Another key parameter observed here is the correlation of the variable and the factors extracted which are called factor loadings. Factor loadings are important to judge which variables are related to which factors. Stevens suggests that for a sample size of 100 to 200 respondents (as in this case where the number of respondents is 132), the loading of an absolute value greater than 0.512 is necessary.

The following figure is given as an example to explain eigenvalues, eigenvectors, and the percentage of variance explained by the eigenvectors (principal components).

Figure 15. Principle Component Extraction-Eigenvalues

Statistical Factor Analysis	Eigenvalues Extraction : Principal Components			
Value	Eigenvalue	% Total Variance	Cumulative Eigenvalue	Cumulative %
1	3.990	30.689	3.0689	30.689
2	1.507	11.595	4.2284	42.284
3	1.258	9.677	5.1961	51.961
4	1.026	7.895	5.9856	59.856
5	.918	7.063	6.66919	66.919
6	.782	6.019	7.2983	72.938
7	.769	5.912	7.8850	78.850
8	.691	5.313	8.4163	84.163
9	.529	4.066	8.8229	88.229
10	.449	3.451	9.1681	91.681
11	.400	3.079	9.4760	94.760
12	.377	2.903	9.7662	97.662
13	.304	2.338	10.000	100.000

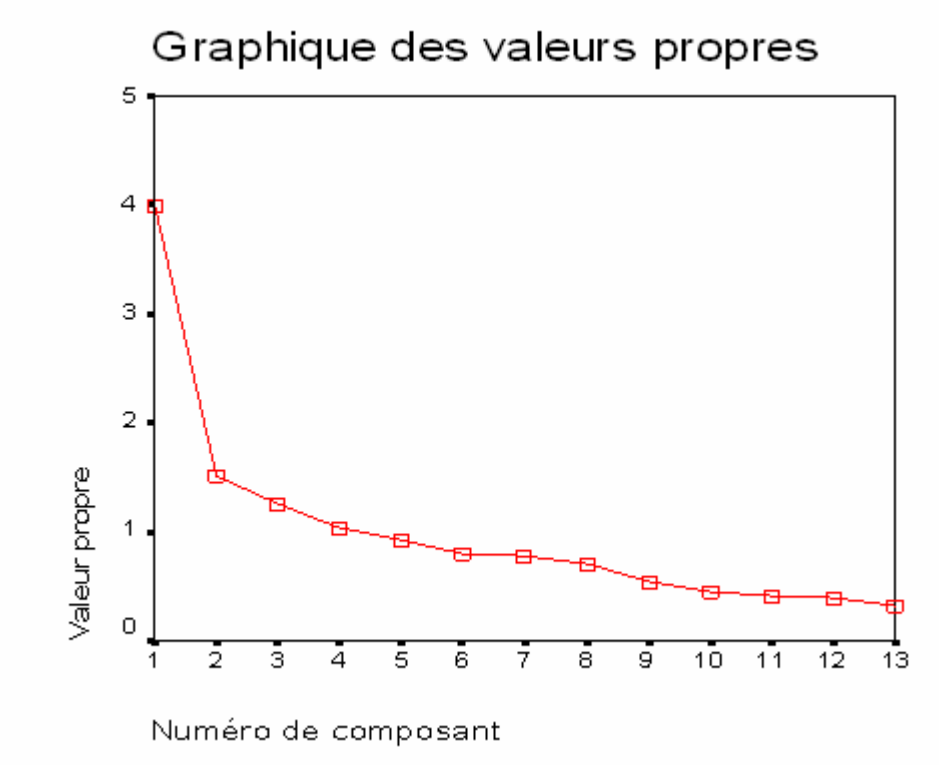
In the above figure, the first column value is the variable and the second column is the eigenvalue associated with the variable. From the third column, it can be seen that variable 1 explains 30.6 % of variance, variable 2 explains 11.5% of variance and so on. The cumulative of all eigenvalues in % (in other words, the eigenvalues of all variables) explain the % of variance in Toto.

On the question of how many factors need be retained, a two pronged approach is employed. The first step is to use the Kaiser Criterion, which states that only those factors with eigenvalues greater than 1 need be retained (Kaiser, 1960). Differing from Kaiser, Jolliffe (1972, 1986) suggests retaining all factors with eigenvalues greater than 0.7. However,

Stevens (1992) suggests that if the number of variables is less than 30, or if the sample size is more than 250 and the resulting communalities are greater than or equal to 0.6, Kaizer's criterion is accurate.

The next step would be to read the screeplot. A screeplot is a curve of each eigenvalue (taken on the Y-axis) against the factor with which it is associated (X-axis). The locus of factors with high eigenvalues has a steep slope in the curve, and the locus descends and flattens when plotting the factors with low eigenvalues. Building on this, Cattell (1966b) argues that only those factors from where the inflexion of the screeplot is observed have to be considered. Thus, in figure 16 given below, only 4 factors are considered and the rest of them are ignored as they have low eigenvalues (less than 1).

Figure 16. Example of Scree Plot



To improve the explanatory power of the variables by extracting distinct factors, Factor Rotation is employed. The factor loadings can be plotted in a scatter plot. In this plot, each variable is represented as a point. In this plot, the axes can be rotated in any direction without changing the relative locations of the points with respect to each other. However, the actual coordinates of the points vary implying that the factor loadings would change. This would

now show factors which are clearly marked by high loadings for some variables and low loadings for other variables.

The different types of rotational strategies are varimax rotation, quartimax rotation, and equamax rotation. The choice of rotation depends on the study itself where the factors are intended to be related or independent. Most common form of rotation and the one which has been used in this current research study as well is the varimax rotation. This is an orthogonal form of rotation which is typically used with Principal Component Analysis (Tabachnik and Fidell, 2001).

Having introduced the definition and the key concepts of Principal component analysis, the next section of the research presents the observations of the one-tailed unilateral t-test results which present a comparative account of collocated and virtual project teams. These observations are followed by the results of the Principal Component Analysis which present the factor structures of the motivational drives of collocated and virtual project team members (‘Want’) and the ability of the collocated/virtual project team environment to provide or support those expectations (‘Get’).

VI. OBSERVATIONS

One Tail T-test

Overall Discrepancy

At the generic level, our t-test on the average scores of each of these factors shows an overall discrepancy of 0.58,significant at P(T<=t)= 0.002 between the expectations of the project team members with respect to the 'sense of ownership' factors and their presence in the environment.

At a more specific level, our t tests on specific variables reveals that the highest discrepancies (ranked according to P(T<=t) value) may be observed with respect to Performance based financial rewards, with a discrepancy of 0.89 (significant at P(T<=t)= 0.00000005), comprehension of the end-user requirements (discrepancy of 0.65 significant at P(T<=t)= 0.00000008), enjoying the nature of work itself (discrepancy of 0.56 significant at P(T<=t)= 0.00000027), Ease of information exchange/communication (discrepancy of 0.78 significant at P(T<=t)= 0.0000099), and Post project evaluation and feedback (discrepancy of 0.66 significant at P(T<=t)= 0.0000282); in that order. We have also found minimal discrepancies with respect to the factors Autonomy at work (discrepancy of 0.17 significant at P(T<=t) unilateral= 0.09) and Project accommodating personal life (discrepancy of 0.17 significant at P(T<=t)= 0.15). Minimal discrepancies at similar levels have also been found with respect to the factors 'Future career opportunities (discrepancy of 0.62 significant at P(T<=t)= 0.00002831) and 'Mentoring by top management (discrepancy of 0.68 significant at P(T<=t)= 0. 00001092).

The summary of the t test results are presented in the figures 17 and 18 below

Figure 17. Overall Discrepancy- 'Want' and 'Get'

	Variable 1 ('WANT')	Variable 2 ('GET')	Difference (WANT-GET)
Average	5.70	5.12	0.57
Variance	0.21	0.25	
Observations	13	13	
Degrees of freedom	24		
P(T<=t) unilateral[1]	0.0026		
P(T<=t) bilateral	0.005		

[1] Note: For P(T<=t) < 0.05, the results are highly significant and Alternate Hypothesis (H1) is accepted

Figure 18. Specific Discrepancy- Overall 'Want' and 'Get'

Project Team Member Motivator	*Average Score*		*(Want-Get) Diff.*	*P(T<=t)*[2] *Unilateral Value*	*Rank of the factor (according to P(T<=t) Unilateral Value*
	Want	Get			
Autonomy at Work	5,87	5,69	0,17	0.09	12
Future Career Opportunities	5,57	4,95	0,62	0.00002831	10
Feedback on Performance	5,63	4,97	0,66	0.00000282	5
Training for Learning	5,85	5,23	0,62	0.00002123	9
Project accommodating personal life	4,90	4,73	0,17	0.15	13
Enjoying the work itself	6,44	5,88	0,56	0.00000027	3
Comprehension of the end-user requirements	6,11	5,45	0,65	0.00000008	2
Performance based financial rewards	5,03	4,14	0,89	0.00000005	1
Mentoring by top management	5,05	4,37	0,68	0.00001092	7
Being involved in critical project activities	5,99	5,61	0,38	0.000141047	11
Ease of information exchange/communication	6,05	5,27	0,78	0.00000099	4
Easy access to project information	5,85	5,20	0,65	0.00001364	8
Strong team spirit	5,79	5,09	0,69	0.00001070	6

[2] Note: For P(T<=t) < 0.05, the results are highly significant and Alternate Hypothesis (H1) is accepted

The detailed t- test results which show the discrepancy between the expectations of the project team members ('Want') and the ability of the project team environments to provide or support those expectations ('Get') are enclosed in Appendix 1.

Comparing Collocated and Virtual Project Teams

In collocated project teams, the overall difference between the expectations of the team members and the project team environment's support to those expectations is very significant (t =11.78, P =.00000003, N=43). Discrepancies specific to the specific variables are summarized in Figure 19.

In case of distributed project teams, the overall difference between the team members' expectations and the project team environment's support to those expectations is also significant (t =6.15, P =.00002, N=42). Discrepancies specific to the variables are summarized in Table N. The overall difference between the motivational drives of collocated and distributed project team members however, is insignificant (t =0.24, P =.4, N=13) as shown in Figure 18. The overall difference in the mean scores of the ability of the project environment to support project team motivation in collocated and distributed teams is quite significant (t =-5.66, P =.00005, N=13) as shown in Figure 18. Finally, the t-test results comparing the overall relative alignment of the motivational drives of the project team members (WANT) and the ability of the project team environment to provide or support those expectations (GET) between the collocated and virtual projects is also quite significant (t =4.87, P =.00019, N=13)

Figure 19. Collocated and Virtual Projects-Overall Results of one tail t-test

	Comparing Project Team Environment with Team Members' Motivation		**Comparing Collocated and Virtual Project Team Environments**	
			Comparing Motivational Drives	Comparing Project Team Environments
	Collocated Want-Collocated Get	Distributed Want-Distributed Get	Collocated Want-Distributed Want	Collocated Get-Distributed Get
Mean Score Difference	0.72	0.45	0.01	-0.25
Observations	13	13	13	13
t- value	11.78	6.16	0.24	-5.66
P(T<=t) Unilateral value	0.0001		0.40	0.000052

Figure 20. Collocated and Virtual Projects-Specific Results of one tail t-test

Variable	Collocated Project Teams					Distributed Project Teams				
	Mean Score					Mean Score				
	want	get	want-get	P(T<=t)• Unilateral value	rank♦	want	get	want-get	P(T<=t)• Unilateral value	rank♦
Autonomy at Work	5.95	5.55	0.39	0.002	12	5.87	5.78	0.07	0.36	13
Future Career Opportunities	5.59	4.66	0.93	0.00005	4	5.36	5.11	0.25	0.11	11
Feedback on Performance	5.54	4.66	0.88	0.0004	8	5.72	5.18	0.53	0.0005	3
Training for Learning	5.90	5.01	0.89	0.000048	2	5.82	5.34	0.47	0.01	8
Project Accommodating Personal Life	4.82	4.54	0.28	0.12	13	4.82	4.93	-0.10	0.34	12
Enjoying Work Itself	6.34	5.82	0.51	0.00009	5	6.47	5.91	0.55	0.0016	4
Comprehension of End-User Requirements	6.14	5.30	0.83	0.00004	2	6.09	5.54	0.55	0.00017	1
Performance-based Financial Rewards	4.87	4.03	0.84	0.00001	1	5.08	4.22	0.86	0.0017	4

• For P(T<=t) < 0.05, the results are highly significant, implying that the two groups differ significantly

♦ rank order of the 'Sense of Ownership' factors according to Ascending Value of P(T<=t) Unilateral Value

Mentoring by Top Management	4.97	4.08	0.89	0.0007	9	4.99	4.53	0.45	0.01	8
Being Involved in Critical Project Activities	5.94	5.45	0.48	0.001	10	4.99	4.43	0.45	0.035	10
Ease of Information Exchange/ Communication	6.16	5.23	0.92	0.0002	6	5.91	5.28	0.62	0.005	7
Easy Access to Project Information	5.85	5.04	0.80	0.0002	6	5.94	5.19	0.75	0.00030	2
Strong Team Spirit	5.86	5.09	0.77	0.0014	11	5.71	5.10	0.61	0.002	6
Overall Score	**5.68**	**4.96**	**0.72**	**0.00000003**		**5.67**	**5.21**	**0.45**	**0.00002**	

Detailed t-test results showing

- The discrepancy between the expectations of the team members and the ability of the project team environment to support those expectations in case of collocated project teams are enclosed in Appendix 2.
- The discrepancy between the expectations of the team members and the ability of the project team environment to support those expectations in case of virtual project teams are enclosed in Appendix 3.
- The affinities between the expectations of the team members working in collocated and virtual project teams are enclosed in Appendix 4.
- The affinities between the characteristics of the project team environments in their support of the expectations of the team members' expectations are enclosed in Appendix 5.

PRINCIPLE COMPONENT ANALYSIS

Expectations of the Project Team Members

A principal-component analysis (varimax rotation) revealed the presence of four distinct factors, which profiled the project team member's motivational drives. The four factors accounted for 59.8 % of the total variance. The first factor, accounting for 30.6% of the total variance loads essentially, and in that order, variables 12, 11, and 4. The second factor, which explains 11.5% of total variance includes variables 10, 3, 9, and 7. Factor three, which accounts for 9.6% of total variance, mostly loads variables 8, 5, and 2. Finally, factor 4, which explains 7.8% of total variance contains the variables 6, 13, and 1. The variables, their corresponding serial number, the Factors and the Factor loadings are summarized in Table N.

Validity of the Factor Structure

For the purpose of the study, a factor was defined as one which loaded at least 3 variables, and each of them having a loading greater than or equal to .5 on that factor (Peterson et al, 1995). A Principal Component Analysis (PCA) has been used and then the components were rotated with Varimax, a common orthogonal rotation method used to achieve simple structure. The suitability for conducting the factor analysis was ensured using the Kaiser-Mayer-Olkin (KMO) test. The KMO test measures the adequacy of a sample in terms of the distribution of values for the execution of factor analysis (Geourge, Mallery, 1999). The KMO statistic can be calculated for individual and multiple variables and represents the ratio of the squared correlation between variables to the squared partial correlation between variables. A value of 0 shows that the sum of partial correlations is large relative to the sum of correlations, indicating that variance common to all the variables is absent. The acceptable value for KMO should be greater than 0.5 (Geourge, Mallery, Field, 2000). Besides, values between 0.5 and 0.7 are mediocre and values between 0.7 and 0.8 are considered good. The result of the KMO test in this case was 0.78. Sampling error was minimized by using a large sample pool in relation to the number of items to be factored (Nunnally, 1978). Grimm and Yarnold (1995) state that to substantiate the reliability of the observed results of PCA (Principal Component Analysis), a minimum of 100 observations must be considered and further the STV ratio (number of subjects or respondents (S) to number of variables (V)) must be greater than or equal to 5. In this case, the total number of respondents (S)= 132 and the number of variables (V) =13; which gives the STV ratio of 10:1

Figure 21. Results of the Principle Component Analysis-Expectactions of Project Team Members ('Want')

Variable Number	*Variable:*	*Factor 1- Communication for Task Facilitation*	*Factor 2- Management Obligation*	*Factor 3- Financial & Non Financial Rewards*	*Factor 4- Work & Work Environment*
12	Easy Access to Project Information	**.85**	.10	-.01	.09
11	Ease of Information Exchange/ Communication	**.74**	.15	-.00	.18
4	Training for Learning	**.72**	.36	.14	.02
10	Being Involved in Critical Project Activities	.05	**.71**	.07	.32
3	Feedback on Performance	.37	**.66**	.16	-.01
9	Mentoring by Top Management	.03	**.54**	.51	-.09
7	Comprehension of End-User Requirements	.34	**.52**	.04	.30
8	Performance based Financial Rewards	-.03	.12	**.78**	.21
5	Project Accommodating Personal Life	.03	.12	**.62**	-.01
2	Future Career Opportunities	.54	-.11	**.58**	.18
6	Enjoying the Work Itself	.02	-.08	.18	**.71**
13	Strong Team Spirit	.105	.31	.12	**.68**
1	Autonomy at Work	.27	.22	-.14	**.62**
	Percentage of Variance Explained	30.68	11.59	9.67	7.89
	Total Variance Explained				59.85

Characteristics of the Project Team Environments

A principal-component analysis (varimax rotation) revealed the presence of two distinct factors, which profiled the project team characteristics in terms of its support to the team members' expectations.. The two factors accounted for 58.8% of the total variance. The first factor, accounting for 49.5 % of the total variance loads essentially, and in that order, variables 12, 11, 10, 13, 6, 4, 1, and 7. The second factor, which explains 9.3 % of total variance includes variables 9, 3, 8, 2, and 5. The variables, their corresponding serial number, the Factors and the Factor loadings are summarized in Table N

Validity of the Factor Structure

As in the previous case, to validate the factor structure profiling the characteristics of the project environment in terms of its support to the project team members' expectations, the criteria employed to establish the project team members' expectations has been employed. The value of KMO in this case was .89

Figure 22. Results of the Principle Component Analysis- Characteristic of Project Environment ('Get')

Variable Number	Variable:	Factor 1- Internal Motivation Factor	Factor 2- External Motivation Factor
12	Easy Access to Project Information	**.80**	.25
11	Ease of Information Exchange/ Communication	**.78**	.31
10	Being Involved in Critical Project Activities	**.75**	.26
13	Strong Team Spirit	**.70**	.26
6	Enjoying Nature of Work Itself	**.69**	.16
1	Training for Learning	**.65**	.46
7	Autonomy at Work	**.64**	.14
9	Comprehension of End-User Requirements	**.63**	.33
3	Mentoring by Top Management	.16	**.83**
8	Post Project Evaluation Feedback	.43	**.73**
8	Performance based Financial Rewards	.35	**.65**
2	Future Career Opportunities	.36	**.65**
5	Project Accommodating Personal Life	.008	**.59**

VII. DISCUSSION OF RESULTS

Overall Discrepancy- What Project Team Members 'Want' and What they 'Get'

The results obtained seem to substantiate the popular literature on motivation. It is observed that the expectations of the team members from their project environment, with respect to the 'Project Team Member Motivators' is significantly higher than what the project environment actually provides them. Though the importance of these factors in fostering motivation amongst the team members and enhancing performance has been presented before, the apparent inability of the project environment to support or provide these factors to match the expectations of the project team members is an issue to be reflected upon and further researched. Overall, these results reflect the contentions of Armstrong (2003) and Guest et al (1996) who in their discussion of the psychological contracts posited that employees have high expectations with respect to equitable rewards, opportunities for further growth, feedback on performance and scope to demonstrate their competence.

Discrepancy with respect to Communication

At a more specific level, we have found high discrepancies with respect to communication aspects in the project environment, with 'comprehension of the end-user requirements', 'post project evaluation feedback' and easy access to project information. This seems to suggest that project team members would highly value communication, which is directly related to their job on the project. Hence, any intervention aiming to achieve team performance and motivation, need to consider project related communication aspects as a priority.

Discrepancy with respect to Nature of Work

The other discrepancies in the nature of work- with the work being enjoyable and the team members wanting to be involved in critical project activities, also reflects the literature. We have seen how interesting and stimulating work leads to increased team performance and motivation. In this direction, we map our discussion back to feedback about the performance and its role in rendering significance to work. Straus (1996) suggests that low feedback on performance may lead to low perceived task significance. These arguments underscoring the importance of feedback which lends the job to be viewed as being meaningful by the incumbent have been put forth by Hackman and Olhdam in their Job Characteristic Model (1976, 1980) and by Cheser (1998). This may especially be true in case of virtual teams, who

may perceive a task to be of low significance or not challenging enough as they do not get adequate feedback on their performance. It is recalled here that the motivating potential of 'nature of work' may be mapped to Maslow (1943, 1971), Herzberg et al (1959), McGregor (1960), and Alderfer (1972). Other studies underscoring the importance of interesting nature of work as being motivating to the employees have been presented by Campion & Thayer (1987), and by Wiley (1997).

Discrepancy with respect to Rewards

Finally, the results from the rewards standpoint have been surprising as the highest discrepancies were observed with respect to the performance based financial rewards. This again may be critical because, the importance of constant appreciation for performance on the job can not be undermined, especially as it impacts team performance (Thamhain, 1998), motivation (Vroom, 1964),and further even project success (Pinto and Slevin, 1988a).

Other Key Observations

The other interesting observations have been with respect to 'autonomy at work' and 'project accommodating personal life', which seems to suggest that the project environments, in general, give adequate space to the personal life of the project team members. This may especially be significant, as this suggests that project environments provide a healthy work-life balance. These results may be explained by the demography of the sample collected for the purpose of the present research study. A significant number of respondents of this study were involved in Information Systems-Information Technology (IS/IT) projects. Perlow (1998) observes that these workers have flexible work arrangements, and have a high degree of autonomy and substantial rewards (Barrett, 2001). The motivating potential of autonomy at work is underscored in the research done by Tyagi (1985a) and Woodward et al 1994).

Likewise, the other significant low discrepancy has been found with respect to the variables 'mentoring by top management' and 'future career opportunities'. The apparent low discrepancy may be stemming from the view that projects are temporary organizations (Turner and Müller, 2003), and therefore, may not be looked upon by the project team members and top management, as the only suitable platform for formal vertical career enhancement. This may especially be true if the project is organized within a functional organization, wherein different segments of the projects are delegated to the respective

functional units, with each unit being responsible for a completing a segment of the project. Thus, being associated with only a segment of the project, which may not be directly linked to professional advancement, may lead to "lack of ownership" towards the project (Larson, 2004).

Other explanation to these results, particularly pertaining to the 'Future Career opportunities' may be given by the studies of Kets de Vries and Mead (1992) who state that as it is becoming increasingly important for professionals to have international exposure (Cava and Mayer, 1993), the organizations are more likely to reward and promote those who have this nature of international exposure. In this direction, it has also been observed that most of the organizations are emphasizing on the mentoring programmes given their potential benefits (Armstrong et al, 2002; Raabe and Beehr, 2003; Viator and Scandura, 1991) and are creating formal mentoring programmes (Armstrong et al, 2002; Noe, 1998; Ragina and Cotton, 1999). In the context of this research, as the sample comprised of team members working with globally dispersed and culturally diverse teams, it may be a case where their organizations provided suitable rewards and opportunities for career advancement to the team members; hence, this low discrepancy between people expectations and the ability of the project environment to support those expectations with respect to 'Future Career Opportunities'.

Other alternative explanation pertaining to the low discrepancy between the expectation of the team members and the ability of the project team environment to provide or support those expectations with respect to the variable 'Future Career Opportunities' is given by Lawler III and Finegold (2000). Mapping to the concept of psychological contracts, they believe that there has been a transformation in the way the contracts are perceived by the employees and the employers, particularly in case of high technology organizations. Employees no longer relate to the traditional career progress and are proactively self directing their career and developing competencies required to excel in the changing workplace (Hall et al, 1996). The employers on their part are providing more career pathways that are suited for the individual's needs. This seems to explain the low discrepancy between the 'want' and 'get' for the variable 'future career opportunities'. Further, Judge et al (1995) in their study of the career success found that executives with a propensity for career advancement also earned higher financial benefits. This seems to imply that proclivity for career advancement may be closely

related to the individual's propensity for financial rewards. Hence, a similarity is observed in these 2 cases of 'performance based financial rewards', and 'future career opportunities'.

Specific Discrepancies in Case of Collocated and Virtual Project Teams

The one tail unilateral t test results comparing the motivational drives of collocated and distributed project teams suggest that the expectations of the team members do not vary and that the degree of 'virtual ness' does not affect team members' motivational drives. But there is a significant discrepancy between the expectations of the project team members ('WANT') and the ability of the project team environment to provide or support those expectations ('GET') in collocated and distributed project teams with respect to the factors related to 'Nature of Work', 'Rewards', and 'Communication'.

It is further concluded that though there exist significant differences between the 'WANT' and the 'GET' in both collocated and distributed project teams, in case of collocated project teams, the discrepancies are highest with respect to the factors 'Performance Based Financial Rewards', 'Comprehension of End-User Requirements', 'Training for Learning', 'Future Career Opportunities', and 'Enjoyable Nature of Work' in that order. In the case of virtual project teams, the differences are most with respect to the factors 'Comprehension of End-User Requirements', 'Easy Access to Project Related Information', 'Post Project Evaluation Feedback', 'Performance based Financial Rewards', and 'Enjoyable Nature of Work', in that order.

To summarize, in collocated projects the discrepancies are most with respect to 'Financial Rewards', followed by 'Communication', and then 'Nature of Work', whereas in distributed teams, the differences are most with respect to 'Communication', followed by 'Financial rewards', and 'Nature of Work'.

Last but not least, it is observed that the virtual project environments better accommodate the motivational drives of their project team members vis-à-vis the collocated project environments. This result is a bit surprising and deserves to be further investigated as some elements of the literature would suggest that collocation is an important factor in creating team spirit and enjoyable nature of work.

As seen above, the results comparing the motives of the project teams members ('WANT') in collocated and distributed team show minimal discrepancy suggesting that there may be underlying factors, which may explain the motivational drives of the project team members, irrespective of they being collocated or virtual. Hence, it is proposed that a further study of this question be undertaken, by employing a Principal Component Analysis of the combined and a larger sample of collocated and distributed project team members to profile the motives ('WANT') of the project team members. Likewise, the two project environments in question-collocated and distributed, do not differ in their ability to support or provide the motives of the project team members ('GET'), suggesting that there may be latent factors which comprehensively explain the nature of the project environments in relation to their support of project team members' motivation. It is expected that a Principle Component Analysis of the combined collocated and distributed project sample would throw light on this issue.

Profiling Motivational Drives of the Project Team Members

The purpose of the research was to profile the motivational drives of the project team members. We first theoretically showed the analogy between motivation and team performance through a literature review. Building on this theory base, we argued that issues common to motivation and team performance in a project context relate to 'Nature of Work',' Communication', and 'Rewards' and that these dimensions should be considered in a study of motivation in projects. We then suggested variables, which were related to the above mentioned 3 dimensions, and which were used as a scale to measure the motivation of project team members.

Overall, the results from the factor analytical observations of the motivational drives of the project team members, while substantiating the popular literature, also reveal interesting observations. With respect to motivation, from the team member's standpoint, contrary to the literature search, this presents a broader view of motivation stemming from work itself, the current observations show specific facets of work, which are perceived to be motivating by the project team members.

The observations with respect to nature of work, support the previous arguments (Campbell and Pritchard, (1976); Dyer and Parker (1975)) that identification of the work-outcomes, which in this case, is project team member's motivation can not be clustered in two general

factors, which pertain exclusively either to intrinsic or extrinsic motivation. Further, Communication emerges as a distinct and a key factor that explains project team member's motivation. Also, motivational issues, which have been posited to be provided by the project manager, and often associated with other factors such as nature of work in the literature, have emerged to be a distinct factor.

Another key factor pertains to rewards, which brings to the fore the mutually complementing relationship between the financial and the non financial rewards. Finally, the factor pertaining to nature of work, while reflecting the literature, also emphasises on the presence of team spirit and its role in enhancing the motivational potential of work. The four factors obtained are discussed below.

Factor 1- Communication for Task Facilitation

The importance of communication in a project context has been put forth in the works of Cleland and Ireland (2002) when they state that a project is tied together by its system of communication. The individual's drive to communicate stems from his desire for social contact, companionship, and emotional support, which he gains by being a part of a group. While this is facilitated by informal communication between the members of the project teams, there also exist formal communiqué such as proposals, reports, policies, procedures and vehicles such as project meetings, which facilitate exchange of project related information among the members of the project teams. Srivastava et al (2006) underscore the importance of communication- sharing task related ideas and other information among the team members by stating that exchange of such information, which they called 'knowledge sharing' is a critical team process that leverages the cognitive resources available within the team (Argote, 1999).
At the conceptual level, the relation between learning or knowledge acquisition through group interaction is explained by the theory of 'action learning' (Raelin, 2000) where learning is generated when the individuals in a group constantly interact with each other (Pedler, 1991; Marquardt, 1999; Raelin, 2000). This learning is essentially targeted at specific actions (Tsoukas and Mylonopoulus, 2004) leading to project accomplishment (Coghlan and Brannick, 2001). Thus, action learning foreshadows the argument that interaction among the group members leads to learning in a project environment.

The relation between learning, specifically training and information exchange are further explained by Cohen and Levinthal (1990) and later by Kwok and Gao (2006). They suggest that employees acquire knowledge through different knowledge sharing channels such as informal discussions (Holtham and Courtney, 1998), or formal training processes (Kwok and Gao, 2006). Further, the employees would highly value applying this knowledge to their work situation. From the motivation stand point, Venkatesh (1999), Venkatesh and Speirer (2000) posit that a training environment with high level of social interaction is motivating to the employees. This suggests that the learning process such as training may be closely related to information sharing among the team members and thus motivating to the team. Thus, it can now be said that, in a project set-up, the team members seem to perceive communication among them and training opportunities as a part of the 'action learning' process, which would help them perform better on their job.

An interesting observation has been the perception of the project team members to view their training as being a tool for communication among the project team members. Noe at al (2003) posit that the objective of the training programme is to empower the employees with the knowledge, skill sets and behaviours which may be applied to their day-to-day activities. Further, the training programme sets to achieve continuous learning among the employees to enable them to understand the relationships among jobs, their work units and the organization by sharing the information among each other. Communication, as discussed earlier, while satisfying the social needs of the people, also facilitates effective task completion. Thus, it seem that in the context of the current research study, it may well be a case where the project team members' highly value self efficacy (Ghee and Chan, 2003)- which gives them the competency to perform a task. Thus, the individuals value variables- Easy Access to Project Information, Ease of Information Exchange/ Communication, and Training for Learning in unity which would give them the required competence to perform their project tasks effectively. Further, these observations seem to suggest that project teams greatly value a continuous learning experience, where the ideas acquired and exchanged during their training programme and during their interpersonal interaction which are then applied to their work environment.

An alternative explanation for this factor may be the team members' need to satisfy their cognitive needs through information exchange (task related and also informal) and therefore valuing training, informal exchange of ideas and exchange of task related information together to meet this end. In a project context, these observations are supported by Kouzes, Posner (1998) who contend that training to achieve a learning purpose, can be fulfilled in an informal environment, where team members discuss a book or an article and how they may be best adapted to their department, work group, or function. Further, the employees seem to value affective outcomes of the training programme, which include attitudes and motivation along with the skill-based outcomes, which include acquisition of learning skills and application of the learnt skills to the job (Noe at al (2003)).

To summarize the discussion on the factor-'Communication for Task Facilitation', from the motivation standpoint, project team members perceive communication as a tool, which complements their work. The synergy between the informal information exchange, project related communication, and a learning experience from the training programme facilitates effective task performance by the project team members, while being a motivating experience. Thus, we accept the alternate hypothesis HI(14), which suggests that people motivated by free flow of information exchange in the teams, are also motivated by easy access to project information.

Factor 2- Management Obligation

An interesting outcome of this analysis is the emergence of the factor 'management obligation'. This factor may be unique to a project setting. This factor suggests that while the project team members may be self driven, they also expect a supportive role from their management and specifically the project manager. Support to this observation can be found in the studies presented by Latham and Saari (1979), Metcalfe (1984), and Nemeroff and Wexley (1977) who suggested that supervisory support in terms of reviewing employees strengths and weaknesses, clearing up job problems, and goal setting motivates the employees (Maier, 1958; Mayer et al (1965). Further, this leads to enhanced performance (Burke, Weitzel & Weir, 1978; Greller, 1975). In the context of this present research study, reviewing employees strengths and weaknesses may be understood as providing the project team member with feedback on his performance.

From the motivation stand point, support to these arguments linking mentoring with providing task significance and feedback on performance can be found in the studies of Kram (1985) who states that providing feedback on the job, suggesting strategies for the completion of the job, and assigning team members challenging and important assignments are facets to mentoring. Likewise, providing coaching and mentoring opportunities to the employees on the job greatly facilitates smooth conduct of the job and a clear understanding of the end-user requirements by the employee provides the employee with a strong goal direction. Taking this discussion forward to a project context, Thorns (1998), while drawing from the various theories on motivation discussed earlier, states that project manager, can motivate his project team by providing them feedback on their performance, involving them in challenging project activities. Further, it is the responsibility of the project manager to provide a strong project vision and clear project objectives to the team members, which are derived when the end user requirements are communicated well to the project team.

The motivating potential of the understanding of the user requirements would be better understood if a discussion of individual's aspirations and specific knowledge seeking behavior of the project team members is understood. Individuals have aspirations, goals and wants (Dasgupta, 1996). Individuals seek knowledge for the satisfaction of these expectations (aspirations, goals and wants). .In case of projects, this knowledge pertains to specific technical knowledge which is closely related to the knowledge of user requirements (Vincenti, 1990; von Hippel, 1998; Iansiti, 1998).

Supporting the task motives of the project team members, this factor also finds a strong relation between the opportunities for mentoring or coaching received by the project team members and the other items which constitute this factor. This indicates that the team members expect opportunities for coaching, while they are performing significant jobs on the project and this complementing the feedback which they receive. This observation is supported by Peansupap and Walker (2005) who state that opportunities for mentoring are impacted by support from management.

Factor 3- Financial and Non-Financial Rewards

Reward structures are pivotal determinants for integration of organizational units and employees (Coombs and Gomez-Mejia, 1991). The study of financial rewards and their

consequent influence on behavioral modification on the employees in terms of motivation has its roots in the studies of Skinner (1953), and Luthans and Kreitner (1975). Reflecting the literature review of the nature of rewards (Thompson, 2002; Amstrong and Brown, 2001), the results suggest that project team members closely associate the non financial rewards with the financial rewards. Supporting these claims in the general human resource management, Armstrong (2003) states that reward systems should be so developed that they provide opportunities for both financial and non financial rewards to recognize achievements.

However, the key aspects observed in the expectancy theory, goal theory, and equity theory need be taken into consideration when the financial rewards are planned. Subscribing to these views, Philips et al (1984) suggest that with respect to non financial rewards such as career advancement, individuals adopt rational (consider various advantages and disadvantages of choosing an alternative), intuitive (believing in intrinsically), or a dependent (considering outcomes based on peers judgements and situations to take a decision) which again map to the Equity theory. Significantly, it has been observed that the project team member's propensity for future career opportunities is not related to top management support which has been presented as the factor 'Management obligation'. This is explained by the concept of career strategy which has been defined as person's method or behaviour for achieving his or her career target in an organization (Gould and Penley, 1984). It has been found that the style of leadership does not influence the career strategy a person adopts and is more related to the person's achievement motivation (Kuo, 2006). Further, adoption of a career strategy by a person leads to enhanced speed of promotion in the organization and increase in the financial rewards (Beehr, Taber & Walsh, 1980; Gould, 1979; Gould and Penley, 1984; Hall, 1976). This seems to suggest that a person's propensity for financial rewards is closely related to his motivation for further career opportunities. These observations (Kuo, 2006) were particularly true in case of highly skilled knowledge workers working in the Information Service industry. Later, these views have been subscribed to by Judge et al (1995) who show empirically that personnel with a high propensity to progress in their careers earn more financial rewards, thus suggesting the link between financial rewards and career advancement.

To take further this discussion on the motivating role of career advancement, from the behavioural standpoint, Cassell (1990) argues that limited career prospects and variety of

experience hinders employee's intellectual and psychological growth. This leads to lower commitment towards the organizational goals and decreased motivation (Garavan and Coolahan, 1996).

In the project context, Olfert and Steinbuch (1995) term these motives related to financial and career advancement as the money motives and the prestige motives respectively. Further, commenting on the motivating potential of the financial rewards, McLean, Smiths, and Tanner (1996), and Staw, Calder, Hess, and Sanderlands (1980) state that receiving less than the expected financial rewards is demotivating to the employees in a project set-up. An interesting conclusion of this study is that the propensity of the project team members to value career advancement along with the financial rewards seems to suggest that they are motivated by what Gattiker and Larwood (1998), Judge and Bretz (1994), and Kotter (1982) defined as 'Objective Career Success'. Objective career success may be defined as an observable career accomplishment that is measured in terms of pay and ascendancy (London and Stumpf, 1982; Judge et al, 1995).

In the context of this present study, it may be inferred that as the respondents consisted of highly skilled personnel working on projects, they tend to adopt a 'career strategy' that would maximize their career opportunities within the organization while also providing them financial rewards. Hence, this partly explains the factor 'financial and non-financial rewards'. A significant observation in this factor was the team member's propensity for work-life balance (presented as 'project accommodating personal life') as a non-financial reward.

The proclivity of the employees for increased work-life balance in terms of flexible work hours has been documented by Baltes et al (1999), Hochschild (1997), Pierce et al (1989), Ralson (1990) and Ronen (1984) where societal changes, increasing number of women in the work force, dual-career households, and work-leisure expectations of the employees have been cited as being the main reasons for employees' inclination for work-life balance. This societal changes together with the emergence of new technology has lead to new forms of collaboration among the employees (Robinson, 2005). While providing work-life balance leads to reduced absenteeism, and increased productivity (deCarufel and Schaan, 1990; Pierce et al, 1989), from the employees' standpoint, Scholarios and Abigail (2004) suggest that

balance between work and personal life of the project team members largely impacts the team members' perception of the extent to which the organization considers his well-being. This again maps to the concept of Psychological Contract seen earlier. This is especially true in case of highly skilled knowledge workers (Davenport, 1999; Scandura and Lankau, 1997).

It may be recalled here that the sample for the current research study consists of highly skilled knowledge workers engaged in projects. The propensity of the project team members towards achieving a work-life balance has been presented by Lewis at al (2002) and earlier by Schein (1996). They propose a view that young workers tend to emphasize more on work-life balance, what Schein terms as 'lifestyle' career anchor. Further, the young people wish to manage their career on their terms by achieving a balance between work and non-work aspects of their lives (Loughlin and Barling, 2001) and the workers engaged in such flexible work arrangements have a propensity for career advancement as with the case of conventional workers (Robinson, 2005). This proactive and individualistic approach to management of their careers by the employees again relates to 'career strategy' discussed earlier (Gould and Penley, 1984). Thus, these results are reflective of the sample size, considered for the purpose of the present research study where the project team members were young and were in the initial or mid stages of their career and therefore demonstrated a proclivity for financial and non financial rewards.

Hence, it can be said conclusively that with respect to the rewards, project team members value complementing money and relational motives such as career ascendancy ('future career opportunities) and work-life balance (project accommodating personal life). It may be added here that these kind of rewards are particularly motivating to the team members when the team members have a high clarity of the outcomes and the rewards, which again is in agreement with the Expectancy Theory discussed earlier (Sarin and Mahajan, 2001). Thus, alternate hypothesis H1(13) which suggests that project team members value complimenting financial and non-financial rewards is accepted. Further, In presenting the relation between the nature of work and rewards, from the project team member's perspective, the present study contradicts the arguments of Edwards et al (1999) and Dorfman, Walter, and Loveland (1986) to the extent that work may not be associated with rewards, as the financial and the non-financial rewards have emerged as an independent factor. Hence, the alternate hypothesis

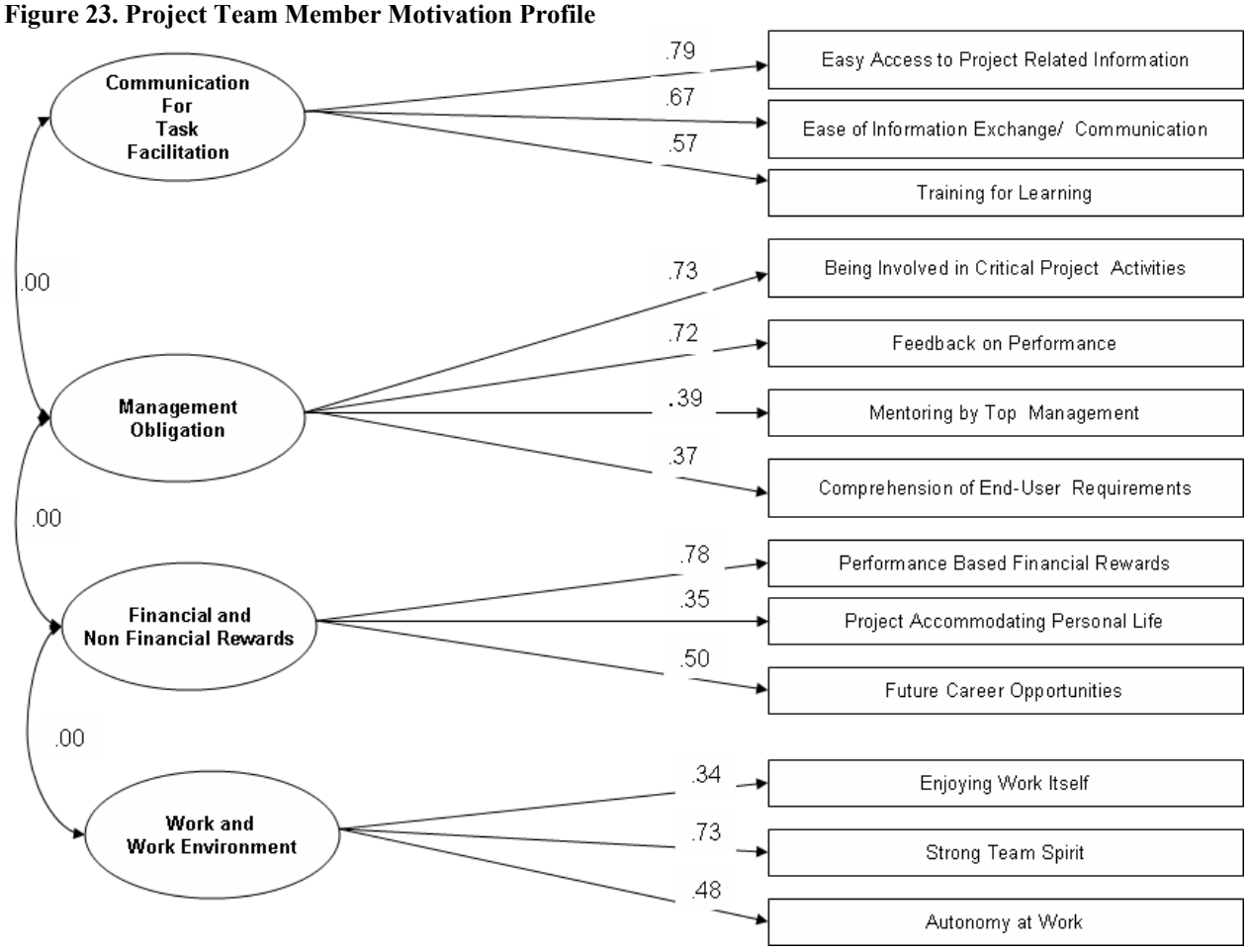
H1(11) which suggests that from the motivation standpoint, the team members perceive nature of work and rewards to be distinct is accepted.

Factor 4- Work and Work Environment

The role of nature of work in being motivating to the project team members, while partially substantiating the literature (see for eg. Hackman and Oldham, 1976; Garies, 2005; Wood and LeBold, 1970), also reveals interesting observations. From the motivation standpoint, there exist strong correlation between what the team members perceive to be enjoyable work degree of autonomy, and strong team spirit. Studies suggesting that there is relation between autonomy, interesting nature of work and cooperation among the employees at the work place has been presented in the industrial psychology literature (for eg. Bussing, 1995; Comelli and van Rosentiel,1995). These observations are further reinforced by the studies of Kochanski, Mastropolo and Ledford (2003) who had compared the motivational propensities of high-tech workers for work content, direct & indirect financial rewards, affiliation, and career related rewards. Their studies revealed that the team members have a high proclivity for work content and affiliate needs. This factor was called 'work environment'. Foreshadowing this study, Wherry and Waters (1968) suggested an orthogonal hierarchical factor structure that showed a strong correlation between intrinsic motivation (related to nature of work) and socialization, which in the context of the present research study connotes to team spirit.

Further exploring the nature of work and its influence on motivation, Keller, Julian, and Kedia (1996) suggest that nature of work together with a cooperation of the team while being motivating, also leads to higher productivity in case of technical workers. These findings are in agreement with the studies of Edwards and Wright (1998) who suggest that team working while leading to increased productivity and efficiency, also increased the commitment of the team members towards their work. Thus, this suggests that team working influences the employee's perception of his nature of work (being perceived as being enjoyable). Hence, the null hypothesis H0(12) which suggests that which suggest that team members do not associate high degree of task autonomy and team spirit with interesting nature of work is accepted. Further, as this factor brings to the fore the association between the enjoyable nature of work, and task autonomy, which may be directly associated with 'Work' on the project, and team spirit, which may be more contingent on the project team environment, this factor is termed 'Work and Work Environment'

Figure 23. Project Team Member Motivation Profile



In conclusion, this study comprehensively explains motivation of the project team members by considering issues related to motivation and team performance. The measures of project team members' motivation, abstracted from the literature on motivation, and team performance and related to 'Nature of Work', 'Rewards', and 'Communication', significantly explain and profile the team members' motivation. The evolution of communication as a distinct factor is of significant importance. Also of noteworthy importance are the observations with respect to 'Nature of Work', which has evolved as a factor, distinct from financial and non-financial rewards (often posited as Intrinsic and Extrinsic motivation factors), thus suggesting that work motivation is different from intrinsic motivation. As such, it is expected that more research would follow this direction, and the people issues in project management would be explored systemically, scrupulously, and objectively to add value to practice and research.

Project Environment- Support to the Motivational Drives of the Team Members

Having discussed the motivational drives of the team members working in collocated and virtual project teams, the discussion now focuses on another facet of this study – to discuss the nature of the project environments in terms of its support to the aspirations of the team members.

The results of the principle component analysis which analyzed the question – "How important are/were the following factors in your current/latest projects?" revealed interesting observations. A significant observation has been a conspicuous difference in the factor structure vis-à-vis the factor structure of the motivational drives of the project team members. These results are foreshadowed by the one-tail unilateral t-test results of the variables investigating how characteristic were the project team member motivator variables in the incumbents' jobs or in other words, how much of the variables pertaining to 'nature of work', 'rewards', and 'communication', did the project team members GET from their job environment. These results showed high affinities between the collocated and the virtual team samples suggesting that the two project environments may not greatly differ in terms of their support to the aspirations of the team members. A two factor structure which loaded 'project team member motivators' External and Internal to the project environment was abstracted and hence were named 'External Motivating Factor' and 'Internal Motivating Factor' respectively.

The variables loaded on the External Motivating Factor subscribed to the Extrinsic Motivators (Herzberg, 1987b; Nelson, 1994; O'Driscoll & Randall, 1999), while the 'Internal Motivation Factor' referred to the Intrinsic Motivators which are related to nature of work itself (Herzberg, 1987a) and which constitute jobs which are challenging (Hwang, 2005).

In the context of projects, the results of the study confirm the findings of Strickler (2006) and Weitz et al (1986) who observe that extrinsic motivation relates to financial benefits, and growth opportunities. These results are further supported by Mahaney and Lederer (2006) when the posit that extrinsic motivation relates to financial benefits, opportunities for career growth. Further, they extend the dimensions of extrinsic motivation to variables such as 'flexible work schedule', and 'opportunity to work at home' suggesting that apart from the financial and the non-financial rewards, work-life balance (which has been presented as 'project accommodating personal life' in the context of the present research study) is extrinsically motivating to project teams. Each of these factors are discussed in detail next.

Factor 1. Internal Motivating Factor

The internal motivating factor, as discussed earlier contains variables which are directly related to the team members' work. White (1959) suggests that job dimensions such as autonomy, challenging work environment, and responsibility are closely associated and load onto the factor Intrinsic Motivation. In the context of the discussion of the Internal Motivating factor, it is observed that the project team members being involved in critical project activities and having work autonomy load onto this factor; thus supporting the studies of White (1959). Further extending the understanding of intrinsic motivation, Mats et al (2005) state that intrinsic motivation relates to interesting, challenging and exciting nature of work and which offers high degree of autonomy to the employee (Ralph, 2005; Piccollo and Colquitt, 2005). Apart from the nature of work in terms being interesting, providing autonomy to the team members, and being challenging, an opportunity for the individuals to enhance their competence is a source of motivation (Deci, 1975). This is best brought to the fore when the individuals are assigned activities which are important (posited as the variable 'being involved in critical project activities') and when they are provided training opportunities which enhance their competence and learning of the job (Hackman and Oldham, 1980). O'Neal (1998) in her discussion on what is most motivating to the employees working in a technology intensive environment suggests that apart from the nature of work itself (in terms

of it being interesting, autonomous, and challenging) work life balance and relationship with colleagues are complementary to nature of work and the environment and thus are motivating.

Factor 2. External Motivating Factor

Ehlers and Lazenby (2004) define a reward as an umbrella component which contains monetary and non-monetary rewards as its components. This definition is highly reflective of the concept of 'total rewards' (Armstrong and Brown, 2001; O'Neal and Sandra,1998) where the financial rewards complement the non financial rewards pertaining to the quality of working life, and career opportunities which are motivating to the employees (WorldatWork, 2000). This is especially true in case of employees engaged in technology intensive work environments such as project team members working in remote working conditions (Rumpel and Medcof, 2006).

The motivating potential of financial rewards, especially when tied to specific performance targets as in case of the project environment has been supported by Harackiewicz, Manderlik, and Sansone (1984) and later by Eisenberger, Rhoades, and Cameron (1999). This is because it increases the self-efficacy of the employees which in turn leads to motivation. Though the motivating potential of the financial rewards as a 'stand alone' may not be abiding, it symbolizes many intangible goals and is directly or indirectly linked to the satisfaction of the basic, security and self-esteem needs of the employees (Armstrong, 2003). Further, considerations of pay have been observed as a dominant factor binding people to their job (Goldthorpe et al, 1968).

Mentoring and coaching are learning initiatives which are designed for the career enhancement of the employees (Armstrong, 2003). From the motivation standpoint, mentoring programmes can lead to increased financial compensation and career satisfaction among the employees (Chao et al, 1992; Dreher and Ash, 1990; Fagenson, 1992; Kberg et al, 1994; Ragins and Cotton, 1999; Ragins et al, 2000; Turban and Dougherty, 1994) which is beneficial to the organizations as well (Kram and Hall, 1989; Mullen and Noe, 1999; Viator and Scandura, 1991; Wilson and Elman, 1990). Further, the different facets of mentoring such as opportunities for financial rewards (Chao et al, 1992; Dreher and Ash, 1990; Fagenson, 1992; Kberg et al, 1994; Ragins and Cotton, 1999; Ragins et al, 2000; Turban and Dougherty, 1994) and career functions such as advancement at work (Hunt and Michael, 1983; Kram,

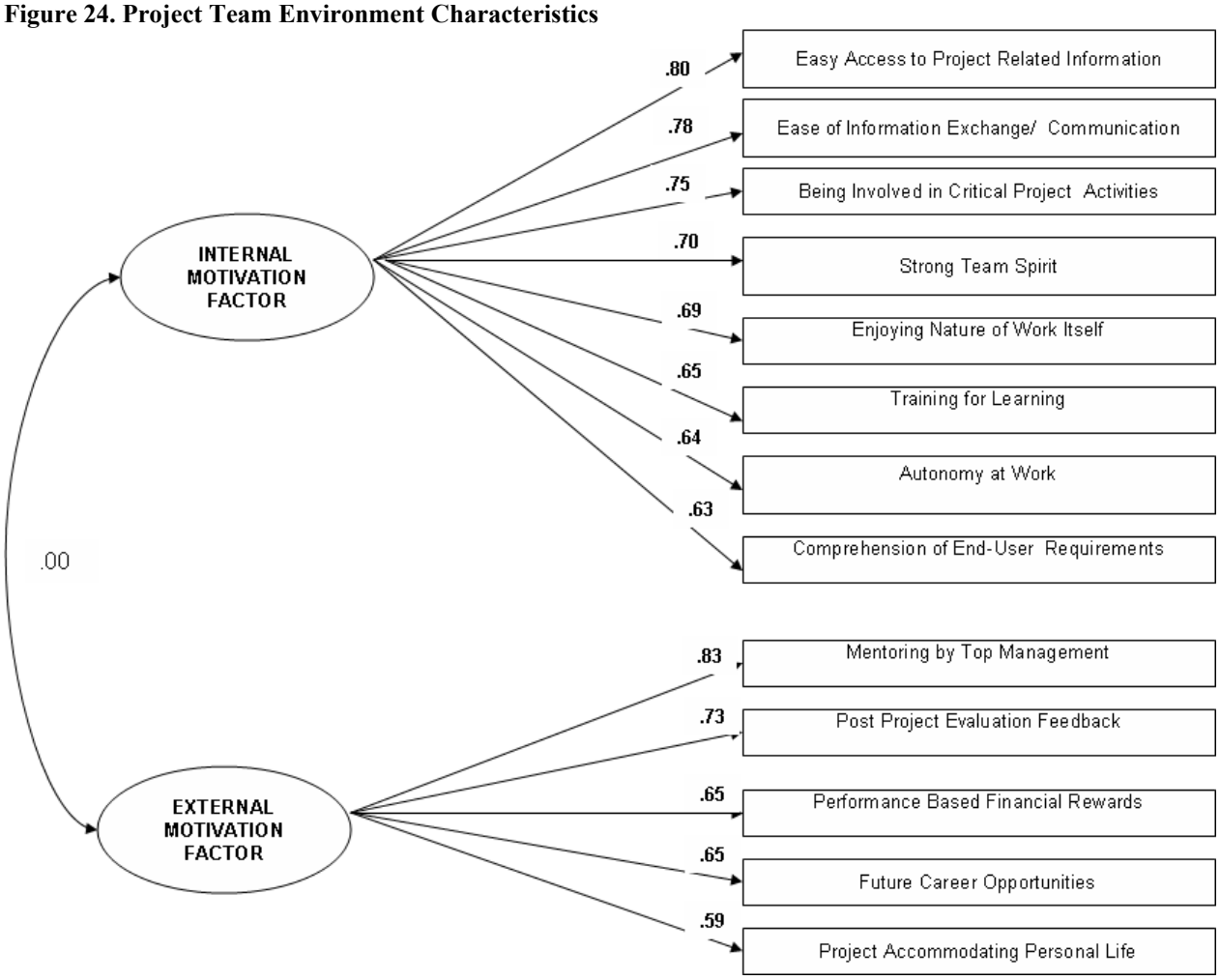
1985; Levinson et al, 1978) and coaching of the employees which involves providing them with feedback on performance (Kram, 1985) have been shown to be interrelated (Kram, 1985).

In consonance with this view where the financial and the non financial rewards are complementary to each other, this factor loads variables pertaining to financial rewards related to performance and non financial rewards pertaining to career growth and work-life balance. These views are supported by Weitz et al (1986) who suggest that extrinsic motivation relates to recognition, money, and growth. These variables have been categorized as 'second-level outcomes' of motivation which are derived from the job performance itself (Galbraith and Cummings, 1967; Lawler, 1970; Lawler and Porter, 1967) and also as the 'hygiene factors' (related to pay and working conditions) by Herzberg in his two factor model (1959). These variables are external to the job itself and are related to the financial benefits and career opportunities (Nelson, 1994; O'Driscoll and Randall, 1999). These observations are further held by Amabile (1983) and Amabile et al (1996) when they state that the constituents of extrinsic motivation include performance evaluation, expectancy of rewards from the organization , thus connoting to the variables related to feedback on performance and the financial and non financial rewards discussed in this study.

In the context of projects, these results have been support by Mahaney and Lederer (2006) who identified flexible work schedule ,time off, and opportunity to work from home (connoting to the variable 'project accommodating personal life'), annual performance review (connoting to the variable 'post project evaluation feedback'), financial bonus (connoting to the variable 'performance based financial rewards), and job promotion (connoting to the variables 'future career opportunities' and 'mentoring by top management').

The results of the 'principle component analysis' of the project team environment's support to the Team members' expectations are summarized in the figure 24 below

Figure 24. Project Team Environment Characteristics



Explaining the Factor Distortion

Moving away from the 'Intrinsic-Extrinsic' paradigm

It has been seen that there is a stark difference in the factor structures of the team members expectations (presented as what the team members' 'Want') and the ability of the project environment to support those expectations (presented as what the team members' 'Get'). These observations reflect the popular research paradigms in motivation which suggests that categorizing employee's motivation as being completely Intrinsic or Extrinsic is an arcane explanation. For example, Dyer and Parker (1975) in their study of industrial/ organizational psychologists have observed the distinction between intrinsic and extrinsic to be highly ambiguous. Further, Billing and Cornelius (1978) posit that researchers working with different paradigms use varying definitions of intrinsic and extrinsic motivation.

Another example may be the Self-Determination Theory's stand-point on Extrinsic Motivation which is that though extrinsic motivation relates to performance of an activity in order to attain separable outcomes, extrinsically motivated behaviour is itself dependent on source of impetus of motivation (Ryan and Deci, 2000). This dependence of extrinsically motivational behaviour on contextual variables further adds complexity to its concept. Taking this argument forward, Billings, Cornelius, and Edwin (1980) hold the view that there is a need to understand individuals do not perceive the outcomes of the motivational drives as being completely intrinsic or extrinsic or in other words, they do not perceive the motivational drives as falling in either of these two categories. Further, they cite that subjects perceptually organize these work outcomes in a multidimensional fashion and that these dimensions may relate either to the expectancy and instrumentality ratings (Lawler and Suttle, 1973) or the importance dimension (Quinn and Cobb, 1971), i.e. how important is a variable to the team members' motivation. This suggests a multi factor model to explain the motivation of the employees' vis-à-vis the dichotomous intrinsic-extrinsic model of motivation.

What is most significant in these readings juxtaposing the two factor strucutures ('Want' and 'Get') is that while the factors 'Communication for Task Facilitation', 'Financial and Non-Financial Rewards', and 'Work Environment' have been retained as being exclusively internal or external factors, the factor 'Management Obligation' has been distorted and the

variables load differently on to the Internal motivation and External motivation factors. This seems to suggest that the project environment, while aptly supporting the Communication, Financial and Non-Financial rewards, and Work and Work environment expectations of the team members, is not accurately supporting the key expectations of the team members relating to task significance, performance feedback, mentoring opportunities and customer requirements, in consonance with their expectations. Thus, the 'management obligation' factor explains most the discrepancy between the expectations of the team members and the ability of the project team environment to support those expectations. This can be further explained by the research done by Kram (1985), Noe (1988a, 1988b), Zey (1984), and Scandura (1992) on the influence of mentoring on the employees behaviour. Kram (1985) identified what he termed 'Career Function' of mentoring. This factor suggests that different aspects of mentoring involve providing the employee with challenging assignments and providing feedback on the employee's performance through coaching. This closely relates to the factor 'Management Obligation' where it has been seen that team members being involved in important project activities, feedback on their performance, and opportunities for mentoring are closely related.

Other aspects of mentoring such as financial rewards, career opportunities and learning opportunities load onto the factors 'Financial and Non Financial Rewards', and 'Communication for Task Facilitation' respectively. From the motivation stand point, this suggests that even while providing opportunities for mentoring to the employees, there is a distortion of the variables related to the 'Career Function' factor of mentoring and thus accounting for a major discrepancy between the factor structures of the team members' expectations ('Want') and the ability of the project team environment to support those expectations ('Get').

The key findings of the research are summarized in figure 25 below

Figure 25. Summary of Key Findings of the Study

Primary Hypotheses (explored using one tail t-test)	**Hypotheses**
Overall Discrepancy (Want-Get)	**Communication** H0 (1): Members working in project teams would not want more in

	terms of 'comprehension of the end-user requirements' than what their project environment is actually offering them H1 (1) : Members working in project teams would want more in terms of 'comprehension of the end-user requirements' than what their project environment is actually offering them- **Alternate Hypothesis Accepted** H0(2): Members working in project teams would not want more in terms of 'feedback on performance' than what their project environment is actually offering them H1(2): Members working in project teams would want more in terms of 'feedback on performance' than what their project environment is actually offering them- **Alternate Hypothesis Accepted** H0(3): Members working in project teams would not want more in terms of 'easy access to project information' than what their project environment is actually offering them H1(3): Members working in project teams would want more in terms of 'easy access to project information' than what their project environment is actually offering them- **Alternate Hypothesis Accepted** **Nature of Work** H0(4): Members working in project teams would not want more enjoyable nature of work, than what their project environment is actually offering them H1(4): Members working in project teams would want more enjoyable nature of work than what their project environment is actually offering

	them-**Alternate Hypothesis Accepted** H0(5): Members working in project teams would not want more in terms of being involved in critical project activities than what their project environment is actually offering them H1(5): Members working in project teams would want more in terms of being involved in critical project activities than what their project environment is actually offering them-**Alternate Hypothesis Accepted** **Rewards** H0(6): Members working in project teams would not more in terms of performance based financial rewards than what their project environment is actually offering them H1(6): Members working in project teams would want more in terms of performance based financial rewards than what their project environment is actually offering them-**Alternate Hypothesis Accepted**
Discrepancy in Collocated and Virtual Project set-ups	**Within the Group Discrepancy (Collocated Projects)** H0(7): There is no significant discrepancy between the expectations of the project team members (WANT) and the ability of the project team environment to provide or support those expectations (GET) in collocated project teams with respect to 'Nature of Work', 'Rewards', and 'Communication'. H1(7): There is significant discrepancy between the expectations of the project team members (WANT) and the ability of the project team environment to provide or support those expectations (GET) in collocated project teams with respect to 'Nature of Work', 'Rewards', and 'Communication'-**Alternate Hypothesis Accepted**

	Within the Group Discrepancy (Virtual Projects) H0(8): There is no significant discrepancy between the expectations of the project team members (WANT) and the ability of the project team environment to provide or support those expectations (GET) in distributed project teams with respect to the factors related to 'Nature of Work', 'Rewards' and 'Communication' H1(8): There is significant discrepancy between the expectations of the project team members (WANT) and the ability of the project team environment to provide or support those expectations (GET) in distributed project teams with respect to the factors related to 'Nature of Work', 'Rewards' and 'Communication-**Alternate Hypothesis Accepted** **Between the Group Discrepancy (Collocated and Virtual Project set-ups)** H0(9): The collocated project environments do not facilitate information exchange among the project team members better than the virtual project environments.-**Null Hypothesis Accepted** H1(9): The collocated project environments facilitate more exchange of information among the project team members than the virtual project environments. H0(10): The collocated project environments do not foster higher strong team spirit among the team members than the virtual project environments.-**Null Hypothesis Accepted** H1(10): The collocated project environments foster higher strong team spirit among the team members than the virtual project environments H0(11): The collocated project environments do not better support

	training opportunities for learning than the virtual project environments-**Null Hypothesis Accepted** H1(11): The collocated project environments better support training opportunities for learning than the virtual project environments
Secondary Hypotheses (explored using PCA)	**Nature of Work** H0(12): From the motivation standpoint, project team members do not associate nature of work with rewards-**Null Hypothesis Accepted** H1(12): From the motivation standpoint, project team members associate nature of work with rewards. H0(13): The project team members do not associate high degree of task autonomy and strong team spirit with interesting nature of work H1(13): The project team members associate high degree of task autonomy and strong team spirit with interesting nature of work-**Alternate Hypothesis Accepted** **Rewards** H0(14): From the team member's standpoint, project team members are not motivated by complementing financial and non financial rewards. H1(14): From the team member's standpoint, project team members are motivated by complimenting financial and non financial rewards-**Alternate Hypothesis Accepted** **Communication** H0(15): Team members do not associate free flow of information exchange with easy access to project information from the motivation standpoint

	H1(15): Team members associate free flow of information exchange with easy access to project information from the motivation standpoint-**Alternate Hypothesis Accepted**

VIII. LIMITATIONS

As in the case of most of the research study, this study too has limitations. The influence of other variables such as Organization culture and Leadership has not been considered. It was assumed that these factors have already been accounted for. Organization culture is deeply embedded in the employee's psyche and therefore has an impact over his decision making ability and behaviour (O'Reilly and Chatman, 1996). Also, a strong organizational culture has been known to influence performance (Barney, 1986).Likewise, another dimension, 'leadership' has an influence of issues such as employee commitment , participation (Ji Li, Koh, & Heng, 1997),work goals and job attitudes (Bono, & Judge, 2003) which in turn impacts employee motivation. Finally, this study was intended to be an investigation of project environments and team members' motivation in projects in general. Therefore, it was necessary to collate the responses from a cross section of industries. Hence, the applicability of our research to specific industries or project types needs to be verified by including other moderating variables specific to those cases.

In spite of these limitations, our study has a number of strengths. First, this study brings to the fore the underlying relation between motivation and team performance, and thus underscores the need to address these two issues together when the people aspects are studied. This was hitherto lacking in project management (Cohen and Bailey, 1997; Dyer, 1984). Further, through an empirical analysis of motivation in project teams, we attempt to critically analyze the human side to projects, which is important (Wilemon, 2002).

IX. CONCLUSIONS

Overall, it has been observed that significant discrepancies exist between the expectations of the team members ('Want') and the ability of the project team environment to support those expectations ('Get'). Highest discrepancies and in that order were observed in the variables

'Performance based Financial Rewards', 'Comprehension of the End-User Requirements', 'Enjoying Nature of Work Itself', 'Ease of Information Exchange/ Communication', and 'Feedback on performance'.

The one tail unilateral t test results comparing the motivational drives of collocated and distributed project teams suggest that the expectations of the team members do not vary and that the degree of 'virtual ness' does not affect team members' motivational drives. But there is a significant discrepancy between the expectations of the project team members ('WANT') and the ability of the project team environment to provide or support those expectations ('GET') in collocated and distributed project teams with respect to the factors related to 'Nature of Work', 'Rewards', and 'Communication'.

It is further concluded that though there exist significant differences between the 'WANT' and the 'GET' in both collocated and distributed project teams, in case of collocated project teams, the discrepancies are highest with respect to the factors 'Performance Based Financial Rewards', 'Comprehension of End-User Requirements', 'Training for Learning', 'Future Career Opportunities', and 'Enjoyable Nature of Work' in that order. In the case of virtual project teams, the differences are most with respect to the factors 'Comprehension of End-User Requirements', 'Easy Access to Project Information', 'Post Project Evaluation Feedback', 'Performance based Financial Rewards', and 'Enjoyable Nature of Work', in that order.

To summarize, in collocated projects the discrepancies are most with respect to 'Financial Rewards', followed by 'Communication', and then 'Nature of Work', whereas in distributed teams, the differences are most with respect to 'Communication', followed by 'Financial rewards', and 'Nature of Work'.

Last but not least, it is observed that the virtual project environments better accommodate the motivational drives of their project team members vis-à-vis the collocated project environments. This result is a bit surprising and deserves to be further investigated as some elements of the literature would suggest that collocation is an important factor in creating team spirit and enjoyable nature of work.

As seen above, the results comparing the motives of the project teams members ('WANT') in collocated and distributed team show minimal discrepancy suggesting that there may be underlying factors, which may explain the motivational drives of the project team members, irrespective of they being collocated or virtual. Hence, the next phase of the study was conducted where the motivational drives of the project team members ('Want') in a combined sample of collocated and virtual teams was analyzed using a Principle Component Analysis.

Likewise, the ability of the project team environment to support those expectations ('Get') was conducted. it is proposed that a further study of this question be undertaken, by employing a Principal Component Analysis of the combined and a larger sample of collocated and distributed project team members to profile the motives ('WANT') of the project team members. Likewise, the two project environments in question-collocated and distributed, do not differ in their ability to support or provide the motives of the project team members ('GET'), suggesting that there may be latent factors which comprehensively explain the nature of the project environments in relation to their support of project team members' motivation. It is expected that a Principle Component Analysis of the combined collocated and distributed project sample would throw light on this issue.

In case of project team members' expectations ('Want'), what does appear significant here is that the identification of specific factors in addition to the general component has provided new insights and group comparison techniques hitherto obscured by a one-factor approach. Four main factors emerged: 'Communication for Task Facilitation', 'Management Obligation', 'Financial and Non-Financial Rewards', and 'Work and Work Environment'. We confirmed the validity of our model using Maximum Likelihood Factor Analysis.

The confirmation of communication as a distinct factor is of significant importance. Also of noteworthy importance are the observations with respect to 'Nature of Work', which has evolved as a factor, distinct from financial and non-financial rewards. This specifically underscores motivating potential of intrinsic motivation for collocated and virtual project team members.

X. FUTURE RESEARCH

To comprehensively understand motivation in project teams, it is suggested that future research may include additional measures pertaining to organization culture and leadership which impact employee aspirations. An interesting study would be a comparative study to look into the influence of high context and low context cultures on motivation (Hanjun, Roberts and Chang-Hoan, 2006) in terms of discrepancy between the team member expectations and the project environment's ability to support those expectations.

With respect to leadership, an important question to explored would be how do different styles of leadership such as the The Situational Leadership Model (Hersey and Blanchard, 1977), The Normative Decision Model (Vroom and Yetton, 1973; Vroom and Jago, 1988), Transformational Leadership Theory (Bass, 1985) influence the difference between the aspirations of the team members and the project environment's support to those expectations.

Future research may also benefit by including a performance dimension such as 'project success'. It has been shown through our literature review how motivation has a bearing on team performance. Thus, a study focussing on the influence of specific motivation dimensions we discussed such as nature of work, rewards, communication and management support on project success would have strong managerial and academic value. While each of these dimensions- 'nature of work', 'rewards', and 'communication' may be explored more in detail, for the sake of parsimony and in consonance with the objectives of a research study, it is believed that a logical extension to this study would be to focus specifically on one of these dimensions and study its influence on project success. Thus, a brief literature review and a possible framework to study the influence of work motivation on project success is presented next. A research proposal, detailing the expected contributions of the study, phases of the research study, proposed research methodology, expected outcomes of the study and conclusion are included as Appendix.

The Influence of Work Motivation on Project Success

Background and Context

Projects have been understood as being complex endeavours involving people, aimed at creating change. However, considering that projects have finite resources, specific objectives, and more importantly, are unique, they differ in their organization, when compared to

operations. Further, with the evolution of projects, and the project management discipline, there has been an increasing focus on the question as to 'what constitutes a successful project?' While project success had been judged in terms of tangible constraints, there had been felt a need to understand the role of 'people' in a project set up and their contribution to its success. However though, given the complex, and inter related facets of 'people' management, such as behaviour, leadership, and competencies, a critical analysis may be warranted in this area of project management. In this direction, the proposed study attempts to focus on a key issue pertaining to human resources in project-Motivation and in consonance with the raison d'être of projects, which is achieving specific objectives, presents its impact on project success.

Significance of the Study and Expected Contributions

In case of project management, although the concepts of team development, team formation and team performance have been well researched, there is dearth of research which focuses on team development issues in projects. Vis-à-vis the other areas of project management, where the research has been substantiated by experience, and scrutiny, the study of human variables seem to be lacking from rigorous definition and analysis (Hoffman et al, 2002). Further, Wilemon (2002) argues that the 'people' aspects in project management have not been studied from the team members' perspective. Though more recently, Lechler (2006) presented his study on the motivation of project team members and the consequent impact on project success, his study considered only the extrinsic motivators. Thus, this study assumes significance, as it sets out to explore the influence of intrinsic motivation or motivation stemming from nature of work itself, and its impact on the project success, from a project team members' perspective.

It is expected that the proposed study would complement the existing research in project management, by significantly incorporating theories and concepts from human resource management and organization behaviour, and enriching the understanding of motivation and project success, from a team members' point of view. Specifically, the conclusion of the proposed study, suggests a model, which attempts to present the relation between the various job dimensions, which are intrinsically motivating (related to nature of work) to the team members, and their influence on project success.

Framework and Related Literature

Project Success

Project success has been typically defined in terms of time, budget, and deliverables (Atkinson, 1999). However, with the perception towards the nature of projects changing, from operational to being more strategic (Jugdev, Muller, 2005), the ability of the project to add value to business has been included as a success criteria, apart from the cost, time, and scope constraints. Seconding these observations are Cooke-Davies (2000), Shenhar et al (2005), and De Wit (1998) who argue that a project's contribution to the organization, through satisfaction of the various stakeholders of the enterprise such as sponsors, project owners, and senior management , is a criteria to measure project success. Supporting this argument of measuring project success in terms of satisfaction of various stakeholders, Baker, Murphy, and Fisher (1988) emphasised on the satisfaction of the key people of the project team and the key users or the clientele of the project, through the project outcomes, apart from technical performance of the project, as being measures of project success. Since the 1990's, there has been an increasing interest in the study of 'people' aspects in project management research, where human factors such as competencies and performance measures were explored (Ulri and Ulri, 2000). Mirroring these trends in the larger project management research, Morris and Hough (1987) developed a framework, describing the preconditions for project success, which included people factors such as attitudes, human qualities, and communication, in addition to project definition, resource management, organization, and contract strategy. The emphasis on people factors in the project success literatures is further brought to fore by Belassi and Tukel (1996) who suggest that effective communication, project manager, and the team impact project success. Further exploring the 'people' centric issues in project success, Pinto and Slevin (1987,1988a,1988b) presented the 10 critical success factors for Projects, that included 'personnel', 'monitoring and feedback', and 'channels of communication'.

Even though, there has been an increasing interest in researching people factors in project management, more research may have been wanting. Further, the people issues have been predominantly presented from the project manager's perspective (Wilemon, 2002). These views are supported by Henrie and Sousa-Poza (2005), who underscore the need to consider soft issues in project management such as human resource practices, leadership, and communication, by incorporating the relevant theories from other disciplines in project management. More recently, Lechler (2006) studied the influence of extrinsic motivators (not

related to nature of work) on project success. Thus, a research study, that studies the impact of nature of work on perceived project success, from a project team members' perspective may have been wanting.

Based on these conclusions on the state of research in the project management discipline, the current research explores specific aspects of people management in project management discipline by drawing from other disciplines of management such as human resource management and organization behaviour. The focus of this research study is on the influence of work related motivation on project success.

Work Motivation in Project Management

In project management, from the project team members' perspective, nature of work as being motivating to the team members has been presented in various theories on motivation such as the Job Characteristic Model (Hackman, Oldham, 1976,), Equity theory (Adams, 1963), Goal Setting theory (Locke, 1968), and Control theory (Klein, 1989). These are discussed in brief below.

The Job Characteristic Model

The Job characteristic model, presents different facets of job and its impact on employee motivation. The model identifies five core job dimensions-skill variety (opportunities to use different skills and talent), task identity (doing identifiable piece of work), task significance (the task having impact on the lives or work of other people), autonomy (degree to which the job provides freedom to the individual to schedule work and processes), and feedback (individual obtaining direct information about effectiveness of his performance) that render the employee to view the job as being motivating.

Equity Theory

Drawing a close analogy with the core dimensions of the Job Characteristic Model is the Equity Theory. (Adams, 1963). This theory states that people vary their efforts which they put into their work, depending on the outcomes obtained such as work, recognition, opportunity to develop technical expertise, collegiality, good working environment, job security, and job satisfaction. Further, people would also compare the achievement of these outcomes with their peers, or with people with similar training and work to vary their efforts for task accomplishment.

Goal Setting Theory

Extending further the importance of having clear objectives, which were mentioned as clear task outcomes in the Job Characteristic Model, is the Goal setting theory (Locke, 1968). This theory states that setting challenging and specific goals, while being motivating, also increase performance. Other studies which present the motivational characteristic of a job have been presented by Sims, Szilagyi, and Keller (1976), who emphasised on work autonomy.

Control Theory

An extension to Goal setting theory, Control theory (Klein, 1989), this theory further underscores the role of feedback, and its impact on motivation. This theory states that individuals seek feedback from managers, and coworkers about their performance on the job against predefined goals. A positive or a negative feedback, thus helps the individuals to assess their performance on the project. Further, as the individuals have an opportunity to detect and correct their deficiencies through this feedback, it gives them increased control over their work as the project progresses, and therefore, increases goal commitment, while being motivating.

In summary, nature of work, has been posited as being a motivator in the project environments. The facets to motivating work have been presented as the employees being given challenging jobs, the job providing the employees with the right degree of autonomy, opportunity to develop skills on the job, having job security, and the employees being given feedback on their performance. These observations have been seconded by the works of Edwards et al (1999), when they present the motivational approach to measure work. These dimensions included job enrichment, job enlargement, intrinsic work motivation, and socio-technical systems (Cherns, 1976, Hackman and Oldham, 1976, 1980, Steers and Mowday, 1977) and were related to the 5 core job dimensions described in the job characteristic model, team spirit, recognition, and career advancement.

In order to propose a framework to study the influence of work motivation on project success, a literature review of peer reviewed articles on work motivation and project success between the years 1985 and 2005 was done. The same are highlighted in the tables below

Figure 26. Future Research-Summary of Literature Review on 'Project Success

Year	**Nature of Projects**	*Critical Success Factors/ Metrics: Project Success*
1985-1989	Management Information System	Tangible Measures (Time, Budget); Business Orientation (Market Share), Client Satisfaction, Understanding User Requirements, Goal Clarity, Communication & Top Management
1990-1994	New Product Development; R&D Projects	Top Management Support, Understanding User Requirements, Project Manager monitoring Project Progress, access to documented information & Information Sharing among Team Members
1995-1999	Business-Process Re-Engineering (BPR), New Product Development , & Construction Projects	Goal Congruence among Team Members, Formal-Informal Communication between the project team and project sponsors, Organizational Learning, Performance Feedback to the team members by Project Manager , Interesting nature of work, and Team empowerment through Training by Top Management

2000-2005	Information Systems (IS) & Construction Projects	Strategic Nature of Projects, Communicating Project Vision to Team Members by Project Manager, Team Building, and Job satisfaction of team members.

Figure 27. Summary of Literature review on 'Work Motivation'

Year	**Theory/Approach in Focus: Work Motivation**	*Critical Success Factors/ Metrics: 'Work Motivation'*
1985-1989	Job Characteristic Model	Challenging Nature of Work, Feedback on Performance, Task Identity, Job Autonomy, work group cooperation& Job enrichment
1990-1994	Vroom's Expectancy Theory, Job Characteristic Model	Task Difficulty, Job Significance, Skill Availability, Resource Availability, Task & Social Feedback, Goal Commitment, Work Group Cooperation
1995-1999	Expectancy Theory, Equity Theory, Cognitive Evaluation Theory, Goal-Setting Theory	Employee's feeling of Competence, Challenging Work, Recognition, mission clarity, cohesive team, & top management providing training to team members and feedback on performance

2000-2005	Social-Identity Approach, Social-Cognitive Theory, Job Characteristic Model	Self-efficacy, individual commitment, relatedness, top management communicating 'vision' and 'mission' to the employees, goal congruence between individual and organization, learning opportunities, employee empowerment, and access to documented information

APPENDICES

Appendix 1. Overall Discrepancy between 'Want[3]' and 'Get[4]' in Project Teams-Results of One Tail T-test

Autonomy At Work

	'Want'	*'Get'*
Moyenne	5,865885417	5,692708333
Variance	1,309948945	1,182867325
Observations	96	96
Coefficient de corrélation de Pearson	0,369407769	
Différence hypothétique des moyennes	0	
Degré de liberté	95	
Statistique t	1,352823853	
P(T<=t) unilatéral	0,08966143	
Valeur critique de t (unilatéral)	1,661051818	
P(T<=t) bilatéral	0,179322861	
Valeur critique de t (bilatéral)	1,985250956	

Future Career Opportunities

	'Want'	*'Get'*
Moyenne	5,5703125	4,951822917
Variance	1,828885691	2,094200589
Observations	96	96
Coefficient de corrélation de Pearson	0,474566818	
Différence hypothétique des moyennes	0	
Degré de liberté	95	
Statistique t	4,21644819	
P(T<=t) unilatéral	0,00002831	
Valeur critique de t (unilatéral)	1,661051818	
P(T<=t) bilatéral	5,66114E-05	
Valeur critique de t (bilatéral)	1,985250956	

[3] Refers to the expectation of the team member ('Want')
[4] Refers to the characteristic of the project environment in supporting the team member's expectation ('Get')

Feedback on Performance

	'Want'	*'Get'*
Moyenne	5,62890625	4,97265625
Variance	1,276464844	1,893158923
Observations	96	96
Coefficient de corrélation de Pearson	0,44486573	
Différence hypothétique des moyennes	0	
Degré de liberté	95	
Statistique t	4,810628538	
P(T<=t) unilatéral	0,00000282	
Valeur critique de t (unilatéral)	1,661051818	
P(T<=t) bilatéral	5,64671E-06	
Valeur critique de t (bilatéral)	1,985250956	

Training for Learning

	'Want'	*'Get'*
Moyenne	5,850260417	5,234375
Variance	1,354151247	1,875411184
Observations	96	96
Coefficient de corrélation de Pearson	0,393391299	
Différence hypothétique des moyennes	0	
Degré de liberté	95	
Statistique t	4,293098123	
P(T<=t) unilatéral	0,00002123	
Valeur critique de t (unilatéral)	1,661051818	
P(T<=t) bilatéral	4,24668E-05	
Valeur critique de t (bilatéral)	1,985250956	

Project Accommodating Personal Life

	'Want'	*'Get'*
Moyenne	4,8984375	4,729166667
Variance	1,620497533	2,044627193
Observations	96	96
Coefficient de corrélation de Pearson	0,283994251	
Différence hypothétique des moyennes	0	
Degré de liberté	95	
Statistique t	1,022438649	
P(T<=t) unilatéral	0,154584964	
Valeur critique de t (unilatéral)	1,661051818	
P(T<=t) bilatéral	0,309169927	
Valeur critique de t (bilatéral)	1,985250956	

Enjoying Nature of Work Itself

	'Want'	*'Get'*
Moyenne	6,436197917	5,877604167
Variance	0,537827234	1,058874726
Observations	96	96
Coefficient de corrélation de Pearson	0,370733958	
Différence hypothétique des moyennes	0	
Degré de liberté	95	
Statistique t	5,37414925	
P(T<=t) unilatéral	0,00000027	
Valeur critique de t (unilatéral)	1,661051818	
P(T<=t) bilatéral	5,47681E-07	
Valeur critique de t (bilatéral)	1,985250956	

Comprehension of End-User Requirements

	'Want'	*'Get'*
Moyenne	6,108072917	5,454427083
Variance	0,759085458	1,439184142
Observations	96	96
Coefficient de corrélation de Pearson	0,441276952	
Différence hypothétique des moyennes	0	
Degré de liberté	95	
Statistique t	5,670014558	
P(T<=t) unilatéral	0,00000008	
Valeur critique de t (unilatéral)	1,661051818	
P(T<=t) bilatéral	1,53157E-07	
Valeur critique de t (bilatéral)	1,985250956	

Performance based Financial Rewards

	'Want'	*'Get'*
Moyenne	5,03125	4,143229167
Variance	1,325	2,738479989
Observations	96	96
Coefficient de corrélation de Pearson	0,472432862	
Différence hypothétique des moyennes	0	
Degré de liberté	95	
Statistique t	5,783019587	
P(T<=t) unilatéral	0,00000005	
Valeur critique de t (unilatéral)	1,661051818	
P(T<=t) bilatéral	9,3389E-08	
Valeur critique de t (bilatéral)	1,985250956	

Mentoring by Top Management

	'Want'	*'Get'*
Moyenne	5,049479167	4,372395833
Variance	1,768249726	2,086835252
Observations	96	96
Coefficient de corrélation de Pearson	0,429457339	
Différence hypothétique des moyennes	0	
Degré de liberté	95	
Statistique t	4,467435863	
P(T<=t) unilatéral	0,00001092	
Valeur critique de t (unilatéral)	1,661051818	
P(T<=t) bilatéral	2,18372E-05	
Valeur critique de t (bilatéral)	1,985250956	

Being Involved in Critical Project Activities

	'Want'	*'Get'*
Moyenne	5,9921875	5,609375
Variance	0,894346217	1,508634868
Observations	96	96
Coefficient de corrélation de Pearson	0,608615747	
Différence hypothétique des moyennes	0	
Degré de liberté	95	
Statistique t	3,771423868	
P(T<=t) unilatéral	0,000141047	
Valeur critique de t (unilatéral)	1,661051818	
P(T<=t) bilatéral	0,000282094	
Valeur critique de t (bilatéral)	1,985250956	

Ease of Information Exchange/ Communication

	'Want'	*'Get'*
Moyenne	6,0546875	5,2734375
Variance	0,976254112	2,136944901
Observations	96	96
Coefficient de corrélation de Pearson	0,287997432	
Différence hypothétique des moyennes	0	
Degré de liberté	95	
Statistique t	5,068030338	
P(T<=t) unilatéral	0,00000099	
Valeur critique de t (unilatéral)	1,661051818	
P(T<=t) bilatéral	1,97711E-06	
Valeur critique de t (bilatéral)	1,985250956	

Easy Access to Project Information

	'Want'	*'Get'*
Moyenne	5,84765625	5,196614583
Variance	1,206974712	1,891034471
Observations	96	96
Coefficient de corrélation de Pearson	0,332701994	
Différence hypothétique des moyennes	0	
Degré de liberté	95	
Statistique t	4,409478248	
P(T<=t) unilatéral	0,00001364	
Valeur critique de t (unilatéral)	1,661051818	
P(T<=t) bilatéral	2,72875E-05	
Valeur critique de t (bilatéral)	1,985250956	

Strong Team Spirit

	'Want'	*'Get'*
Moyenne	5,786458333	5,092447917
Variance	1,171025219	2,242843681
Observations	96	96
Coefficient de corrélation de Pearson	0,340115184	
Différence hypothétique des moyennes	0	
Degré de liberté	95	
Statistique t	4,472573067	
P(T<=t) unilatéral	0,00001070	
Valeur critique de t (unilatéral)	1,661051818	
P(T<=t) bilatéral	2,14084E-05	
Valeur critique de t (bilatéral)	1,985250956	

Appendix 2. Discrepancy in Collocated Project Teams- 'Want[5]' and 'Get[6]'

Autonomy at Work

	Collocated 'Want'	*Collocated 'Get'*
Moyenne	5,95639535	5,558139535
Variance	1,43666944	1,182551218
Observations	43,00000000	43
Coefficient de corrélation de Pearson	0,42041502	
Différence hypothétique des moyennes	0,00000000	
Degré de liberté	42,00000000	
Statistique t	2,11597207	
P(T<=t) unilatéral	0,02015862	
Valeur critique de t (unilatéral)	1,68195236	
P(T<=t) bilatéral	0,04031724	
Valeur critique de t (bilatéral)	2,01808168	

Future Career Opportunities

	Collocated 'Want'	*Collocated 'Get'*
Moyenne	5,59883721	4,668604651
Variance	1,64996885	2,301996816
Observations	43,00000000	43
Coefficient de corrélation de Pearson	0,48984736	
Différence hypothétique des moyennes	0,00000000	
Degré de liberté	42,00000000	
Statistique t	4,26805796	
P(T<=t) unilatéral	0,00005497	
Valeur critique de t (unilatéral)	1,68195236	
P(T<=t) bilatéral	0,00010994	
Valeur critique de t (bilatéral)	2,01808168	

[5] Refers to the expectations of the team members working in Collocated Project Teams ('Want')
[6] Refers to the characteristic of the collocated project environment in supporting the team member's expectations ('Get')

Feedback on Performance

	Collocated 'Want'	*Collocated 'Get'*
Moyenne	5,54941860	4,662790698
Variance	1,08715739	2,52197536
Observations	43,00000000	43
Coefficient de corrélation de Pearson	0,30170673	
Différence hypothétique des moyennes	0,00000000	
Degré de liberté	42,00000000	
Statistique t	3,59879396	
P(T<=t) unilatéral	0,00041833	
Valeur critique de t (unilatéral)	1,68195236	
P(T<=t) bilatéral	0,00083665	
Valeur critique de t (bilatéral)	2,01808168	

Training for Learning

	Collocated 'Want'	*Collocated 'Get'*
Moyenne	5,90988372	5,011627907
Variance	0,80158153	2,01623062
Observations	43,00000000	43
Coefficient de corrélation de Pearson	0,37395394	
Différence hypothétique des moyennes	0,00000000	
Degré de liberté	42,00000000	
Statistique t	4,31083529	
P(T<=t) unilatéral	0,00004809	
Valeur critique de t (unilatéral)	1,68195236	
P(T<=t) bilatéral	0,00009618	
Valeur critique de t (bilatéral)	2,01808168	

Project Accommodating Personal Life

	Collocated 'Want'	*Collocated 'Get'*
Moyenne	4,82558140	4,543604651
Variance	1,50531215	2,051252769
Observations	43,00000000	43
Coefficient de corrélation de Pearson	0,31353242	
Différence hypothétique des moyennes	0,00000000	
Degré de liberté	42,00000000	
Statistique t	1,18018441	
P(T<=t) unilatéral	0,12228405	
Valeur critique de t (unilatéral)	1,68195236	
P(T<=t) bilatéral	0,24456810	
Valeur critique de t (bilatéral)	2,01808168	

Enjoying Nature of Work Itself

	Collocated 'Want'	*Collocated 'Get'*
Moyenne	6,34302326	5,828488372
Variance	0,68608112	0,969511351
Observations	43,00000000	43
Coefficient de corrélation de Pearson	0,60161786	
Différence hypothétique des moyennes	0,00000000	
Degré de liberté	42,00000000	
Statistique t	4,10898379	
P(T<=t) unilatéral	0,00009003	
Valeur critique de t (unilatéral)	1,68195236	
P(T<=t) bilatéral	0,00018007	
Valeur critique de t (bilatéral)	2,01808168	

Comprehension of End-User Requirements

	Collocated 'Want'	*Collocated 'Get'*
Moyenne	6,1453488	5,308139535
Variance	0,5944421	1,494307171
Observations	43,0000000	43
Coefficient de corrélation de Pearson	0,2643656	
Différence hypothétique des moyennes	0,0000000	
Degré de liberté	42,0000000	
Statistique t	4,3532269	
P(T<=t) unilatéral	0,0000421	
Valeur critique de t (unilatéral)	1,6819524	
P(T<=t) bilatéral	0,0000842	
Valeur critique de t (bilatéral)	2,0180817	

Performance Based Financial Rewards

	Collocated 'Want'	*Collocated 'Get'*
Moyenne	4,8750000	4,034883721
Variance	1,0476190	2,214527962
Observations	43,0000000	43
Coefficient de corrélation de Pearson	0,6377278	
Différence hypothétique des moyennes	0,0000000	
Degré de liberté	42,0000000	
Statistique t	4,7959983	
P(T<=t) unilatéral	0,0000103	
Valeur critique de t (unilatéral)	1,6819524	
P(T<=t) bilatéral	0,0000206	
Valeur critique de t (bilatéral)	2,0180817	

Mentoring by Top Management

	Collocated 'Want'	*Collocated 'Get'*
Moyenne	4,97965116	4,084302326
Variance	2,17554333	2,509464978
Observations	43,00000000	43
Coefficient de corrélation de Pearson	0,36202074	
Différence hypothétique des moyennes	0,00000000	
Degré de liberté	42,00000000	
Statistique t	3,39355495	
P(T<=t) unilatéral	0,00075792	
Valeur critique de t (unilatéral)	1,68195236	
P(T<=t) bilatéral	0,00151585	
Valeur critique de t (bilatéral)	2,01808168	

Being Involved in Critical Project Activities

	Collocated 'Want'	*Collocated 'Get'*
Moyenne	5,94186047	5,453488372
Variance	0,93255122	1,17933278
Observations	43,00000000	43
Coefficient de corrélation de Pearson	0,51174019	
Différence hypothétique des moyennes	0,00000000	
Degré de liberté	42,00000000	
Statistique t	3,14246850	
P(T<=t) unilatéral	0,00153447	
Valeur critique de t (unilatéral)	1,68195236	
P(T<=t) bilatéral	0,00306894	
Valeur critique de t (bilatéral)	2,01808168	

Ease of Information Exchange/ Communication

	Collocated 'Want'	*Collocated 'Get'*
Moyenne	6,16279070	5,235465116
Variance	0,95426703	1,94732835
Observations	43,00000000	43
Coefficient de corrélation de Pearson	0,10493628	
Différence hypothétique des moyennes	0,00000000	
Degré de liberté	42,00000000	
Statistique t	3,76001062	
P(T<=t) unilatéral	0,00025965	
Valeur critique de t (unilatéral)	1,68195236	
P(T<=t) bilatéral	0,00051929	
Valeur critique de t (bilatéral)	2,01808168	

Easy Access to Project Information

	Collocated 'Want'	*Collocated 'Get'*
Moyenne	5,85174419	5,049418605
Variance	0,99795819	1,751591916
Observations	43,00000000	43
Coefficient de corrélation de Pearson	0,30450238	
Différence hypothétique des moyennes	0,00000000	
Degré de liberté	42,00000000	
Statistique t	3,77307529	
P(T<=t) unilatéral	0,00024971	
Valeur critique de t (unilatéral)	1,68195236	
P(T<=t) bilatéral	0,00049942	
Valeur critique de t (bilatéral)	2,01808168	

Strong Team Spirit

	Collocated 'Want'	*Collocated 'Get'*
Moyenne	5,869186047	5,093023256
Variance	0,677792774	2,031319214
Observations	43	43
Coefficient de corrélation de Pearson	0,04739588	
Différence hypothétique des moyennes	0	
Degré de liberté	42	
Statistique t	3,157744896	
P(T<=t) unilatéral	0,001471086	
Valeur critique de t (unilatéral)	1,681952358	
P(T<=t) bilatéral	0,002942173	
Valeur critique de t (bilatéral)	2,018081679	

Appendix 3. Discrepancy in Virtual Project Teams- 'Want[7]' and 'Get[8]'

Autonomy at Work

	Virtual 'Want'	*Virtual 'Get'*
Moyenne	5,85714286	5,785714286
Variance	1,18031359	1,24869338
Observations	42,00000000	42
Coefficient de corrélation de Pearson	0,26642261	
Différence hypothétique des moyennes	0,00000000	
Degré de liberté	41,00000000	
Statistique t	0,34675921	
P(T<=t) unilatéral	0,36527286	
Valeur critique de t (unilatéral)	1,68287800	
P(T<=t) bilatéral	0,73054572	
Valeur critique de t (bilatéral)	2,01954095	

Future Career Opportunities

	Virtual 'Want'	*Virtual 'Get'*
Moyenne	5,36904762	5,110119048
Variance	1,86048200	1,737959132
Observations	42,00000000	42
Coefficient de corrélation de Pearson	0,47574468	
Différence hypothétique des moyennes	0,00000000	
Degré de liberté	41,00000000	
Statistique t	1,22141083	
P(T<=t) unilatéral	0,11445372	
Valeur critique de t (unilatéral)	1,68287800	
P(T<=t) bilatéral	0,22890744	
Valeur critique de t (bilatéral)	2,01954095	

[7] Refers to the expectations of the team members working in the virtual environment ('Want')
[8] Refers to the characteristic of the virtual project environment in supporting the team members' expectations ('Get')

Feedback on Performance

	'Virtual 'Want'	*Virtual 'Get'*
Moyenne	5,72023810	5,1875
Variance	1,33064750	1,405678354
Observations	42,00000000	42
Coefficient de corrélation de Pearson	0,65288091	
Différence hypothétique des moyennes	0,00000000	
Degré de liberté	41,00000000	
Statistique t	3,54129189	
P(T<=t) unilatéral	0,00050421	
Valeur critique de t (unilatéral)	1,68287800	
P(T<=t) bilatéral	0,00100841	
Valeur critique de t (bilatéral)	2,01954095	

Training for Learning

	Virtual 'Want'	*Virtual 'Get'*
Moyenne	5,821428571	5,345238095
Variance	1,620535714	1,792537747
Observations	42	42
Coefficient de corrélation de Pearson	0,513099192	
Différence hypothétique des moyennes	0	
Degré de liberté	41	
Statistique t	2,392333477	
P(T<=t) unilatéral	0,010704112	
Valeur critique de t (unilatéral)	1,682878003	
P(T<=t) bilatéral	0,021408223	
Valeur critique de t (bilatéral)	2,019540948	

Project Accommodating Personal Life

	Virtual 'Want'	*Virtual 'Get'*
Moyenne	4,827380952	4,931547619
Variance	1,833042973	1,749392059
Observations	42	42
Coefficient de corrélation de Pearson	0,261389919	
Différence hypothétique des moyennes	0	
Degré de liberté	41	
Statistique t	-0,414988138	
P(T<=t) unilatéral	0,340157099	
Valeur critique de t (unilatéral)	1,682878003	
P(T<=t) bilatéral	0,680314199	
Valeur critique de t (bilatéral)	2,019540948	

Enjoying Nature of Work Itself

	Virtual 'Want'	*Virtual 'Get'*
Moyenne	6,479166667	5,919642857
Variance	0,459540142	1,177455357
Observations	42	42
Coefficient de corrélation de Pearson	0,190396763	
Différence hypothétique des moyennes	0	
Degré de liberté	41	
Statistique t	3,112942433	
P(T<=t) unilatéral	0,001685253	
Valeur critique de t (unilatéral)	1,682878003	
P(T<=t) bilatéral	0,003370505	
Valeur critique de t (bilatéral)	2,019540948	

Comprehension of End-User Requirements

	Virtual 'Want'	*Virtual 'Get'*
Moyenne	6,098214286	5,544642857
Variance	0,876932709	1,47547365
Observations	42	42
Coefficient de corrélation de Pearson	0,662431606	
Différence hypothétique des moyennes	0	
Degré de liberté	41	
Statistique t	3,901858234	
P(T<=t) unilatéral	0,000173845	
Valeur critique de t (unilatéral)	1,682878003	
P(T<=t) bilatéral	0,00034769	
Valeur critique de t (bilatéral)	2,019540948	

Performance Based Financial Rewards

	Virtual 'Want'	*Virtual 'Get'*
Moyenne	5,0803571	4,220238095
Variance	1,7323334	2,890860918
Observations	42,0000000	42
Coefficient de corrélation de Pearson	0,3059263	
Différence hypothétique des moyennes	0,0000000	
Degré de liberté	41,0000000	
Statistique t	3,0901300	
P(T<=t) unilatéral	0,0017935	
Valeur critique de t (unilatéral)	1,6828780	
P(T<=t) bilatéral	0,0035869	
Valeur critique de t (bilatéral)	2,0195409	

Mentoring by Top Management

	Virtual 'Want'	*Virtual 'Get'*
Moyenne	4,99107143	4,538690476
Variance	1,72743358	1,51028056
Observations	42,00000000	42
Coefficient de corrélation de Pearson	0,53816861	
Différence hypothétique des moyennes	0,00000000	
Degré de liberté	41,00000000	
Statistique t	2,39441239	
P(T<=t) unilatéral	0,01065122	
Valeur critique de t (unilatéral)	1,68287800	
P(T<=t) bilatéral	0,02130244	
Valeur critique de t (bilatéral)	2,01954095	

Being Involved in Critical Project Activities

	Virtual 'Want'	*Virtual 'Get'*
Moyenne	5,970238095	5,678571429
Variance	1,027293844	1,914743031
Observations	42	42
Coefficient de corrélation de Pearson	0,67640736	
Différence hypothétique des moyennes	0	
Degré de liberté	41	
Statistique t	1,849321571	
P(T<=t) unilatéral	0,035814841	
Valeur critique de t (unilatéral)	1,682878003	
P(T<=t) bilatéral	0,071629683	
Valeur critique de t (bilatéral)	2,019540948	

Ease of Information Exchange/ Communication

	Virtual 'Want'	*Virtual 'Get'*
Moyenne	5,910714286	5,288690476
Variance	1,133601916	2,500372024
Observations	42	42
Coefficient de corrélation de Pearson	0,41113811	
Différence hypothétique des moyennes	0	
Degré de liberté	41	
Statistique t	2,687683057	
P(T<=t) unilatéral	0,005174457	
Valeur critique de t (unilatéral)	1,682878003	
P(T<=t) bilatéral	0,010348915	
Valeur critique de t (bilatéral)	2,019540948	

Easy Access to Project Information

	Virtual 'Want'	*Virtual 'Get'*
Moyenne	5,946428571	5,196428571
Variance	1,095383275	2,019925958
Observations	42	42
Coefficient de corrélation de Pearson	0,470975595	
Différence hypothétique des moyennes	0	
Degré de liberté	41	
Statistique t	3,712428503	
P(T<=t) unilatéral	0,000305697	
Valeur critique de t (unilatéral)	1,682878003	
P(T<=t) bilatéral	0,000611395	
Valeur critique de t (bilatéral)	2,019540948	

Strong Team Spirit

	Virtual 'Want'	*Virtual 'Get'*
Moyenne	5,71726190	5,104166667
Variance	1,73327708	2,146277947
Observations	42,00000000	42
Coefficient de corrélation de Pearson	0,54557167	
Différence hypothétique des moyennes	0,00000000	
Degré de liberté	41,00000000	
Statistique t	2,98230819	
P(T<=t) unilatéral	0,00239952	
Valeur critique de t (unilatéral)	1,68287800	
P(T<=t) bilatéral	0,00479904	
Valeur critique de t (bilatéral)	2,01954095	

Appendix 4. Affinity Between the Expectations of Collocated[9] and Virtual[10] Project Team Members

Autonomy at Work

	Collocated 'Want'	*Virtual 'Want'*
Moyenne	5,956395349	5,857142857
Variance	1,436669435	1,180313589
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	83	
Statistique t	0,400180359	
P(T<=t) unilatéral	0,345025895	
Valeur critique de t (unilatéral)	1,663420175	
P(T<=t) bilatéral	0,69005179	
Valeur critique de t (bilatéral)	1,988959743	

Future Career Opportunities

	Collocated 'Want'	*Virtual 'Want'*
Moyenne	5,598837209	5,369047619
Variance	1,649968854	1,860481998
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	82	
Statistique t	0,799208633	
P(T<=t) unilatéral	0,213239201	
Valeur critique de t (unilatéral)	1,663649185	
P(T<=t) bilatéral	0,426478402	
Valeur critique de t (bilatéral)	1,989318521	

[9] Refers to as Collocated 'Want'
[10] Refers to as Virtual 'Want'

Feedback on Performance

	Collocated 'Want'	*Virtual 'Want'*
Moyenne	5,598214286	5,720238095
Variance	1,008792465	1,330647503
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	80	
Statistique t	-0,517027058	
P(T<=t) unilatéral	0,303281897	
Valeur critique de t (unilatéral)	1,664124579	
P(T<=t) bilatéral	0,606563795	
Valeur critique de t (bilatéral)	1,990063387	

Training for Learning

	Collocated 'Want'	*Virtual 'Want'*
Moyenne	5,909883721	5,821428571
Variance	0,801581534	1,620535714
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	73	
Statistique t	0,369766777	
P(T<=t) unilatéral	0,356313414	
Valeur critique de t (unilatéral)	1,665996224	
P(T<=t) bilatéral	0,712626827	
Valeur critique de t (bilatéral)	1,992997097	

Project Accommodating Personal Life

	Collocated 'Want	*Virtual 'Want'*
Moyenne	4,825581395	4,827380952
Variance	1,505312154	1,833042973
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	82	
Statistique t	-0,00641672	
P(T<=t) unilatéral	0,497447909	
Valeur critique de t (unilatéral)	1,663649185	
P(T<=t) bilatéral	0,994895818	
Valeur critique de t (bilatéral)	1,989318521	

Enjoying Nature of Work Itself

	Collocated 'Want'	*Virtual 'Want'*
Moyenne	6,343023256	6,479166667
Variance	0,686081118	0,459540142
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	81	
Statistique t	-0,830130298	
P(T<=t) unilatéral	0,204452567	
Valeur critique de t (unilatéral)	1,663883913	
P(T<=t) bilatéral	0,408905133	
Valeur critique de t (bilatéral)	1,989686288	

Comprehension of End-User Requirements

	Collocated 'Want'	*Virtual 'Want'*
Moyenne	6,145348837	6,098214286
Variance	0,594442137	0,876932709
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	79	
Statistique t	0,253018457	
P(T<=t) unilatéral	0,400455593	
Valeur critique de t (unilatéral)	1,66437141	
P(T<=t) bilatéral	0,800911187	
Valeur critique de t (bilatéral)	1,990450177	

Performance based Financial Rewards

	Collocated 'Want'	*Virtual 'Want'*
Moyenne	4,875	5,080357143
Variance	1,047619048	1,732333406
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	77	
Statistique t	-0,801728311	
P(T<=t) unilatéral	0,212588716	
Valeur critique de t (unilatéral)	1,664884538	
P(T<=t) bilatéral	0,425177432	
Valeur critique de t (bilatéral)	1,991254363	

Mentoring by Top Management

	Collocated 'Want'	*Virtual 'Want'*
Moyenne	4,979651163	4,991071429
Variance	2,175543328	1,72743358
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	82	
Statistique t	-0,037708229	
P(T<=t) unilatéral	0,485005983	
Valeur critique de t (unilatéral)	1,663649185	
P(T<=t) bilatéral	0,970011966	
Valeur critique de t (bilatéral)	1,989318521	

Being Involved in Critical Project Activities

	Collocated 'Want'	*Virtual 'Want'*
Moyenne	5,941860465	5,970238095
Variance	0,932551218	1,027293844
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	83	
Statistique t	-0,132101029	
P(T<=t) unilatéral	0,447612048	
Valeur critique de t (unilatéral)	1,663420175	
P(T<=t) bilatéral	0,895224095	
Valeur critique de t (bilatéral)	1,988959743	

Ease of Information Exchange/ Communication

	Collocated 'Want'	*Virtual 'Want'*
Moyenne	6,162790698	5,910714286
Variance	0,954267027	1,133601916
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	82	
Statistique t	1,136647182	
P(T<=t) unilatéral	0,129498317	
Valeur critique de t (unilatéral)	1,663649185	
P(T<=t) bilatéral	0,258996633	
Valeur critique de t (bilatéral)	1,989318521	

Easy Access to Project Information

	Collocated 'Want'	*Virtual 'Want'*
Moyenne	5,851744186	5,946428571
Variance	0,997958195	1,095383275
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	83	
Statistique t	-0,426485108	
P(T<=t) unilatéral	0,335429259	
Valeur critique de t (unilatéral)	1,663420175	
P(T<=t) bilatéral	0,670858517	
Valeur critique de t (bilatéral)	1,988959743	

Strong Team Spirit

	Collocated 'Want'	*Virtual 'Want'*
Moyenne	5,869186047	5,717261905
Variance	0,677792774	1,733277076
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	69	
Statistique t	0,636166542	
P(T<=t) unilatéral	0,263386266	
Valeur critique de t (unilatéral)	1,667238549	
P(T<=t) bilatéral	0,526772531	
Valeur critique de t (bilatéral)	1,99494539	

Appendix 5. Affinity Between the Characterisitcs of the Collocated[11] and Virtual[12] Project Environments

Autonomy at Work

	Collocated 'Get'	*Virtual 'Get'*
Moyenne	5,558139535	5,785714286
Variance	1,182551218	1,24869338
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	83	
Statistique t	-0,9512719	
P(T<=t) unilatéral	0,172114155	
Valeur critique de t (unilatéral)	1,663420175	
P(T<=t) bilatéral	0,34422831	
Valeur critique de t (bilatéral)	1,988959743	

Future Career Opportunities

	Collocated 'Get'	*Virtual 'Get'*
Moyenne	4,668604651	5,110119048
Variance	2,301996816	1,737959132
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	82	
Statistique t	-1,433104718	
P(T<=t) unilatéral	0,077814838	
Valeur critique de t (unilatéral)	1,663649185	
P(T<=t) bilatéral	0,155629676	
Valeur critique de t (bilatéral)	1,989318521	

[11] Refers to the Characteristic of the Collocated Project environment in supporting the team member's expectation (Collocated 'Get')
[12] Refers to the Characteristic of the Virtual Project environment in supporting the team member's expectations (Virtual 'Get')

Feedback on Performance

	Collocated 'Get'	*Virtual 'Get'*
Moyenne	4,662790698	5,1875
Variance	2,52197536	1,405678354
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	78	
Statistique t	-1,728796476	
P(T<=t) unilatéral	0,043900976	
Valeur critique de t (unilatéral)	1,664624645	
P(T<=t) bilatéral	0,087801951	
Valeur critique de t (bilatéral)	1,990847036	

Training for Learning

	Collocated 'Get'	*Virtual 'Get'*
Moyenne	5,011627907	5,345238095
Variance	2,01623062	1,792537747
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	83	
Statistique t	-1,114709039	
P(T<=t) unilatéral	0,134096237	
Valeur critique de t (unilatéral)	1,663420175	
P(T<=t) bilatéral	0,268192473	
Valeur critique de t (bilatéral)	1,988959743	

Project Accommodating Personal Life

	Collocated 'Get'	*Virtual 'Get'*
Moyenne	4,543604651	4,931547619
Variance	2,051252769	1,749392059
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	83	
Statistique t	-1,297796638	
P(T<=t) unilatéral	0,098976195	
Valeur critique de t (unilatéral)	1,663420175	
P(T<=t) bilatéral	0,197952389	
Valeur critique de t (bilatéral)	1,988959743	

Enjoying nature of work itself

	Collocated 'Get'	*Virtual 'Get'*
Moyenne	5,828488372	5,919642857
Variance	0,969511351	1,177455357
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	82	
Statistique t	-0,405305506	
P(T<=t) unilatéral	0,343154238	
Valeur critique de t (unilatéral)	1,663649185	
P(T<=t) bilatéral	0,686308476	
Valeur critique de t (bilatéral)	1,989318521	

Comprehension of End-User Requirements

	Collocated 'Get'	*Virtual 'Get'*
Moyenne	5,308139535	5,544642857
Variance	1,494307171	1,47547365
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	83	
Statistique t	-0,89465513	
P(T<=t) unilatéral	0,186779282	
Valeur critique de t (unilatéral)	1,663420175	
P(T<=t) bilatéral	0,373558564	
Valeur critique de t (bilatéral)	1,988959743	

Performance based Financial Rewards

	Collocated 'Get'	*Virtual 'Get'*
Moyenne	4,034883721	4,220238095
Variance	2,214527962	2,890860918
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	81	
Statistique t	-0,534336287	
P(T<=t) unilatéral	0,297286246	
Valeur critique de t (unilatéral)	1,663883913	
P(T<=t) bilatéral	0,594572492	
Valeur critique de t (bilatéral)	1,989686288	

Mentoring by Top Management

	Collocated 'Get'	*Virtual 'Get'*
Moyenne	4,084302326	4,538690476
Variance	2,509464978	1,51028056
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	79	
Statistique t	-1,479544622	
P(T<=t) unilatéral	0,071485804	
Valeur critique de t (unilatéral)	1,66437141	
P(T<=t) bilatéral	0,142971609	
Valeur critique de t (bilatéral)	1,990450177	

Being Involved in critical project activities

	Collocated 'Get'	*Virtual 'Get'*
Moyenne	5,453488372	5,678571429
Variance	1,17933278	1,914743031
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	78	
Statistique t	-0,832981547	
P(T<=t) unilatéral	0,203699258	
Valeur critique de t (unilatéral)	1,664624645	
P(T<=t) bilatéral	0,407398516	
Valeur critique de t (bilatéral)	1,990847036	

Ease of Information Exchange/ Communication

	Collocated 'Get'	*Virtual 'Get'*
Moyenne	5,235465116	5,288690476
Variance	1,94732835	2,500372024
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	81	
Statistique t	-0,164398491	
P(T<=t) unilatéral	0,434913503	
Valeur critique de t (unilatéral)	1,663883913	
P(T<=t) bilatéral	0,869827006	
Valeur critique de t (bilatéral)	1,989686288	

Easy Access to Project Information

	Collocated 'Get'	*Virtual 'Get'*
Moyenne	5,049418605	5,196428571
Variance	1,751591916	2,019925958
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	82	
Statistique t	-0,493254913	
P(T<=t) unilatéral	0,311575458	
Valeur critique de t (unilatéral)	1,663649185	
P(T<=t) bilatéral	0,623150916	
Valeur critique de t (bilatéral)	1,989318521	

Strong Team Spirit

	Collocated 'Get'	*Virtual 'Get'*
Moyenne	5,093023256	5,104166667
Variance	2,031319214	2,146277947
Observations	43	42
Différence hypothétique des moyennes	0	
Degré de liberté	83	
Statistique t	-0,0355344	
P(T<=t) unilatéral	0,485869469	
Valeur critique de t (unilatéral)	1,663420175	
P(T<=t) bilatéral	0,971738938	
Valeur critique de t (bilatéral)	1,988959743	

Appendix 6. Relative Discrepancy between 'Want' and 'Get'- Collocated and Virtual Project Set-Ups

Autonomy at Work

	Collocated 'Want'-Collocated 'Get'	*Virtual 'Want'- Virtual 'Get'*
Moyenne	0,398255814	0,071428571
Variance	1,523255814	1,78212108
Observations	43	42
Variance pondérée	1,651129018	
Différence hypothétique des moyennes	0	
Degré de liberté	83	
Statistique t	1,172403631	
P(T<=t) unilatéral	0,122194556	
Valeur critique de t (unilatéral)	1,663420175	
P(T<=t) bilatéral	0,244389112	
Valeur critique de t (bilatéral)	1,988959743	

Future Career Opportunities

	Collocated 'Want'-Collocated 'Get'	*Virtual 'Want-Virtual 'Get'*
Moyenne	0,930232558	0,258928571
Variance	2,042635659	1,887494556
Observations	43	42
Variance pondérée	1,965999692	
Différence hypothétique des moyennes	0	
Degré de liberté	83	
Statistique t	2,206870827	
P(T<=t) unilatéral	0,015042263	
Valeur critique de t (unilatéral)	1,663420175	
P(T<=t) bilatéral	0,030084527	
Valeur critique de t (bilatéral)	1,988959743	

Feedback on Performance

	Collocated 'Want'-Collocated 'Get'	*Virtual 'Want'-Virtual 'Get'*
Moyenne	0,805232558	0,532738095
Variance	2,896802326	0,950502686
Observations	43	42
Variance pondérée	1,935377202	
Différence hypothétique des moyennes	0	
Degré de liberté	83	
Statistique t	0,902868043	
P(T<=t) unilatéral	0,184604387	
Valeur critique de t (unilatéral)	1,663420175	
P(T<=t) bilatéral	0,369208773	
Valeur critique de t (bilatéral)	1,988959743	

Training for Learning

	Collocated 'Want'-Collocated 'Get'	*Virtual 'Want'-Virtual 'Get'*
Moyenne	0,898255814	0,476190476
Variance	1,867005814	1,664053426
Observations	43	42
Variance pondérée	1,766752225	
Différence hypothétique des moyennes	0	
Degré de liberté	83	
Statistique t	1,463663604	
P(T<=t) unilatéral	0,073531461	
Valeur critique de t (unilatéral)	1,663420175	
P(T<=t) bilatéral	0,147062923	
Valeur critique de t (bilatéral)	1,988959743	

Project Accommodating Personal Life

	Collocated 'Want'-Collocated 'Get'	*Virtual 'Want'-Virtual 'Get'*
Moyenne	0,281976744	-0,104166667
Variance	2,454682309	2,646277947
Observations	43	42
Variance pondérée	2,549325937	
Différence hypothétique des moyennes	0	
Degré de liberté	83	
Statistique t	1,114770214	
P(T<=t) unilatéral	0,134083202	
Valeur critique de t (unilatéral)	1,663420175	
P(T<=t) bilatéral	0,268166403	
Valeur critique de t (bilatéral)	1,988959743	

Enjoying Work Itself

	Collocated 'Want'-Collocated 'Get'	*Virtual 'Want'-Virtual 'Get'*
Moyenne	0,514534884	0,55952381
Variance	0,674262874	1,356888792
Observations	43	42
Variance pondérée	1,011463629	
Différence hypothétique des moyennes	0	
Degré de liberté	83	
Statistique t	-0,20619584	
P(T<=t) unilatéral	0,418571444	
Valeur critique de t (unilatéral)	1,663420175	
P(T<=t) bilatéral	0,837142887	
Valeur critique de t (bilatéral)	1,988959743	

Comprehension of End-User Requirements

	Collocated 'Want'-Collocated 'Get'	*Virtual 'Want'-Virtual 'Get'*
Moyenne	0,837209302	0,553571429
Variance	1,590427741	0,845383275
Observations	43	42
Variance pondérée	1,222393728	
Différence hypothétique des moyennes	0	
Degré de liberté	83	
Statistique t	1,182518857	
P(T<=t) unilatéral	0,120188183	
Valeur critique de t (unilatéral)	1,663420175	
P(T<=t) bilatéral	0,240376366	
Valeur critique de t (bilatéral)	1,988959743	

Performance Based Financial Rewards

	Collocated 'Want'-Collocated 'Get'	*Virtual 'Want'-Virtual 'Get'*
Moyenne	0,840116279	0,860119048
Variance	1,319438677	3,253965229
Observations	43	42
Variance pondérée	2,275048179	
Différence hypothétique des moyennes	0	
Degré de liberté	83	
Statistique t	-0,061128568	
P(T<=t) unilatéral	0,475701887	
Valeur critique de t (unilatéral)	1,663420175	
P(T<=t) bilatéral	0,951403774	
Valeur critique de t (bilatéral)	1,988959743	

Mentoring by Top Management

	Collocated 'Want'-Collocated 'Get'	*Virtual 'Want'-Virtual 'Get'*
Moyenne	0,895348837	0,452380952
Variance	2,993251661	1,49920151
Observations	43	42
Variance pondérée	2,255226888	
Différence hypothétique des moyennes	0	
Degré de liberté	83	
Statistique t	1,359648133	
P(T<=t) unilatéral	0,088811783	
Valeur critique de t (unilatéral)	1,663420175	
P(T<=t) bilatéral	0,177623565	
Valeur critique de t (bilatéral)	1,988959743	

Being Involved in Critical Project Activities

	Collocated 'Want'- Collocated 'Get'	*Virtual 'Want'- Virtual 'Get'*
Moyenne	0,488372093	0,291666667
Variance	1,038552049	1,044715447
Observations	43	42
Variance pondérée	1,041596619	
Différence hypothétique des moyennes	0	
Degré de liberté	83	
Statistique t	0,888415179	
P(T<=t) unilatéral	0,188442459	
Valeur critique de t (unilatéral)	1,663420175	
P(T<=t) bilatéral	0,376884918	
Valeur critique de t (bilatéral)	1,988959743	

Ease of Information Exchange/ Communication

	Collocated 'Want'-Collocated 'Get'	*Virtual 'Want'-Virtual 'Get'*
Moyenne	0,927325581	0,62202381
Variance	2,615500415	2,249609829
Observations	43	42
Variance pondérée	2,434759282	
Différence hypothétique des moyennes	0	
Degré de liberté	83	
Statistique t	0,901884078	
P(T<=t) unilatéral	0,184864106	
Valeur critique de t (unilatéral)	1,663420175	
P(T<=t) bilatéral	0,369728212	
Valeur critique de t (bilatéral)	1,988959743	

Easy Access to Project Information

	Collocated 'Want'-Collocated 'Get'	*Virtual 'Want'-Virtual 'Get'*
Moyenne	0,802325581	0,75
Variance	1,944369463	1,714176829
Observations	43	42
Variance pondérée	1,830659849	
Différence hypothétique des moyennes	0	
Degré de liberté	83	
Statistique t	0,178262357	
P(T<=t) unilatéral	0,429475659	
Valeur critique de t (unilatéral)	1,663420175	
P(T<=t) bilatéral	0,858951318	
Valeur critique de t (bilatéral)	1,988959743	

Strong Team Spirit

	Collocated 'Want'-Collocated 'Get'	*Virtual 'Want'-Virtual 'Get'*
Moyenne	0,776162791	0,613095238
Variance	2,59788552	1,775007259
Observations	43	42
Variance pondérée	2,191403488	
Différence hypothétique des moyennes	0	
Degré de liberté	83	
Statistique t	0,507756848	
P(T<=t) unilatéral	0,306485282	
Valeur critique de t (unilatéral)	1,663420175	
P(T<=t) bilatéral	0,612970564	
Valeur critique de t (bilatéral)	1,988959743	

Appendix 7. Project Team Member Expectations- Results of the Principle Component Analysis

Analyse factorielle

Indice KMO et test de Bartlett

Mesure de précision de l'échantillonnage de Kaiser-Meyer-Olkin.		,783
Test de sphéricité de Bartlett	Khi-deux approximé	432,184
	ddl	78
	Signification de Bartlett	,000

Qualité de représentation

	Initial	Extraction
AUTO	1,000	,542
FUTURE	1,000	,688
FEEDBACK	1,000	,605
TRAINING	1,000	,672
PROACCOM	1,000	,400
ENJOYWOR	1,000	,558
USERREQ	1,000	,486
FINREW	1,000	,671
MENTOR	1,000	,578
CRITICAL	1,000	,633
INFOEXCH	1,000	,606
PROACCES	1,000	,749
TEAMSPT	1,000	,593

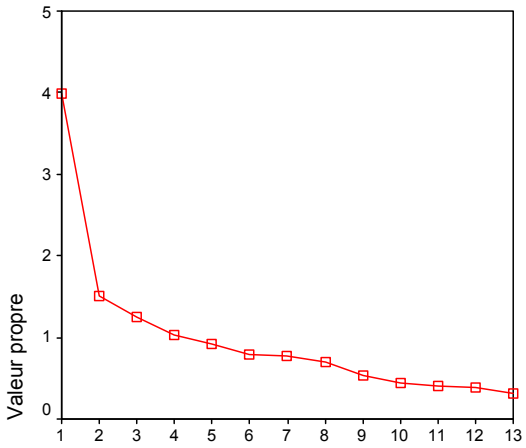
Méthode d'extraction : Analyse en composantes principales.

Variance totale expliquée

Composante	Valeurs propres initiales			Extraction Sommes des carrés des facteurs retenus			Somme des carrés des facteurs retenus pour la rotation		
	Total	% de la variance ==	% cumulés	Total	% de la variance ==	% cumulés	Total	% de la variance ==	% cumulés
1	3,990	30,689	30,689	3,990	30,689	30,689	2,448	18,830	18,830
2	1,507	11,595	42,284	1,507	11,595	42,284	1,888	14,522	33,352
3	1,258	9,677	51,961	1,258	9,677	51,961	1,731	13,314	46,666
4	1,026	7,895	59,856	1,026	7,895	59,856	1,715	13,190	59,856
5	,918	7,063	66,919						
6	,782	6,019	72,938						
7	,769	5,912	78,850						
8	,691	5,313	84,163						
9	,529	4,066	88,229						
10	,449	3,451	91,681						
11	,400	3,079	94,760						
12	,377	2,903	97,662						
13	,304	2,338	100,000						

Méthode d'extraction : Analyse en composantes principales.

Graphique des valeurs propres



Matrice des composantes[a]

	Composante			
	1	2	3	4
TRAINING	,719	-,246	-,304	-3,23E-02
FEEDBACK	,649	1,195E-02	-,190	-,384
USERREQ	,643	-8,11E-02	,131	-,221
PROACCES	,635	-,492	-,263	,187
INFOEXCH	,633	-,405	-,140	,148
CRITICAL	,586	,144	,262	-,447
FUTURE	,570	,143	-,263	,523
TEAMSPT	,567	,101	,510	3,606E-02
AUTO	,511	-,231	,475	4,472E-02
FINREW	,413	,666	-5,50E-02	,231
PROACCOM	,300	,495	-,225	,124
MENTOR	,459	,472	-,242	-,294
ENJOYWOR	,335	,134	,536	,375

Méthode d'extraction : Analyse en composantes principales.

a. 4 composantes extraites.

Matrice des composantes après rotation[a]

	Composante			
	1	2	3	4
PROACCES	,854	,100	-1,86E-02	9,319E-02
INFOEXCH	,741	,150	-3,55E-03	,186
TRAINING	,721	,362	,144	2,805E-02
CRITICAL	5,601E-02	,719	7,887E-02	,328
FEEDBACK	,377	,660	,165	-1,22E-02
MENTOR	3,748E-02	,548	,516	-9,85E-02
USERREQ	,342	,522	4,127E-02	,308
FINREW	-3,02E-02	,126	,780	,213
PROACCOM	3,533E-02	,121	,620	-1,64E-02
FUTURE	,543	-,119	,587	,186
ENJOYWOR	2,477E-02	-8,72E-02	,184	,718
TEAMSPT	,105	,312	,128	,684
AUTO	,278	,224	-,144	,628

Méthode d'extraction : Analyse en composantes principales.
Méthode de rotation : Varimax avec normalisation de Kaiser.

a. La rotation a convergé en 5 itérations.

Matrice de tranformation des composantes

Composante	1	2	3	4
1	,642	,536	,353	,419
2	-,578	,148	,802	,019
3	-,413	,045	-,326	,849
4	,289	-,830	,354	,320

Méthode d'extraction : Analyse en composantes principales.
Méthode de rotation : Varimax avec normalisation de Kaiser.

Appendix 8. Project Team Environment Characteristics- Results of the Principle Component Analysis

Analyse factorielle

Indice KMO et test de Bartlett

Mesure de précision de l'échantillonnage de Kaiser-Meyer-Olkin.		,895
Test de sphéricité de Bartlett	Khi-deux approximé	932,548
	ddl	78
	Signification de Bartlett	,000

Qualité de représentation

	Initial	Extraction
AUTO	1,000	,437
FUTURE	1,000	,561
FEEDBACK	1,000	,729
TRAINING	1,000	,647
PROACCOM	1,000	,360
ENJOYWOR	1,000	,512
USERREQ	1,000	,515
FINREW	1,000	,558
MENTOR	1,000	,718
CRITICAL	1,000	,626
INFOEXCH	1,000	,718
PROACCES	1,000	,705
TEAMSPT	1,000	,568

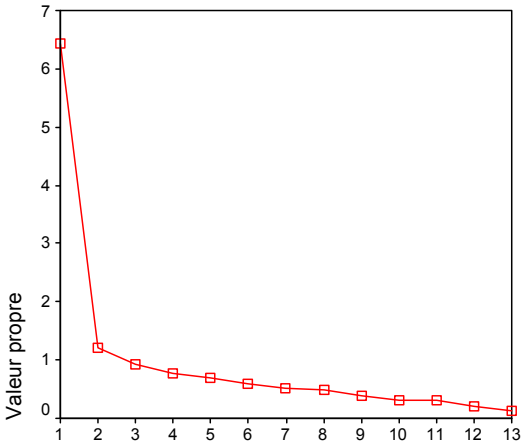
Méthode d'extraction : Analyse en composantes principales.

Variance totale expliquée

Composante	Valeurs propres initiales			Extraction Sommes des carrés des facteurs retenus			Somme des carrés des facteurs retenus pour la rotation		
	Total	% de la variance ==	% cumulés	Total	% de la variance ==	% cumulés	Total	% de la variance ==	% cumulés
1	6,442	49,555	49,555	6,442	49,555	49,555	4,538	34,906	34,906
2	1,211	9,316	58,870	1,211	9,316	58,870	3,115	23,964	58,870
3	,939	7,223	66,093						
4	,761	5,854	71,947						
5	,707	5,435	77,382						
6	,596	4,588	81,970						
7	,519	3,995	85,965						
8	,486	3,738	89,703						
9	,376	2,893	92,596						
10	,316	2,432	95,028						
11	,304	2,340	97,368						
12	,204	1,568	98,936						
13	,138	1,064	100,000						

Méthode d'extraction : Analyse en composantes principales.

Graphique des valeurs propres



Matrice des composantes[a]

	Composante	
	1	2
INFOEXCH	,816	-,229
TRAINING	,804	-1,98E-02
PROACCES	,790	-,284
FEEDBACK	,790	,323
CRITICAL	,746	-,264
TEAMSPT	,723	-,213
USERREQ	,709	-,112
FUTURE	,684	,305
FINREW	,678	,313
ENJOYWOR	,654	-,290
MENTOR	,632	,564
AUTO	,600	-,276
PROACCOM	,429	,419

Méthode d'extraction : Analyse en composantes principales.

a. 2 composantes extraites.

Matrice des composantes après rotation[a]

	Composante	
	1	2
PROACCES	,802	,250
INFOEXCH	,789	,310
CRITICAL	,754	,239
TEAMSPT	,705	,266
ENJOYWOR	,696	,164
TRAINING	,653	,469
AUTO	,645	,142
USERREQ	,633	,339
MENTOR	,164	,831
FEEDBACK	,435	,735
FINREW	,352	,659
FUTURE	,362	,656
PROACCOM	8,913E-02	,593

Méthode d'extraction : Analyse en composantes principales.
Méthode de rotation : Varimax avec normalisation de Kaiser.

a. La rotation a convergé en 3 itérations.

Matrice de tranformation des composantes

Composante	1	2
1	,797	,603
2	-,603	,797

Méthode d'extraction : Analyse en composantes principales.
Méthode de rotation : Varimax avec normalisation de Kaiser.

Appendix 9. Survey Instrument- 'Sense of Ownership' in Project Teams

Project Management Research Study

SENSE OF OWNERSHIP IN PROJECT TEAMS

- ***How much do you feel that you are a part of the project and that you OWN the project***

By

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Under the supervision of

Dr. Christophe N. Bredillet, *PhD,*

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Privacy Statement

The purpose of this survey is to collect data for Ravikiran Dwivedula for his research study titled 'SENSE OF OWNERSHIP IN PROJECT TEAMS' –to explore how much do the project team members feel that they are a part of the project and own the project.

This research is being conducted under the supervision of Dr. Christophe N. Bredillet, PhD, CESMA-MBA, PRINCE2, AFITEP-IPMA LEVEL A, CMP – AFITEP / CCE – ICEC, Director of Strategy, Programme and Project Management, ESC-Lille

This comprehensive study will take approximately **15 minutes** to complete. You **DO NOT** have to complete the questionnaire in one sitting. You can **SAVE** your results and complete the questionnaire as per your convenience.

Please provide your valid email address in the box below IF you wish to receive the results of the survey.

Email:

DEMOGRAPHICAL INFORMATION

Please complete the following Demographical Information about you. In order for the data to be interpreted in a meaningful manner, it is important that the Demographical information be collected to determine the variables that may affect the outcome. This demographic information is private and confidential, and analysis will be conducted on the aggregate data only and will not be used on an individual basis.
The contact information would enable me to send you the survey results by e-mail. (This information will not be shared with anyone but the respondents.)

1. Age

☐	19-24
☐	25-30
☐	31-36
☐	37-42
☐	43-48
☐	49-54
☐	55-60
☐	61-66
☐	>66

2. Sex

☐	Male
☐	Female

3. Level of Education

☐	High School
☐	Bachelors Degree/ Undergraduate Degree
☐	Masters Degree/ Graduate Degree
☐	PhD/ Doctorate

4. Professional Experience (in Years)

☐	<5
☐	6-10
☐	11-15
☐	16-20
☐	21-25
☐	26-30
☐	31-35
☐	>35

5. What best describes the industry you work in

☐	General Construction
☐	Oil, Gas, Petroleum or Natural Resources
☐	Telecommunications
☐	IS/ IT
☐	Pharmaceuticals
☐	Management Services
☐	Banking
☐	Consulting
☐	Others (Please specify)

6. What best describes your Job title

☐	Project Manager
☐	Functional Manager
☐	Estimator/ Cost Scheduler
☐	Finance/ Accounting
☐	Sales and Marketing
☐	Training, Mentoring or Consulting
☐	Human Resources
☐	Engineering/ Technical Support
☐	Procurement/ Purchasing/ Expediting
☐	Others (Please Specify)

Note: Please answer **Question 7 IF** you are working in an **IT PROJECT** else go to Question 8.

7. What best describes your Job Title (in the IT project)

☐ *Project Manager*

☐ *Product Manager*

☐ *Architect*

☐ *User-Interface designer*

☐ *End-User liason*

☐ *Developers*

☐ *Quality Assurance(QA)/ Testers*

☐ *Tool Smith*

☐ *Build Coordinator*

☐ *Risk Officer*

End-User

☐ *Documentation specialist*

8. What best describes the location of your work.

☐	North America
☐	Central/ South America
☐	Europe
☐	Middle East
☐	Africa
☐	Asia Pacific
☐	Indian Subcontinent

Country:

City:

9	What percentage of your time do you spend telecommuting (working from home) in a typical working week? ☐ 0 % ☐ 20% ☐ 40% ☐ 60% ☐ 80% ☐100% (Please select the appropriate option)	
10	How many colleagues from your project usually work within a 10 meter (11 yards) radius from your desk?	
11	How many people from your project usually work within a 50 meters (55 yards) radius from your desk?	
12	How many people do you interact with physically on a given day for your project related work?	
13	On your current project, what percentage of the workforce is working from a distance? ☐ 0 % ☐ 20% ☐ 40% ☐ 60% ☐ 80% ☐100% (Please select the appropriate option)	

14. Would you say that your current project is

☐	Co-Located	☐	Distributed

(Select the appropriate option)

The questionnaire is based on the following factors:

- ***TRAINING FOR LEARNING***

I have been given a training programme at the start of the project, training me in skills which are required for the project. This training would help me perform better in my current and future projects, thus making me self reliant.

- ***FEEDBACK ON PERFORMANCE***

The post project evaluation process from my previous project by my peers, superiors and top management helps me to know my strengths and weaknesses. This would help me to perform better in my current and future project, thus making me self reliant.

- ***FUTURE CAREER OPPORTUNITIES***

My work in the current project lays a strong foundation for my future career growth.

- ***AUTONOMY AT WORK***

I have freedom to innovate in my work and my project manager and the top management supports my work style.

- ***MENTORING BY TOP MANAGEMENT***

I have a mentor in the company who would help me perform better in the project with his advice and expertise.

- ***BEING INVOLVED IN THE CRITICAL PROJECT ACTIVITIES***

My project manager and the top manager often assign me activities which are critical to the project. Working on these core project activities is a matter of pride to me.

- ***EASY ACCESS TO PROJECT INFORMATION***

I am competent to do the work because I have real time access to factual project related data such as people working on the project, resources available, information about previous projects and information on the central knowledge database.

- ***EASE OF INFORMATION EXCHANGE/COMMUNICATION***

I coordinate with my peers and exchange **project related information** using a simple messenger tool or email frequently.

- ***PERFORMANCE BASED FINANCIAL REWARDS***

I receive an immediate financial incentive apart from my regular pay for my performance in the project.

- ***COMPREHENSION OF THE END USER REQUIREMENTS***

I work closely with the end users of the project from the initial stages of the project and therefore am well aware of their requirements and the final project deliverable.

- ***ENJOYING THE WORK ITSELF***

I take great pride in being associated with the project and more importantly enjoy my work.

- ***PROJECT ACCOMMODATING MY PERSONAL LIFE***

The project schedule accommodates my personal life.

- ***STRONG TEAM SPIRIT***

My project team has a strong team culture (eg: be do's and don'ts for the team members, socializing etc) and this team culture helps us to achieve the project goals.

SURVEY QUESTIONS

Question I. How important to you on a scale of 1 to 7 are the following factors so that you feel that a "PROJECT IS YOURS. Please select the box BELOW the option you like best on every line.

1. Autonomy at Work. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

2. Future Career Opportunities. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

3. Post Project Evaluation Feedback. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

4. Training for Learning. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

5. Project accommodating my personal life. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

6. Enjoying the work itself. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

7. Comprehension of the end user requirements. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

8. Performance based Financial Rewards. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

9. Mentoring by Top Management. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

10. Being Involved in Critical Project Activities. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

11. Ease of Information exchange/ Communication. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

12. Easy Access to Project Information. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

13. Strong Team Spirit. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

Question II. How important are/were the following factors in your current/ latest projects. Please select the box BELOW the option you like best on every line.

14. Autonomy at Work. (CURRENT PROJECT Providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

15. Future Career Opportunities. (CURRENT PROJECT Providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

16. Post Project Evaluation Feedback. (CURRENT PROJECT Providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

17. Training for Learning. (CURRENT PROJECT Providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

18. Project accommodating my personal life. (CURRENT PROJECT Providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

19. Enjoying the work itself. (CURRENT PROJECT Providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

20. Comprehension of the end user requirements. (CURRENT PROJECT Providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

21. Performance based Financial Rewards. (CURRENT PROJECT Providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

22. Mentoring by Top Management. (CURRENT PROJECT Providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

23. Being Involved in Critical Project Activities. (CURRENT PROJECT Providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

24. Ease of Information exchange/ Communication. (CURRENT PROJECT Providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

25. Easy Access to Project Information. (CURRENT PROJECT Providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

26. Strong Team Spirit. (CURRENT PROJECT Providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

Question III. How important to you on a scale of 1 to 7 are the following factors so that you feel that a "PROJECT IS YOURS". Please select the box BELOW the option you like best on every line.

27. Doing an interesting job. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

28. Knowledge of end user needs. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

29. Monetary benefits for performance. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

30. Coaching by top management. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

31. Doing significant job in the project. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

32. Free flow of communication and information sharing. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

33. Project data easily available. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

34. Strong team bonding. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

35. Freedom at work. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

36. Better Job Opportunities. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

37. Advice and response about my performance. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

38. Acquiring knowledge and skills. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

38. Time to pursue personal interests. (Importance TO ME)

Not Important	☐	☐	☐	☐	☐	☐	☐	Very Important
	1	2	3	4	5	6	7	

Question IV. How important are/were the following factors in your current/ latest projects. Please select the box BELOW the option you like best on every line.

40. Doing an interesting job. . (CURRENT PROJECT providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

41. Knowledge of end user needs. . (CURRENT PROJECT providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

42. Monetary benefits for performance. (CURRENT PROJECT providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

43. Coaching by top management. . (CURRENT PROJECT providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

44. Doing significant job in the project. . (CURRENT PROJECT providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

45. Free flow of communication and information sharing. (CURRENT PROJECT providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

46. Project data easily available. (CURRENT PROJECT providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

47. Strong team bonding. (CURRENT PROJECT providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

48. Freedom at work. (CURRENT PROJECT providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

49. Better Job Opportunities. (CURRENT PROJECT providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

50. Advice and response about my performance. (CURRENT PROJECT providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

51. Acquiring knowledge and skills. (CURRENT PROJECT providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

52. Time to pursue personal interests. (CURRENT PROJECT providing this)

Strongly Disagree	☐	☐	☐	☐	☐	☐	☐	Strongly Agree
	1	2	3	4	5	6	7	

Thank you for your response.

Ravikiran Dwivedula

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