



GRADUATE SCHOOL OF BUSINESS (GSB)
UNIVERSITI SAINS MALAYSIA

DECLARATION

I hereby declare that the project is based on my original work except for quotations and citation which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at USM or any other institutions.

A handwritten signature in black ink, appearing to be 'TCK', written over a horizontal line.

(Signature):

Name: TAN CHONG KING

Date: 27/12/2011

The effectiveness of virtual team: An empirical investigation of manufacturing industry in Penang Malaysia.

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ABSTRAK

Pasukan maya (*virtual team*) akan menjadi satu cara asas untuk menjalankan perniagaan demi organisasi terus bertanding dalam sekeliling global. Organisasi yang sudi memahami apa yang menyebabkan pasukan maya berkesan akan menghasilkan keputusan positif daripada pasukan maya. Oleh yang demikian, tujuan penyelidikan ini adalah mengkaji faktor-faktor yang mempengaruhi keberkesanan pasukan maya. Penyelidikan ini akan menguji kesan daripada tujuh faktor (penyelarasan, pembinaan hubungan, kecenderungan bertaut, komunikasi, ganjaran, kepercayaan and kesulitan tugas) terhadap prestasi pasukan dan kepuasan ahli pasukan. Soalan-soalan peninjauan daripada penyelidikan dahulu akan diambil alih dan diubahsuai, serta model akan dianalisis dengan menggunakan *partial least squares* and alat pemodelan persamaan berstruktur – SmartPLS 2.0 M3. Keputusan penyelidikan menunjukkan perhubungan yang positif bererti muncul di antara pembinaan hubungan, kecenderungan bertaut, komunikasi dan kepercayaan terhadap prestasi pasukan. Penyelarasan, pembinaan hubungan dan kecenderungan bertaut juga didapati mempengaruhi kepuasan ahli pasukan dengan positif bererti. Sebaliknya, tiada perhubungan yang bererti didapati di antara penyelarasan and ganjaran terhadap prestasi pasukan. Kesulitan tugas didapati tidak menyederhanakan perhubungan antara kepercayaan and prestasi pasukan. Keputusan daripada penyelidikan ini boleh menjadi rujukan untuk pengurus mengurus pasukan maya dengan lebih berkesan, sementara mengoptimalkan penggunaan sumber dan melaksanakan alat-alat komunikasi yang paling efisien, seterusnya meningkatkan keberkesanan organisasi secara keseluruhan. Penyelidikan ini amat berguna untuk

penyelidik, pengurus and organisasi mengutamakan faktor-faktor yang menyumbangkan kepada keberkesanan pasukan maya. Akhir sekali, penyelidikan ini menyimpulkan beberapa batasan dalam penyelidikan ini serta cadangan untuk penyelidikan selanjutnya pada masa depan.

ABSTRACT

Virtual teams had become a fundamental way to conduct business in order for organizations to remain competitive and sustain in a global environment. Organizations which willing to understand what makes virtual teams more effective can likely accrue positive results from virtual teams. Therefore, the purpose of this research is to study factors that impact the effectiveness of virtual team. This study tests the impact of seven factors (coordination, relationship building, cohesion, communication, reward, trust and task complexity) on team performance and member satisfaction by 203 virtual teams in Malaysia. Survey questions from prior studies were adopted and customized, and the model was analyzed using partial least squares and structural equation modeling tool - SmartPLS 2.0 M3. The results indicated that a significant and positive relationship exists between relationship building, cohesion, communication and trust towards team performance. Coordination, relationship bulding and cohesion also have a significant and positive relationship with team member satisfaction. On the other hand, no significant relationship was found between coordination and reward towards team performance. The task complexity does not moderate the relationship between trust and team performance. The findings from this study can serve as guideline for managers to manage the virtual teams effectively, as well as to optimizes the resources usage and implement the most efficient tools of communication, and subsequently improve the overall efficiency of the teams. This study is useful for researchers, managers, and organizations to highlight the factors that contribute to effectiveness of virtual team. Finally, this study concluded with some limitations of the study and some recommendations for future research.

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Today, Malaysia plays a key role as global information and communication technology (ICT) player and a growing ICT hub in the regional. The attractive factors such as the ideal business environment, the availability of skillful workers, and competitive labour cost and have encourage more multinational companies move to Malaysia. Malaysia had become one of the most preferred locations for global services especially in ICT, and research and development (R&D). This will indirectly strengthen Malaysia's position for being chosen by companies to outsource or offshore their services activities.

It is noteworthy that as at 2009, investments of the top 10 United States (US) companies in Malaysia were valued at some RM46 billion. Collectively, they have created more than 158,000 jobs (The Star Online, 2010). The companies include Intel, Western Digital and Motorola. Besides that, the US is the biggest foreign investor in Malaysia on a cumulative basis, and was the largest source of new foreign direct investment in Malaysia in 2010 (U.S. Department of State, 2011). American organizations are usually involved in the electronics, manufacturing, and oil and gas industries. Based on Multimedia Development Corporation (MDeC), Malaysia continues to attract outsourcing jobs from famous organization like America based hard disk manufacturer Seagate Technology Ltd, which began outsourcing its Information Technology (IT) services in May 2009 (MSC Malaysia, 2009). Indirectly, they create high-value economic impact for the nation.

Nunamaker, Reinig and Briggs (2009) reported from the study conducted by Intel Corporation, it indicated that approximately two-thirds of their employees collaborated with team members located at different sites and in different regions. An effective virtual team with good collaboration and superior performance in innovation in organizations believed to be one of the main sources of competitive advantage in the modern market place (Gressgard, 2011). At the same time, Malaysian resilience in surviving the global electronic downturn hinges on its ability to promote innovation in new product development (Islam, Doshi, Mahtab & Ahmad, 2009). In addition, the rapid development of new communication technologies such as Internet has speed up this trend so that today, most of larger companies employ virtual teams to on some degree in their business (Hertel, Geister & Konradt, 2005).

Electronic media networks such as internet and e-mail have increased the speed of organizational interactions, information flow and new forms of workplace collaboration (Horwitz, Bravington & Silvis, 2006). Therefore, each technology (desktop video-conferencing systems, collaborative software systems, Internet/intranet systems) needs to be evaluated in terms of its effectiveness and cost benefits regarding the generation of ideas and plans, solving routine and complex problem, and negotiating interpersonal or other forms of conflict in the organization (Ivancevich et al., 2008).

Besides coping with rapid technological changes, many companies face the challenge of shorter product life cycles and higher complexity in the business systems. Sethi et al. (2001) stressed that multinational and interdisciplinary virtual teams are frequently setup with the intention of developing new products and services (Gressgard, 2011). For examples stated by Kirkman et al. (2004), Hewlett Packard's virtual teams

solve customers' computing problems, Eastman Kodak's virtual teams design new products, and Sun Microsystems' virtual teams generate new business models.

As a result, a popular response to increasing competition, the need for faster decisions, and technology advancements has been the creation of virtual teams (Ivancevich et al., 2008). Although there are various definitions of virtual team, Ivancevich et al. (2008) have defined virtual team as a number of people geographically separated that are assembled by using various technologies to accomplish specific goals. Hence, examining key variables in success and failure of virtual team is essential.

1.2 Problem Statement

Due to the global economy becomes a reality, virtual teams in many multinational companies had grow rapidly and employees are increasingly working and playing important roles in a virtual team environment. Thus, the capability provided by information technology enable the ability to assemble virtual teams of people located in different geographic locations (Evans & Collier, 2007).

Wide ranges of variables have been examined in the previous study as affecting on the virtual team effectiveness. Team coordination is very important because members are performing work anytime, anyplace thus leaders face challenges in coach, build trust, evaluate performance and provide feedback (Ivancevich et al., 2008). Careful implementation of efficient communication is very essential and can prevent misunderstandings and conflict escalation. Moreover, a bad relationship building can weaken feelings of inclusiveness or a sense of belonging to team thus affect team effectiveness.

Although develop and sustain trust among members is formed with complicated, but it is very important to contribute to the successful project completion (Greenberg, Greenberg & Antonucci, 2007). Besides that, the appropriate use of reward will increase team member satisfaction (Bryant, Albring & Murthy, 2009). Team cohesion is very crucial for the virtual team effectiveness due to it can monitor team functioning, encourage extra-role helping, and decrease the fluctuation of team members (Hertel et al., 2005).

Casey (2010) stated geographical, temporal distance, cultural, and linguistic differences all negatively impact on coordination, cooperation, communication, and visibility in the virtual team environment. Furthermore, different process maturity levels, tools, standards, and different levels of experience have recognized that the project management of a virtual team must be carried out in a different manner to that of a collocated team (Casey, 2010). In addition, virtual team members must be self-reliant but remain connected to and knowledgeable about the goals of the organization in terms of creating a sense of team (Ivancevich et al., 2008).

According to Islam et al. (2009), Page (1991) argued that many R&D projects never result in a commercial product, and between 33 to 60 percents of all new products that reach the market place fail to generate an economic return. It showed new product failures rates are still very high. Hence, virtual teamwork with high –technology product development projects require continuous collaborative effort among team members from different functional specialties across the organization while geographically dispersed. The complexities of systems and products today require integration of knowledge from

diverse disciplinary and personal skill-based perspectives where creative cooperation is crucial for the success of the team (Islam et al., 2009).

As such, this research attempts to understand more on the virtual team effectiveness, key factors mentioned above which impact on the effectiveness of virtual team, as well as the influence from task complexity on trust and team performance in a Malaysian perspective.

1.3 Research Objectives

This study has been carried out to test and examine the factors influencing the team effectiveness in virtual team. This study is designed in an attempt to accomplish three main objectives as follows:

- (a) To assess the impact of coordination, communication, relationship building, trust, reward and cohesion on virtual team performance.
- (b) To assess the impact of coordination, relationship building and cohesion on virtual team member satisfaction.
- (c) To assess the moderating effect of task complexity on trust and team performance.

1.4 Research Questions

In attempting to understand the problem statement, this study seeks to address the following research questions:

- (a) What is the impact of coordination, communication, relationship building, trust, reward and cohesion on virtual team performance?

- (b) What is the impact of coordination, relationship building and cohesion on virtual team member satisfaction?
- (c) Does task complexity moderate the relationship between trust and virtual team performance?

1.5 Scope of Research

This study attempts to focus on the team effectiveness based on the responses from virtual team members that are working in multinational organizations in manufacturing industry of Penang Malaysia. However due to the nature of the study, and the challenge to closely monitor the respondents who are working in virtual teams to represent the team's data, this research consists of samples from multinational companies in the manufacturing sector located in state Penang only and has been administered manually. Due to the resource constraints of this study in terms of time and cost, this study only concentrates on some important components expected to impact the effectiveness of virtual team.

1.6 Significance of the Study

In term of practical significance, this study is important in understanding the key variables impacting the success of a virtual team. As the virtual team could possibly consist of members from different backgrounds, geographical locations and time zones, thus by nature this could improve innovativeness of the team when well managed (Ramayah, Muhamad, Aizzat & Koay, 2003). The findings from this research will serve as a guideline for top executives and strategists to strategize their organization for better

performance, by implementing appropriate actions and enforcing positive culture 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 such as reward system.

On a broader aspect, the findings from this study can be used for multinational companies in Malaysia especially manufacturing sector. Previous research had done on the effectiveness of virtual R&D teams in Malaysian small and medium enterprise (SME) (Ebrahim, Rashid, Ahmed & Taha, 2011). Besides that, research on virtual teams in Malaysia also had done using a qualitative investigation in multimedia super corridor (MSC) status companies whereby the aim of the study is to understand virtual teams and its working environment in MSC status organization (Aripin, Mustafa & Hussein, 2010). A preliminary study of virtual team in multinational firms operating in Penang also been done on the internal group dynamics (team member relations, team leadership, face-to-face communication, social communication, electronic communication), team characteristics (team size, functional diversity) and team effectiveness (Ramayah et al., 2003).

In term of theoretical significance, this study will provide significant empirical evidence to identify and critically evaluates important factors for virtual team effectiveness besides examined by other researchers in western countries (Lurey & Raisinghani, 2001; Hertel et al., 2005; Horwitz et al., 2006; Peters & Manz, 2007; Stockdale & Kuhne, 2007). Based on the study from Lin et al. (2008) on develop an effective virtual team, they found that only five factors (relationship building, cohesion,

trust, communication and coordination) had impacted the team performance and member satisfaction of virtual teams. This study will added new variable which is reward into the research framework to investigate for possible relationship toward team performance. Besides that, new relationship also will be assessed in this study which is possible moderating effect of task complexity on the relationship between trust and team performance.

In short, this study will review the factors such as coordination, communication, relationship building, trust, cohesion, and reward impact on the effectiveness of virtual team in team performance and team member satisfaction with consideration on possible impact from team characteristics, mainly task complexity. These factors have yet to be researched in the context of virtual team in multinational manufacturing firms of Malaysia.

1.7 Definition of Terms

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

- (a) **Virtual Team** is a group of people working on interdependent tasks, geographically distributed, conduct their core work mainly through an electronic medium and share responsibility for team outcomes (Horwitz et al., 2006).
- (b) **Team Effectiveness** is defined in terms of group-produced outputs and the consequences a group has for its members (Piccoli et al., 2004). In this study, team performance and member satisfaction represent the two major measures of effectiveness of virtual teams.

- (c) **Coordination** is defined as comprises the degree of effort between the team members to manage collective resources and the extent to which the work activities of team members are logically consistent and coherent (Lin, Standing & Liu, 2008).
- (d) **Communication** is defined as the transition of information and understanding through the use of common symbols (verbal or nonverbal) between two or more team members in the appropriate manner (Ivancevich et al., 2008).
- (e) **Relationship Building** is defined as includes interaction processed designed to increase feelings of inclusiveness or belonging to the team that further foster cohesion and trust (Powell, Piccoli & Ives, 2004).
- (f) **Cohesion** is defined as a dynamic process that is reflected in the tendency for a group to stick together and remain united in the pursuits of its instrumental objectives and/or for the satisfaction of member affective needs (Hambley, O'Neill & Kline, 2007).
- (g) **Trust** is defined as the willingness of virtual projects team members to be reliant on each other based on the expectation that each member will perform actions beneficial to the success of the team (Mumbi & McGill, 2008).
- (h) **Reward** is defined as the ultimate motivator that used to encourage individual and group performance by means of a range of mechanisms such as salary increases and performance bonuses (Drouin, Bourgault & Gervais, 2010).
- (i) **Task Complexity** is defined as the extent of difficulty and complexity of the activities and jobs that need to be carried out by the virtual team. Routine and knowledge are two component of task complexity (Dayan & Di Benedetto, 2009).

- (j) **Team Performance** is defined as the extent to which the group's output, product or service, meets the required standards or measures (Lurey & Raisinghani, 2001).
- (k) **Team Member Satisfaction** is defined as the extent of the members' perception of decision and agreements with the eventual outcomes (Lin et al., 2008).

1.8 Organization of the Remaining Chapters

Chapter 1, the current chapter, introduced the background of study, identified the research problems and discussed its context. This report is presented in the following sequence for remaining chapters: Chapter 2 reviews the related literatures of theories for study and main variables in the research. This is followed by Chapter 3 that mainly focus on the research framework, design of study and methodological procedures. Next, Chapter 4 will elaborate the data analysis done on the results and the research hypothesis tested. Lastly, Chapter 5 conclude the thesis with discussions, implications and limitations of research.

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 coordination, communication, relationship building, trust, cohesion, reward, 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. This chapter also highlights the gaps identified from previous studies.

2.2 Virtual Team

There are different definitions of virtual teams, but in general they can be summarized as teams that rely on technology and have some constraints such as location and time. Based on Striukova and Rayna (2008), a team can be completely virtual or predominantly face-to-face, and partially dependent on technologies of communication. Hence, the degree of virtuality is influenced by the extent to which a team is dependent on technology. In addition, there are two types of virtual teams which it may be permanent or temporal (Striukova & Rayna, 2008). Virtual teams can be found in various fields, such as research & development, customer services or problem solving task forces, and they also exist in non-economic organizations such as virtual laboratories in sciences (Hertel et al., 2005).

Another definition by Powell et al. (2004) is virtual teams as groups of geographically, organizationally and/or time dispersed workers brought together by information and telecommunication technologies to accomplish one or more organizational tasks. In short, a virtual team has been identified with the following four common characteristics as below (Hertel et al., 2005):

- (a) Two or more team members who
- (b) Collaborate interactively to achieve common goals, while
- (c) At least one of the team members works at a different location, organization, or at a different time so that
- (d) Communication and coordination is predominantly based on electronic communication media (e-mail, phone, video conference, fax etc.)

Organizations are taking advantage of innovations in communication technology to enhance performance by creating virtual team. The creation of virtual teams provides companies with the flexibility to draw on skills, knowledge, and perspectives that would not be available for onsite collaboration when valuable members are geographically and organizationally dispersed (Greenberg et al., 2007). Besides that, the unifying perspectives of working in a multi-cultural environment can underpin the increasing importance of the provision of services to global customers and improve decision making and problem solving (Stockdale & Kuhne, 2007). As cited from Cascio (2000), Horwitz et al. (2006) stated virtual team may also have disadvantages such as setup, maintenance and training costs, potential cross-cultural difficulties in team interaction, feelings of isolation and lack of trust.

2.3 Theoretical Background

There are three theories which are more suitable for this study: Media Richness Theory (MRT), Social Information Processing Theory (SIP) and Social Presence Theory. This section explains each theory and justification of the selected theory in this study will also be discussed.

2.3.1 Media Richness Theory

The Media Richness Theory, proposed by Daft and Lengel (1986) stated the key factors in “richness” are “the medium’s capacity for immediate feedback, the number cues and channels utilized, personalization, the language variety” (Beranek & Martz, 2005; Bryant et al., 2009). Based on the study from Bryant et al. (2009), Daft and Lengel (1986) provide the following list of media in order of decreasing richness:

- (1) Face-to-face,
- (2) Telephone,
- (3) Personal documents such as letters or memos
- (4) Impersonal written documents, and
- (5) Numeric documents.

From the Figure 1, newer technologies, such as video conference, anticipated to rank below face-to-face communication, but above the telephone in terms of media richness (Hambley et al., 2007).

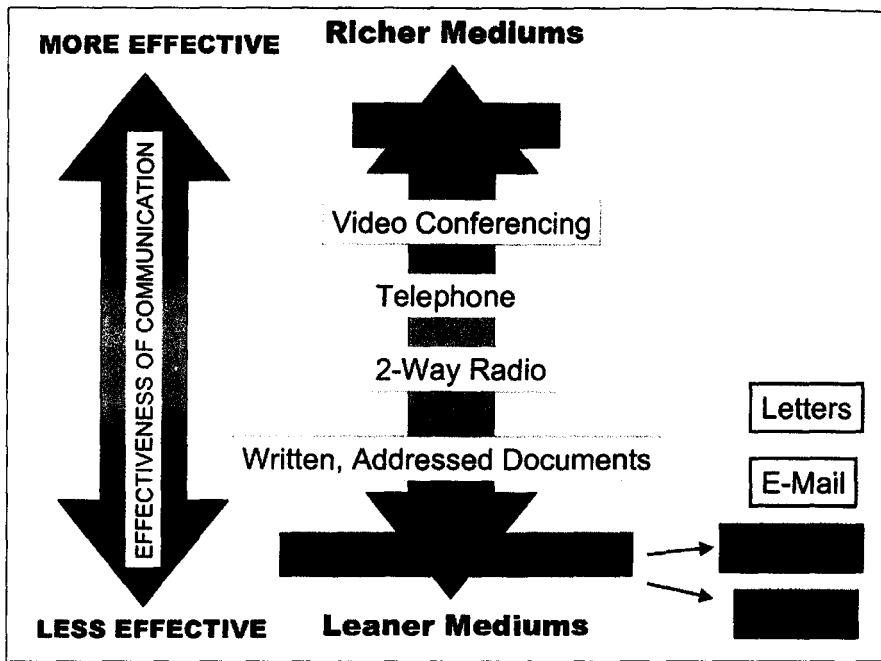


Figure 1. Media Richness Theory: Explanatory Diagram (Daft and Lengel, 1986)

Virtual teams face challenges in limitation in quantity and quality of information due to limitation of media. As cited from Daft and Lengel (1986), Lin et al. (2008) stated the Media Richness Theory showed that the success of organization is determined by the ability to process information of appropriate richness in order to reduce uncertainty and clarify equivocality. According to this theory, the type of medium most suitable for a task depends on the level of uncertainty and the equivocality of the task at hand (Bryant et al., 2009). Example, based on Bryant et al. (2009), a task high in uncertainty and high in equivocality should benefit from rich media in the decision-making process.

Therefore, according to Beranek and Martz (2005), Media Richness Theory suggests that rich media such as face-to-face communication are better suited for highly equivocal tasks; and leaner media such as written or textual are better suited for less equivocal tasks, and the appropriate match of media and task promotes enhanced

managerial effectiveness. This theory assumes that task performance can be improved by an effective match between communication method and task, and that making that match is an executive skill (DeLuca & Valacich, 2006).

2.3.2 Social Information Processing Theory

As cited by Beranek and Martz (2005), Social Information Processing (SIP) proposed by Walther (1992) stated this theory suggests that relational intimacy may take longer to develop in computer-supported groups, and the theory was used as the basis for testing a temporally bounded model of group behavior. This theory suggests that the impact of media on group outcomes will likely evolve over time, allowing for social processes and group outcomes to be enhanced as team members willing familiarity with each other and gain expertise with the media and their features (Pazos & Beruvides, 2011).

As cited from Walther (1996), the theory suggests that team members are driven to develop strong social relationships and that those relationships can also be built in computer-mediated groups when they may need more time to exchange enough social information. Team members will adapt to the communicative cues that the media offers them over a period of time; therefore, the role of time should not be ignored in the study of group communication and behavior (Pazos & Beruvides, 2011).

2.3.3 Social Presence Theory

The Social Presence Theory, proposed by Short et al. (1976) stated this theory implies that the fewer channels available within a medium, the less attention is paid by the users to the presence of other participants' interactions, and social presence declines as

messages become more impersonal (Beranek & Martz, 2005). This theory would tell us to choose media based on the amount of interpersonal involvement needed for a task. Besides that, this theory also supports the use of face-to-face media for complex tasks in team (DeLuca & Valacich, 2006).

Cited from Short et al. (1976), the degree of social presence varies, depending on how rich the medium is, and whether the communication is synchronous or asynchronous in a virtual environment. A richer medium has the opportunity to increase social presence because of the additional cues and communication channels available in a richer media (Bryant et al., 2009). It is felt this is caused in part by fewer non-verbal cues and social context cues characteristically found in virtual teams which, in turn, negatively impact interpersonal impressions (Beranek & Martz, 2005).

2.3.4 Choice of Theory

Virtual teams always deal with considerable distances, different cultures, and diverse organizational backgrounds. Thus, Media Richness theory has been chosen and underpins the theoretical base of this study due to the lack of face-to-face communication in virtual teams (Lin et al., 2008). Besides that, Media Richness Theory is a commonly used theory for describing how task performance impacted by different communication (Hambley et al., 2007). This theory is a deterministic theory suggesting that media effects and constraints remain static over time and disregards the dynamic and complex nature of teams and the adaptation to the environment and to the media (Pazos & Beruvides, 2011). Lin et al. (2008) stated MRT showed that organizational success determined by the organization's ability to process information of appropriate richness.

2.4 Variables of the Study

This section discusses variables identified in this study and what are the impacts of those variables on the effectiveness of virtual team. Justification of the selected variables will also be discussed.

2.4.1 Coordination

Malik (2004) stated that multinational companies (MNCs) have increased the volume of technological knowledge flows between their corporate headquarters and subsidiary operations, therefore the coordination of knowledge activity through employment of virtual teams which geographically dispersed, are recognized by many large organizations as an enabler of competitive advantages for business. Procedures should always enforce to monitor the level of cooperation between team members in all locations by utilizing technology effectively (Casey, 2010).

According to Peters and Manz (2007), Duarte and Snyder (2001) stated it is very crucial that there is shared understanding about roles and accountabilities in a virtual environment because this leverages expertise, facilitates coordination, and avoids redundancy and duplication of work. Virtual team should have proper coordination to achieve performance because members who are geographically dispersed experience longer project delays than the collocated ones (Ahuja, 2010). Teams may not be able to develop such a common understanding due to the reduced frequency in informal communication, thus leading to weaker coordination within teams (Dayan & Di Benedetto, 2009).

Exchanging information through computer mediated communication cultivates the coordination of virtual teams (Lin et al., 2008). As cited by Piccoli et al. (2004), Johansson et al. (1999) found that virtual teams will be more effective and satisfied if the team can overcome coordination difficulties such as cultural or work process differences, power considerations, and lack of communication. In their study to identify the impact of managerial controls on virtual team effectiveness, Piccoli et al. (2004) found that the most satisfied team members were in the virtual teams with effective coordination and communication.

2.4.2 Communication

Communication represents the core of any virtual team process. Brake (2006) stated that communications on the virtual team must have a significant “getting to know you” component where by team members not just feel valued for what they do or where they are but they need to feel valued for who they are. Thus, in order to employing electronic communication, technology infrastructure is a necessary foundation (Buche, 2008).

The richest medium is face-to-face communication, followed by telephone, chat, e-mail, and print communications (Hambley et al., 2007). At the same time, according to Powell et al. (2004), virtual team faces challenges in effective communication including time delays in sending feedback, lack of a common frame of reference for all members, assurance of participation from remote team members, and differences in salience and interpretation of written text.

One important component to virtual team working is communication and this provides one method for evaluating the effectiveness of virtual team working (Anderson,

McEwan, Bal & Carletta, 2007). As cited by the Anderson et al. (2007), communicative difficulties in traditional and virtual team have been found to relate to poor performance, thus good communication flow within organization is considered to be important in virtual team. Casey (2010) stressed that the management should ensure that effective policies and procedures are put in place to facilitate communication between sites; therefore communication difficulties do not become an obstacle for virtual team operate effectively.

According to Ahuja (2010), effective communication in virtual team is necessary for a strong performance because proper communication helps in avoiding misunderstandings and conflict. As cited by the Anderson et al. (2007), in the study on virtual team where members located in different countries, Kayworth and Leidner (2000) suggested that ongoing communication frequently was crucial for virtual team effectiveness.

2.4.3 Relationship Building

Lack of personal interaction has become one of the major challenges that need to be overcome when using computer-mediated communication (Peters & Manz, 2007). Based on the study of virtuality impact on team performance from Ahuja (2010), Warkentin et al. (1997) found that virtual team should out more effort and time for relationship building as compared to FTF team in the initial phase of project. Face-to-face meetings should be encouraged because it will create a sense of belonging to the team and relationship building in the beginning stage of team development.

According to Lin et al. (2008)'s study, Pauleen (2003) found out seven virtual team leaders from several New Zealand organizations and developed a framework to strengthen the relationship of virtual team members. Preparation of relationship building is one of the key components of the framework prior to the commencement of a project. Team members also need to take up the responsibility to develop and sustain relationships (Peters & Manz, 2007).

From the study to determine the factors that contribute to/inhibit the success of a virtual team from Lurey and Raisinghani (2001), there is a strongest relationships between members' relation and team performance or member satisfaction. Besides that, from the study done by Beranek and Martz (2005) on improving the communications among virtual team members using training methods, relational link training seems beneficial for virtual teams as the teams that had relational link:

- (a) had higher level of satisfaction with their team's output,
- (b) had higher levels of team cohesiveness, and
- (c) had a better impression of the team's virtual meeting process.

From their studies, relationship building can be seen as a key variable in a virtual team and appropriate communication targeted at developing better relationships among the team members becomes a critical factor.

2.4.4 Trust

Trust plays an important role that holds the entire team together where virtual team members are not physically co-located and where technology is used as the major means of communication (Clemmensen, Khryashcheva & Podshibikhina, 2008). This is one

central issue that has evoked an increased need for trust in virtual teams. Although software applications such as e-mail, Instant Messaging (IM) and mobile communication, and interaction on web-based infrastructures provides rich opportunities for instant communication, it often lacks the differentiating cues that influence judgments about trustfulness (Julsrud, 2008).

Hence, an understanding of how trust impacts a virtual team is essential to help management monitoring appropriate activities that influence trust components throughout the virtual team life cycle. Additionally, Horwitz et al. (2006) stated a lack of trust can impact the virtual team success. Building trust within a team is a core process that is important for collaboration, communication, and coordination, as well as overall team performance (Drouin et al., 2010). Based on the research done by Mumbi and McGrill (2008) on the role of trust in virtual project management success, trust had a significant positive impact on project success in virtual team. Clemmensen et al. (2008) reported the benefits of increased trust in virtual team is better productivity, efficiency and quality performance, due to the non-productive behaviours such as excessive checking and protective control are reduced.

In the study of Dayan and Di Benedetto (2010) to determine the impacts of trust on NPD team performance and antecedents of trust formation in NPD teams, the results showed that team performance (team learning and new product success) can be impacted by interpersonal trust.. As cited by Ahuja (2010), Chudoba et al. (2005) argued that the development of trustworthy relationships in the teams leads towards better performance. Conclusion, trust can be considered as a key variable in a virtual team.

2.4.5 Cohesion

Team cohesion is a dynamic process that is reflected in the tendency for a group to stick together and remain united in achieving its instrumental objectives and/or the satisfaction of member affective needs (Hambley et al., 2007). Drouin et al. (2010) stated cohesion appears to have a major impact on effective virtual team, as it facilitates team functioning, encourages extra-role helping, and helps prevent employee turnover in organization.

According to Pazos and Beruvides (2011), Festinger (1950) defined cohesion as the resultant forces which are acting on the members to stay in a group. Powell et al. (2004) argued that in virtual team environment, while team members begin with lower cohesion, over time, team members exchange enough social information to develop strong cohesion. As stated by Hertel et al. (2005), cohesion has been considered relevant for a number of positive effects in virtual team from the previous studies, such as enhanced motivation, better decision, more open communication and higher satisfaction. According to Beranek and Martz (2005), Evans and Dion (1991) analyzed over 17 studies that investigated cohesiveness and found that cohesion contributed to a number of positive outcomes such as increased awareness of conflicts, improved morale and motivation, and a willingness to change.

Highly cohesive teams show improvement in their decision-making processes, use more open communication, and generate higher personal satisfaction (Drouin et al., 2010). A review of current literature done by Powell et al. (2004), they found that cohesion has been associated with better performance from the Lurey and Raisinghani

(2001), and Maznevski and Chudoba (2001) studies and greater satisfaction from Chidambaram (1996) study. Hence, cohesion is an key variable in the virtual team.

2.4.6 Reward

According to Drouin et al. (2010), reward system is used to encourage individual and team performance by means of a range of mechanisms such as salary increases and performance bonuses. It ensures organizational monitoring of the team's progress in achieving objectives. According to Rack et al. (2011), Ellwart, Hertel and Konradt (2011), in order to maintain or even increase team members' work motivation, no other incentive or motivational approach comes even close to money with respect to its instrumental value.

Choi, Kang and Lee (2008) stated a reward system can motivate employees to focus on their efforts in achieving common goals in organization, and rewards consist of extrinsic rewards (bonuses) and intrinsic rewards (praise and public recognition). In their study, Choi et al. (2008) found that the relationship between intrinsic reward and knowledge sharing was to be stronger than that between extrinsic reward and knowledge sharing. In recent years, team-based rewards become increasingly important in many companies as compared to individual-pay systems, because team-based encourage information exchange and organizational learning instead of inter-individual competition between employees (Rack et al., 2011). One of the objectives of reward system is to motivate employees to achieve high levels of performance (Hertel et al., 2005).

Drouin et al. (2010) stated the reward system is the ultimate motivator that converts the team's potential into performance. Lurey and Raisinghani (2001) surveyed

67 individuals who comprised a total of 12 virtual teams found that team leaders need to create team-based reward system due to this is one of the variable exhibited the strongest association to team effectiveness. Hertel et al. (2005) stated in their research that the relationship between the implementation of recognition plans related to the overall team success and the effectiveness of virtual teams is significant. While Bryant et al. (2009) who also conducted a study to explore the dynamics of virtual team and they found that the use of a mix-incentive reward system will increase team member satisfaction.

According to Rack et al. (2011), Jenkins et al. (1998) found that financial incentives lead to higher task performance when performance is measured quantitatively on his meta-analysis findings based on 39 studies. Besides that, Hertel et al. (2004) showed that team-based rewards were positively related to team performance in a cross-sectional field study with 31 virtual business teams (Rack et al., 2011). Hence, the development of a fair and motivating reward system is another important issue at the beginning of virtual teamwork.

2.4.7 Task Complexity

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 (Ramayah et al., 2003). In the study done by Dayan and Di Benedetto (2009), there are two components of task complexity:

- (a) Routine is about the level of repetitiveness of the elements of tasks.
- (b) Knowledge is about whether the tasks rely on established bodies of knowledge or require new or novel solutions.