VIRTUAL TEAM:

CHARACTERISTICS, INTERNAL GROUP DYNAMICS AND

EFFECTIVENESS

By

KOAY HOOI LING

Research report submitted in partial fulfillment of the requirements for
the degree of Master of Business Administration

DEDICATION

… to

my parents,

my husband

and

my son

ACKNOWLEDGEMENTS

I would like to express my greatest gratitude and heartfelt appreciation to my supervisor, Professor Muhamad Jantan for his understanding, patience, guidance and advice throughout the whole research and thesis write up. I would also like to express my appreciation towards Mr. Ramayah who has been very concerned and helpful during the data analysis stage of this research. In addition, special thanks go to Miss Tan, who has been very caring and has assisted in communicating appointments with Professor Muhamad Jantan, and to Dr. Zainal for his support and concern.

In addition, I would like to express my sincere thanks to all my MBA peers and friends who have assisted in managing the questionnaires distribution and collection. I am truly indebted to all who have assisted me directly or indirectly in data collection.

I am also very grateful to meet all my fellow MBA course mates, especially Kee Yong, Chee Wai, Tiam Yit and Luan Wah for their encouragement, friendship and support in the course of completing this research project.

Last but not least, I am very grateful to my family members for their full support and understanding.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRAK

Transformasi perniagaan serta kesengitan cabaran perdagangan hari ini telah menyebabkan kemunculan pasukan maya (virtual team). Oleh yang demikian, penyelidikan ini bertujuan memahami dengan lebih mendalam tentang keberkesanan pasukan maya serta pengaruh daripada dinamik dalaman kumpulan, ciri-ciri pasukan dan kesulitan tugas. Dengan menggunakan borang soal-selidik data dari 152 pasukan maya telah dianalisis dengan menggunakan SPSS versi 11.0. Sebanyak enam hipotesis telah diuji. Daripada enam hipotesis ini, hanya dua disokong. Hasilnya menunjukkan bahawa ciri-ciri pasukan tidak mempengaruhi dinamik dalaman kumpulan, mahupun keberkesanan pasukan maya. Sementara itu dinamik dalaman kumpulan didapati mempengaruhi keberkesanan pasukan maya secara positif. Di antara dimensi yang diselidiki, didapati bahawa perhubungan di antara ahli mempengaruhi pencapaian pasukan and kepuasan ahli pasukan secara positif, manakala ketua pasukan didapati mempengaruhi kepuasan ahli pasukan secara positif. Kesulitan tugas juga didapati menyederhanakan enam perhubungan dalam penyelidikan ini; iaitu, perhubungan di antara ketua pasukan and pencapaian pasukan, perhubungan di antara komunikasi bersemuka ("face-to-face") dan pencapaian pasukan, perhubungan di antara komunikasi elektronik dan pencapaian pasukan, perhubungan di antara ketua pasukan dan kepuasan ahli pasukan, perhubungan di antara komunikasi bersemuka dan kepuasan ahli pasukan, serta perhubungan di antara komunikasi social dan kepuasan ahli pasukan.

ABSTRACT

Transformation of business enterprises and stronger business competition today has prompted the emergence of virtual teams. Thus, this study attempts to understand more about virtual team effectiveness and the influences from internal group dynamics, team characteristics and task complexity. Data collected through questionnaires from 152 teams have been analysed using SPSS version 11.0. There are six hypotheses that have been tested. Among these six, only two are supported. The findings showed that team characteristics do not impact internal group dynamics or team effectiveness; while internal group dynamics correlates positively with virtual team effectiveness. Among the dimensions, it is found that team member relations correlates positively to both team performance and team member satisfaction, while team leadership is found to be correlated positively to team member satisfaction. Task complexity is found to moderate six relationships in this study: the relationship between team leadership and team performance, the relationships between face-to-face communication and team performance, the relationships between electronic communication and team performance, the relationships between team leadership and team member satisfaction, the relationships between face-to-face communication and team member satisfaction, and the relationships between social communication and team member satisfaction.

Chapter 1

INTRODUCTION

1.1 Business Environment

Today, the business world has been transformed from the conventional enterprises which are hierarchical, labor intensive, low technological-based, and monopolized type into enterprises that are modern, flattened, and highly technologically dependent with great dynamism. The threats and opportunities from business cycles and economic volatility have posed great challenges to modern businesses to maintain competitiveness. The emergence of open economy such as World Trade Organization (WTO) and Asian Free Trade Area (AFTA) have further promoted the need for firms to stay competitive in the business world as well as to maintain managerial ability of the firm's leadership in order to survive the globalization turbulence.

This transformation of business enterprises and globalization can be strongly attributed to the rapid growth of computer technology over the past 20 years. The rapid growth of Internet, telecommuting and digital firms has created a new look for the modern business world. The discipline of digital business design is not solely about wiring workforce, converting research and development (R&D), and manufacturing facilities to computer aided design (CAD) or computer aided manufacturing (CAM), or selling products through Web site. Instead, it is about using digital technologies to expand the company's strategic options; about better customer services, creating unique value propositions, leveraging talent, achieving order-of-magnitude improvements in productivity, and increasing and protecting profits (Slywotzky & Morrison, 2001).

Meanwhile, the industrial economies have transformed from industrial economies to knowledge and information-based service economies, and manufacturing has been transferred to low-wage countries in search for higher operational efficiencies (Laudon & Laudon, 2002). This has made information the key ingredients in creating wealth for organizations. The ability to keep up with the information, communication and technological advancement is mandatory for the survival of businesses. As a result, the study of knowledge management evolved for companies to manage resources more effectively in a hyper-competitive, global economy (McCampbell, Clare & Gitters, 1999). Organizational units can produce more innovations and enjoy better performance if they occupy central network positions that provide access to new knowledge developed by other units. However, this depends on the units' absorptive capacity, or ability to successfully replicate new knowledge; and depends on external access and internal capacity, especially the importance of the capacity to absorb knowledge by increasing R&D intensity (Tsai, 2001).

At the same time, from economics view point, based on comparative advantage theory, the workforce today as compared to that of the last decade has evolved from being generalists to specialists for better production efficiency, by having the best people doing the job they do best. In addition, economic progress with a constant stream of new ideas and products that contribute to improve quality of life has made it even more evident the need for innovation and creativity to bring about competitive advantage to companies and nations (Yossifov, 2002). Creativity, inventions, and innovations have been the most important components driving technological and social progress. Tsai's (2001) study showed that interaction

between absorptive capacity and network position has significant, positive effects on business unit innovation and performance. These can only happen as a result of the long and hard work of many individual specialists, working in teams.

1.2 Emergence of Team

Teams, relationships, and networks have become three basic elements for the effective transfer of knowledge for better organizational competitiveness (McCampbell, Clare & Gitters, 1999). People form teams at work to enable them to focus more brainpower, while performing a variety of functions together. However, this would mean creating an environment in which specialists and separate business units are interdependent, and collaborate with one another, and with those in functional activities on a daily basis. Teams can be formed with people from a horizontal or vertical distribution of the workforce. Teams in the form of task forces or ad hoc groups can cut across organizational boundaries to create a talented mix of human assets that enhance problem-solving capabilities. It can be formed for a variety of purposes, ranging from accomplishing a specific task, training together, problem solving, or planning a product life cycle (Harris & Harris, 1996).

Working in a business team environment demands much more from employees than the traditional combination of industry-specific knowledge and skills. A team member must have both technical skills that can be tested for competence – the "visible skill" and "invisible skill", which include time management, problem solving, or collaboration skills or also known as "social interdependence" to work effectively within a team environment (Tarricone & Luca, 2002).

According to Elmuti (1997), a well-designed business team helps

organizations to:

- Minimize and reduce costs and number of employees,

- Increase profits and reduce the hierarchical structure of the business,

- Improve customer relationships and maintain a client focus,

- Increase employee motivation and commitment, and

- Improve processes for the recognition of team and individual contribution

1.3 Emergence of Virtual Team

As a result, in order to achieve improved time-to-market and time-to-volume, as well as to improve position in the competitive market with more innovative inventions, enterprises have moved towards the forming of a new form of teams to counter these challenges. There is a growing trend of team that is both global and virtual in nature, consisting of individuals collaborating in the execution of a specific project while located at multiple individual sites or multiple group sites. Virtual teams have emerged from the need for global organizations to get projects done as quickly as possible, while utilizing the skills of project team members that are geographically dispersed (Andres, 2002). One of the fastest growing, high-tech office trends today is "virtual team" (Johnson, Heimann & O'Neill, 2001).

1.4 Problem Statement

Today, global virtual teams are playing an increasingly important role in international business by offering organizations the opportunity for reaching beyond traditional boundaries (Pauleen & Yoong, 2001). However, global, multicultural, inter-organizational, virtual teams and the effective use of information and communication

technologies (ICTs) present real and compelling challenges to its facilitators, as well as presenting to the teams unparalleied opportunities for expanding on perspective, approaches, and ideas. While research shows that the development of personal relationships between virtual team members is an important factor in effective working relationships, little research has been conducted on the effects of crossing organizational, cultural, time and distance boundaries on relationship building in virtual teams (Pauleen & Yoong, 2001). The use of virtual team has outpaced our understanding of their dynamics and unique characteristics.

According to Hacker and Lang (2000), there are various issues confronting virtual teams. Like conventional (local) teams, virtual teams need team charters, and measurable objectives for alignment, and cohesion between team members. These teams need defined and agreed upon team processes for interactions, decision- making and conflict resolution. Unlike local teams, virtual teams must replace the need for regular face-to-face interactions with regular, electronically supported virtual interactions; thus effective technology is required to facilitate communication and coordination. Unlike local teams, these teams must balance loyalties between their local site and the virtual team. The team members must be held accountable for both their virtual and non-virtual team responsibilities. In addition, similar to local teams, these teams have cultural differences to overcome, as it tends to span across various geographical boundaries with greater cultural differences. Miscommunication can happen easily. Diversity awareness training and initial face-to-face team building activities are ways to reduce the effect of these cultural differences.

Due to the rapid growth of virtual teams in many global organizations, especially to take advantage of the time zone differences by having product

development team across all sites to work for 24 hours round the clock rather than the normal single site 8 hours per day, the urge to understand more on virtual team effectiveness and its internal group dynamics has been significant. As such, this research attempts to understand more on the virtual team effectiveness, team dynamics as well as the influence from team characteristics such as team size and functional diversity on team dynamics and team effectiveness, in addition to task complexity.

1.5 Research Objectives

This research has been designed to test a general hypothesis that virtual team effectiveness is influenced by internal group dynamics and team characteristics. This study attempts to achieve the following:

a) To examine the impact of team characteristics such as team size and team members' functional diversity on internal group dynamics.

b) To examine the impact of team characteristics such as team size and team members' functional diversity on team effectiveness.

c) To examine the influence of internal group dynamics on virtual team effectiveness.

d) To examine the relationship among team characteristics, internal group dynamics and virtual team effectiveness.

e) To examine the relationship among team characteristics, internal group dynamics, task complexity and virtual team effectiveness.

Although there have been some studies done in Western countries on related areas in different contexts and settings, most of these are in experimental settings or in

a more general perspective. This study attempts to concentrate on the internal group dynamics based on the responses from virtual team members that are working in multi-national organizations in Malaysia.

1.6 Research Questions

In attempting to achieve the above objectives, this study seeks to address the following research questions:

(a) What is the impact of team size and function diversity on internal group dynamics?

(b) What is the impact of team size and function diversity on virtual team effectiveness?

(c) What is the impact of internal group dynamics on virtual team effectiveness?

(d) Does internal group dynamics mediates the relationship between team characteristics and virtual team effectiveness?

(e) How does task complexity moderates the relationship between team characteristics and virtual team effectiveness?

(f) How does task complexity moderates the relationship between internal group dynamics and virtual team effectiveness?

1.7 Scope of Research

This research will study virtual teams from multinational companies operating in Malaysia. However, due to the nature of the study, and the challenge to closely monitor and pair up the respondents from the same virtual teams to represent the team's data, this research consists of samples from multinational companies located in

Penang only and has been administered manually.

There are three major factors contributing to virtual team effectiveness (Lurey & Raisinghani, 2001). These are internal group dynamics, external support mechanisms and design process. Due to the resource constraints of this study in terms of time and cost, this study only concentrates on some components from internal group dynamics, especially on team member relations, and team process, while considering the additional effects of team size, team functional diversity and task complexity. Design process and external support mechanism has been excluded from this study.

1.8 Significance of Research

This study is important in understanding the factors that contribute to the success of a virtual team. As the virtual team could possibly consist of individuals from different backgrounds, geographical locations and time zones, thus by nature this could enhance innovativeness of the team when well managed. In addition, the forming of virtual teams enables concurrent engineering for research and development teams (Bal & Teo, 2000), hence, reduces development time, ensuring time-to-market for new products and services. The significance of concurrent engineering has been clearly proven as companies have switched from asking questions like "Why concurrent engineer?" to "How concurrent engineering?" in the Management Roundtable's Seventh International Conference on Design for Manufacturability, held in Orlando, Florida, USA (Tong & Fitzgerald, 1994).

The findings from this research will serve as a guideline for top executives and strategists to strategize their organization for better performance, by adopting

appropriate practices and enforcing positive climate for more effective virtual teams. It can also provide a benchmark for management to track the effectiveness of team performance development and improvement initiatives, as well as to enable focus for team building, and training or development programs and activities.

This study will review the impact of internal group dynamics on the virtual team performance with consideration on possible impact from task complexity and team characteristics, mainly team size and functional diversity of the team.

1.9 Definition of Terms

The following definitions are the description of the key terms used in this study:

- Teams are groups of people who share a common purpose or goal and interact interdependently within a larger organizational setting (Lurey & Raisinghani, 2001). These are relatively permanent work groups whose members share common goals, are interdependent, and are accountable as a functioning unit to the organization as a whole (Cook, Hunsaker & Coffey, 1997).

- Virtual teams are groups with members dispersed across organizational, space, and/or time boundaries and are often cross-functional in nature. Consequently, these teams' members have a low frequency of face-to-face contact, and are able to collaborate through the use of emerging computer and communication technologies, including teleconferencing, video-conferencing, email, fax, and telephone. (Lurey & Raisinghani, 2001).

- Internal group dynamics refers to the dynamism and closeness of the virtual teams' members and how the team synergizes and collaborates to complete tasks that are being assigned. The internal group dynamics includes dimensions such as

team member relations, team leadership, face-to-face communication, social communication and electronic communication.

- Team characteristics in this context refer to the characteristics of the virtual team in terms of team size and team's functional diversity.

- Team effectiveness refers to how well the virtual team achieves its set objectives and goals. Two dimensions that will be considered in this study are team performance and team member satisfaction.

- Task complexity refers to the extent of difficulty and complexity of the tasks and jobs that need to be carried out by the virtual team.

1.10 Organization of This Thesis

This report has been organized in the following manner: -

Chapter 1, the current chapter, introduces the trend of business transformation, the emergence of teams and virtual teams, the research's problem and discusses its context. Chapter 2 reviews the literature related to the main variables in the study. This is followed by Chapter 3 that mainly concentrates on the theoretical framework, design of study and methodological procedures. Next, the results and the research hypotheses will be tested and elaborated in Chapter 4. Finally, the thesis will conclude with discussions, implications and conclusion in Chapter 5.

Chapter 2

LITERATURE REVIEW

2.1 Introduction

There are various literature and past studies that address the virtual team effectiveness and its relationship to various possible factors, including influences from internal group dynamics, team characteristics, and task complexity. The main emphasis of this chapter is to understand the body of knowledge on these topics, to review the facts and findings from some previous studies and to report all that are deemed most relevant to the present study.

2.2 Teamwork

Harris and Harris (1996) defined a team as a work group or unit with a common purpose through which members develop mutual relationships for the achievement of goals or tasks; and teamwork implies cooperative and coordinated effort by individuals working together in the interests of their common cause. A collection of individuals is not a group if the members are interested primarily in individual accomplishments and is not concerned with the activities of other members or sees those others as rival (Proehl, 1997).

As cited in Stough, Eom and Buckenmyer's (2000) study, a 1993 survey of 1,293 US-based organizations by the American Society for Quality Control (ASQC) and the Gallup Organization found that over 80 percent of respondents reported some form of work team activity. Two-thirds of full-time employees indicated that they participated in teams and 84 percent participated in more than one team (ASQC,

1993).

In addition, in 1992, Lawler, Mohrman, and Ledford conducted a survey among Fortune 500 companies concerning employee involvement in teams and concluded that employee involvement in teams had a strong positive relationship with several dimensions of organizational effectiveness and worker effectiveness, such as improved management decision making, increased employee trust in management, improved implementation of technology, improved customer service, improved quality of products and services, lower absenteeism and turnover (as cited in Stough et al., 2000).

There are various types of teams, including natural work group, self-managed team, temporary project group, and long-term cross-functional team. Cross-functional teams have been used increasingly in organizations to develop new products, to reengineer organizational processes, to improve customer relationships, and to improve organizational performance (Proehl, 1997).

As cited by Harris and Harris (1996), UCLA professor William Ouchi once wrote a book called *The M-Form Society* which is an analysis of how American teamwork can capture the competitive edge in business. In addition, Professor Ralph Kilmann at the University of Pittsburg had advised that no one new management approach would work towards creating and sustaining an organization's high performance and morale except by an integrated combination of classic strategies that comprises team-building. This infuses into the work group cultures the norms and management skills that ensure high performance and high quality decision-making. Elloy and McCombs (1996) stressed the importance of autonomous work groups as a strategy for organizations to become more responsive to the competitive environment

with the implementation of open systems theory in manufacturing plant. Brodbeck (2002) in his study emphasized that self-organizing team structures are positioned as a resource for businesses to developing internal efficiencies and business opportunities as a means to enhance productivity and sustain competitive advantage. The similar discussions on team approach for better business efficiency and excellence has been strongly emphasized in various past studies from various aspects with relates to different issues (Andres, 2002; Bal & Teo, 2000; Brodbeck, 2002; Elloy & McCombs, 1996; Hacker & Lang, 2000; Harris & Harris, 1996; Lurey & Raisinghani, 2001; Pauleen & Yoong, 2001; Pawar & Sharifi, 1997; Proehl, 1997; Tarricone & Luca, 2002; Tsai, 2001).

Maier (1967) as cited by Stough et al. (2000) has identified various positive outcomes from his study. These include the following:

- Teams produce a greater quantity of ideas than individuals.

- Teams improve understanding and acceptance among individuals.

- Teams create higher motivation and performance levels than individuals.

- Teams offset personal biases and blind spots that hinder the decision process.

- Teams sponsor more innovative and risk-taking decision-making.

Although the team approach's benefits to businesses are significant, there are teams who failed due to various problems. These includes organizational structure that are incompatible and evaluate performance based on individual instead of team, ineffective communication, lack of resources, lack of trust, non-supportive corporate culture and inappropriate use of the team approach, for example in cases with time constraint (Tarricone & Luca, 2002).

2.3 Virtual Team

Emerging from the growth of team concepts and the forces that push for faster and shorter product life cycle, virtual teams are playing an increasingly important role in organizational life. These teams are often assigned the most important tasks in an organization, such as product design and concurrent engineering (Bal & Teo, 2000; Lurey & Raisinghani, 2001; Pawar & Sharifi, 1997; Proehl, 1997; Slywotzky & Morrison, 2001; Tarricone & Luca, 2002; Tong & Fitzgerald, 1994), strategic planning (Stough et al., 2000), multinational product launches, negotiate mergers and acquisitions among global companies and managing strategic alliances (Pauleen & Yoong, 2001).

2.3.1 Definition and Characteristics

Lurey and Raisinghani (2001) defined virtual team as people who share a common purpose or goal and interact interdependently within a larger organizational setting, with members dispersed across organizational, space, and/or time boundaries, and are often cross-functional in nature, from a variety of organizational departments or business units. These teams have a low frequency of face-to-face contact, and are able to collaborate through the use of emerging computer and communication technologies.

Andres (2002) introduced virtual teams as groups of individuals collaborating in the execution of a specific project while located at multiple individual sites or multiple group sites. These teams have been brought about by the need for organizations to get projects done as quickly as possible while utilizing the skills of project team members that are geographically dispersed.

As cited by Johnson et al. (2001), virtual teams are groups of people who collaborate closely even though they may or may not be separated by space, time, and organizational barriers (Jennings, 1997). However, Pape (1997), as cited by Johnson et al. (2001), commented that every team that needs to work together and whose members are more than 50 feet apart is a virtual team. Johnson et al. (2001) stated that this workplace is unrestrained by time and space; it is a virtual workplace where productivity, flexibility, and collaboration will reach new levels, while most of the time it is a cross-functional team.

Potter, Balthazard and Cooke (2000) have identified virtual team as having members who are geographically distributed, each possessing the relevant knowledge and will need to collaborate to accomplish the tasks. Typically, the team members have different areas of expertise and often work in different functional areas.

According to Anderson and Shane (2002)'s study, Howard (2000) indicated that *netcentricity* is the power of digital networks to connect a global wealth of people, information assets, and services; and it is this *netcentricity* that has made virtual teams happened. The goal of *netcentricity* is to have all members of a team share data, information, instructions, and some trade secrets in near real time. The power of *netcentricity* has made significant impact on global teams, including both intercultural teams and virtual global teams. *Netcentric* teams are made up of the best and brightest employees qualified for a given project so that there is no learning curve for team members, and team members are from anywhere a telephone line can reach, and without considering for some reasonable proximity.

As cited by Bal and Teo (2000), Lipnack and Stamps (1997), and Henry and Hartzler (1998) have formally defined the term "virtual team", Lipnack and Stamps

(1997) defined virtual team as "a group of people who interact through interdependent task guided by common purpose" and "works across space, time, and organizational boundaries with link strengthened by webs of communication technologies". Whereas, Henry and Hartzler, defined it as "groups of people who work closely together even though they are geographically separated by miles or even continents" and as "intact workgroups or cross functional groups brought together to tackle a project for a finite period of time through a combination of technologies". Although other literatures reviewed by Bal and Teo do not give a formal definition for the term, they found that Duarte and Snyder (1999), Fisher and Fisher (1997) and Haywood (1998) have characterized virtual team in a similar way.

In short, a virtual team has been identified with the following four common characteristics (Bal & Teo, 2000):

- Geographically dispersed,

- Driven by a common purpose,

- Enabled by communication technologies, and

- Involved in cross-boundary collaboration.

In addition to the above, Bal and Teo (2000) have also identified (from a review of five books on the subject) other characteristics of virtual team to include the following:

- It is usually not a permanent team,

- Members solve problems and make decisions jointly and are mutually accountable for team results,

- Normally, team size is small,

- Have inconsistent membership, and

16

- Team members are knowledge workers.

2.3.2 Drivers and Challenges

Bal and Teo's (2000) concluded that there are drivers or reasons that have prompted businesses to adopt virtual teaming. The drivers are summarized in the following table (Table 2.1):

Table 2.1 Summary of drivers of virtual team (Bal & Teo, 2000)

Main Drivers	Descriptions
Organizational trends	Globalization and increasing competition Mergers, acquisitions, downsizing and outsourcing
Business requirements	Cross organizational product development Changes in contemporary products and services Offshore development and manufacturing
Technology	Advances in electronic communication technology Higher return on investment due to decrease in cost of bandwidth
Expertise	Greater and more in-depth expertise Leverage of organizational expertise Technical specialization

Stough et al. (2000) in their study stated that virtual teams provide for the use and development of streamlined organizations. An organization can now stretch across every corner of the world. In addition, assuming the computer infrastructure is in place, virtual teams can be created with relatively small start-up costs. Moreover, virtual teams' spatial independence has distinguished it from conventional highly structured teams. Other additional drivers of implementing virtual teaming is it can reduce cost and time to market (Pawar & Sharifi, 1997).

In addition, organizational downsizing, and organizational structure flattening, with the effort to improve efficiency, has contributed to virtual team growth (Johnson et al., 2001). On the other hand, the increasing number of employees that opt for

teleworking has promoted cost and time saving to organizations. This trend has also contributed to the growth of virtual teaming (Johnson et al., 2001). Other reasons why organizations adopt virtual teams and some resulting benefits include: allow flexible working hours to employees; creates and disperses improved business processes across organizations; supports cross-functional and cross-divisional interaction; save time; reduces pollutions from reduce usage of transportation due to teleworking; requires less office and parking space; and reduction in costs of facilities and electricity (Johnson et al., 2001).

Kayworth and Leidner (2001) have identified communications, culture, logistics and technology as four key areas of challenges of virtual teaming. In communication, traditional social mechanisms are lost or distorted as communication dynamics such as facial expressions, vocal inflections, verbal cues, and gestures are altered. Distinctions among member's social and expert status is lost, thus inhibiting trust building and causing communication process dysfunction. At the same time, cultural diversification requires greater communication skills. Unrealistic cultural expectations or distorted communication may cause cultural biases. Moreover, multiple time zones make scheduling meetings and discussions difficult. Potential technophobia due to needs for proficiency across a wide range of technologies could be an additional challenge to virtual teams.

Johnson et al. (2001) has identified three challenges or obstacles to virtual teaming as: (1) possible technophobia among employees, (2) difficulty in establishing trust among employees, and (3) potentially more stressful work environment as higher efficiency and productivity are expected from virtual team.

Key issues of virtual teams identified by Bal and Teo (2000) are goals and

objectives, leaderships and team member roles, communication, shared values, team and organizational process, reward and performance measures, and trust. On the other hand, Lurey and Raisinghani (2001) have studied the influence of internal group dynamics, design process and external support mechanism on virtual team effectiveness in search of the best practices for a virtual team's success.

2.4 Internal Group Dynamics

As cited by Forsyth (1999), Lewin (1951) described the way groups and individuals act and react to changing circumstances in groups as group dynamics. Lewin used the term to stress the powerful impact of these complex social processes on group members. He also used the phrase to describe the scientific discipline devoted to the study of these dynamics. In 1968, Dorwin Cartwright and Alvin Zander formally defined group dynamics as a "field of inquiry dedicated to advancing knowledge about the nature of groups, the laws of their development, and their interrelations with individuals, other groups, and larger institutions" (as cited in Forsyth, 1999).

Studies on impact of internal group dynamics on conventional team performances are abundant. However, studies on its effects in virtual team context remain limited. In 2001, Lurey and Raisinghani studied five dimensions of internal group dynamics: job characteristics, selection procedures, team member relations, team process, and internal team leadership, toward virtual team effectiveness. They found that team processes and team members' relations presented the strongest influence on team performance and team member satisfaction, while selection procedures and executive leadership styles also exhibited moderate associations to these measures of effectiveness.

Though internal group dynamics encompass various dimensions, this study focuses on a few of them such as team member relations, team leadership, face-to-face communication, social communication and electronic facilitated communication that contribute to virtual team effectiveness.

2.4.1 Team Member Relations

Pauleen and Yoong (2001), in a field study of New Zealand-based virtual team facilitators working with boundary-spanning virtual teams found that boundary-crossing issues can affect relationship building in many important ways. For instance, facilitators found that organizational boundary crossing was affected by differing organizational cultures, policies, time, and distance. Crossing time and distance barriers necessitated the skillful use of synchronous and asynchronous ICTs and communication channels, thus affecting relationships building among team members. As cited by Pauleen and Yoong, Kimball (2000) stated that the purpose of building and maintaining relationships in teams is to ensure that individuals develop at least enough harmony to be able to get their group work done.

Tarricone and Luca (2002) in their study stated that a cooperative team environment is reliant on each team member's individual goal achievements and ambitions correlating with the aims of the team. Positive interdependence results in promotive interactions, negative interdependence results in oppositions or conflicting interaction, and no interdependence results in an absence of interaction. Thus, conflicting interaction can lead to team member relations that are weak, and would negatively impact the results achieved by the team.

As cited by Potter et al. (2000), a study by Watson and Michaelsen (1988)

showed that a team's interaction style could affect performance. In their study, they identified positive and negative behaviors as components of group interaction style, and found that positive behaviors such as expectations of performance and integration, leadership, and cohesiveness contributed to team performance. On the other hand, Potter et al. stated that Cooke and Szumal (1994) had suggested that group interaction can be analyzed in terms of three general styles: constructive, passive, and aggressive. It was found that groups whose interactions are characterized by a dominant style achieve different levels of patterns of effectiveness. Specifically, predominantly constructive groups produce solutions that are superior in quality as compare to those produce by passive groups, and superior in acceptance to those produce by either passive or aggressive groups.

In another study, Pawar and Sharifi (1997) argued that intra-team communication, particularly, becomes even more focal to the performance of the team due to the variation that exist among the members of the team in their understandings and interpretations of the communication.

Harris and Harris (1996) found that high performing team requires its members to have the ability to communicate both in writing and orally at both the interpersonal and organizational levels. Team are successful and effective when they overcome difficulties; achieved through interdependence and good team member relations.

Duarte and Snyder (2001) stressed that networking, resolving conflicting royalties, and clarifying ambiguous situations are important virtual team activities. Hence, virtual team members are required to take the initiative to coordinate and collaborate with team members, with other people in the organization, and with

external partners to facilitate their coordination and collaboration roles, and autonomy roles.

Therefore, strong team member relations can be achieved through improved interaction and interpersonal skills.

2.4.2 Team Leadership

The role of the leader and the function of the leadership role have been given considerable attention by Duarte and Snyder (2001) and Lipnack and Stamps (2000) in their discussion on building a successful virtual team. The leaders in virtual team experience unique challenges. They need to link the distributed minds together without superimposing their own mind on the team members. Apart from the generic attributes that are important for effective knowledge teamwork, Fisher and Fisher (1997), as cited by Bal and Teo (2001a), stressed that the leader should also articulate vision for the organization; manage by principles rather than policy; effectively coach individuals and teams; understand and communicate business information; aggressively eliminate barriers to team effectiveness; actively eliminate barriers and develop team members; and focus on the customer's perspective. These are additional attributes that a virtual team leader should possess in addition to the generic attributes which include passionate commitment to get good results, a clear understanding of what it takes to succeed, excellent interpersonal and communication skills and a technical base consistent with the organization culture.

Duarte and Snyder (2001) recognized that virtual team leader's role is more demanding than the conventional team leaders. They listed seven competencies for a successful virtual team leader: performance management and coaching; appropriate

use of technology; cross-cultural management; career development and transition of team members; building trust; networking; and developing and adapting team processes.

According to Bal and Teo (2001a), a successful virtual team needs more than just a single leader and that in successful teams, leadership is shared. Duarte and Snyder (2001) explained that from time to time, leadership shifts to a team member who has certain expertise to deal with a specific problem, or who has access to a unique body of knowledge. In this case, leadership emerges and is redistributed as expertise becomes relevant and as problem arises and shifts. The team leader will facilitate this shift while being held accountable for the results. As cited by Bal and Teo, Fisher and Fisher (1997) shared the similar findings on distributed leadership. Andersen and Shane (2002) suggested that for psychological reasons, employees who work in teams and have shared leadership role, feel more secure and more productive than team members who are not empowered to participate in making decisions. However, they also stressed that leaders are required to facilitate communication among team members.

On the other hand, Harris and Harris's (1996) study had similar findings on shared leadership but in a different perspective. They stated that there are multiple functions performed by different members in the team at various times. For instance, the team member who can develop a computer simulation provides task leadership; the one who tells a joke in a moment of crisis and releases tension offers maintenance leadership; while the person, who helps the group to deal effectively with minority opinions or people, contributes norm leadership. Task leadership affects team process, maintenance leadership affects group cohesiveness, team member relations and

morale, while norm leadership can be seen in the customs and traditions the team develops, or the protocols, which influence how the virtual team works.

2.4.3 Face-to-Face Communication

Communication is one of the major components of teamwork (Potter et al., 2000). Communication involves the exchange of information between two or more team members in the appropriate manner. It serves to clarify, verify, and acknowledge messages. Communication is central to teamwork and group dynamics because it links together other components such as monitoring of performance and feedback. Strong teamwork contributes to strong internal group dynamics and is critical for virtual team's success. Hence, face-to-face interaction and communication play an important role in building internal group dynamics.

Lipnack and Stamps (2000) stressed that "Face-to-face time is increasingly precious, a scarce resource in limited, costly supply". As compared to co-located teams, virtual teams have a harder time getting started and holding together. Thus, they need to be much more intentions about creating face-to-face meetings that nourish the natural rhythms of team life, as well as to improve team interaction and effectiveness. Duarte and Snyder (2001) also warned that experience and research have shown that, if not managed properly, communication in virtual teams can be less effective than traditional teams.

As cited by Bal and Teo (2001a), Henry and Hartzler (1998) found that keeping the synergy and creativity flowing without frequent face-to-face interaction, is the greatest challenge to a virtual team. They pointed out that conflict tends to escalate in virtual teams where there is no means for clarifying misunderstanding