THE INFLUENCE OF LEADERSHIP ROLES AND TEAM BUILDING & PARTICIPATION ON TEAM SHARED MENTAL MODELS: A STUDY OF PROJECT MANAGERS IN MALAYSIA

A INFLUÊNCIA DOS PAPÉIS DE LIDERANÇA E CONSTRUÇÃO DA EQUIPE E PARTICIPAÇÃO NOS MODELOS MENTAIS COMPARTILHADOS POR EQUIPES: UM ESTUDO DE GERENTES DE PROJETOS NA MALÁSIA

Han Ping FUNG

Email: hanping.fung@aeu.edu.my

School of Management, Asia e University, Kuala Lumpur, Malaysia

Abstract – More and more project teams are formed to achieve organizational objectives as organizations generally recognize the importance and benefits of project teams. One of the outcomes working in a project team is the proliferation of Team Shared Mental Models (TSMM). It is critical to examine the antecedents of TSMM which is the aim of this study as TSMM by itself can contribute to project team learning and others. However, it is unclear from literature whether both leadership roles and team building & participation can influence TSMM concurrently especially in a project setting study whereby there is resource and time constraint compare to normal work teams which are ongoing and operational in nature. This study has developed a research model underpinned on Cohen and Bailey's (1997) Team Effectiveness Framework to empirically analyze how leadership roles and team building & participation can predict TSMM. Based on 201 random sample responses from project managers in Malaysia, findings suggest that leadership roles can influence TSMM indirectly via team building & participation. Knowledge contribution of this study is that project managers should invest extra efforts in team building & participation as it is the main contributor to TSMM.

Keywords – Team Shared Mental Models, Leadership Roles, Team Building & Participation, Cohen and Bailey's (1997) Team Effectiveness Framework, Project Manager.

Resumo
Mais e mais equipes de projeto são formadas para atingir os objetivos organizacionais, pois as organizações geralmente reconhecem a importância e os benefícios das equipes de projeto. Um dos resultados trabalhando em uma equipe de projeto é a proliferação de Team Mental Models Compartilhados (TSMM). É fundamental examinar os antecedentes do TSMM, que é o objetivo deste estudo, já que o TSMM por si só pode contribuir para o aprendizado da equipe do projeto e outros. No entanto, não está claro na literatura se os papéis de liderança e

formação de equipe e participação podem influenciar o TSMM simultaneamente, especialmente em um estudo de configuração do projeto, em que há restrição de recursos e tempo para equipes de trabalho normais e operacionais. Este estudo desenvolveu um modelo de pesquisa baseado no Enquadramento de Eficácia da Equipe de Cohen e Bailey (1997) para analisar empiricamente como os papéis de liderança e a formação e participação de equipes podem prever o TSMM. Com base em 201 respostas de amostras aleatórias de gerentes de projetos na Malásia, as descobertas sugerem que as funções de liderança podem influenciar indiretamente o TSMM por meio da formação e participação de equipes. A contribuição do conhecimento deste estudo é que os gerentes de projeto devem investir esforços extras na formação de equipes e participação, pois é o principal contribuinte para a TSMM.

Palavras-chave – Equipe, Modelos Mentais Compartilhados, Papéis de Liderança, Construção de Equipe e Participação, Cohen e Bailey (1997), Estrutura da Equipe de Eficácia, Gerente de Projetos

1 INTRODUCTION

Today, more and more organizations are using project teams to deliver products or services as well as resolving problems especially on complex tasks. This is because team performance through team is more rewarding than individual performance as the team outcomes exceed the sum of individual outputs (Belbin, 1993). One of the outcomes working in a team is the proliferation of **Team Shared Mental Models** (TSMM). TSMM *refers to shared knowledge about team members' characteristics and team interaction patterns that enable team members to adapt and coordinate among themselves to complete a project* (Cannon-Bowers, Salas & Converse, 1993).

The rationale to study TSMM is that it is affecting team effectiveness, team commitment and team performance (Carley, 1997; Heffner, 1998; Kraiger & Wenzel, 1997; Mathieu, Heffner, Goodwin, Salas & Cannon-Bowers, 2000; Kang, Yang & Rowley, 2006; Marberry, 2007; Hsu, Jiang, Parolia & Klein, 2007; Yang, Kang & Mason, 2008; Hamilton, 2009; Barnes, 2009). Moreover, TSMM is also influencing decision making effectiveness (Randall, 2008), team visibility, team satisfaction, team learning as well as team creativity (Nandkeolyar, 2008).

Literature shows that TSMM has significant impact on team learning and organizational

learning. According to Nandkeolyar (2008), TSMM is one of the learning mechanisms that determine team learning and effectiveness. Druskat and Pescosolido (2002) also posited that TSMM is capable to support and encourage team activities that will improve learning and development. Team learning is critical because it can improve team effectiveness and performance (Quick & Nelson, 2009). According to Garvin (1993), Pedler, Burgoyne and Boydell (1991), Senge (1992) and Stata (1989), building a learning organization is the only true source for sustainable competitive advantage. However, in order to achieve learning organization, management teams need to share their mental models i.e. share their viewpoints about their organizations, markets and competitions (deGeus, 1988). Morrison and Rosenthal (1997) also suggested that capability to harness shared mental models is a critical factor in building learning organizations. Since TSMM is proven to impact learning, hence it is important to find out what are the antecedents of TSMM.

From literature, there are some individual antecedents of TSMM which include skill and agreeableness (Yang et al., 2008), team leadership, team composition i.e. cognitive ability, achievement striving and psychological collectivism (Randall, 2008), team building (Hsu et al., 2007), team characteristics i.e. experience, member diversity, personality and education (Bergiel, 2006). However, project management literature is generally silent on how leadership roles and team building & participation are concurrently influencing TSMM in a Malaysian project setting.

Hence, problem statement of this study is lack of empirical understanding on how project leadership roles and team building & participation are influencing TSMM in a multi-ethnical and multi-cultural Malaysia. This study deems important in view of the impact of TSMM on project team learning, effectiveness and performance. These impacts are highly sought after by many Malaysian organizations because they have invested a lot of resources onto project teams in order to achieve their objectives. Research objective for this study is to evaluate how

leadership roles and team building & participation are influencing TSMM as perceived by project managers in Malaysia. Research questions for this study include: (a) Can leadership roles significantly influence TSMM? (b) Can leadership roles significantly influence team building & participation? (c) Can team building & participation significantly influence TSMM?

1. LITERATURE REVIEW AND RESEARCH MODEL

Relationships between team-related factors and team effectiveness, team performance or team outputs can be found in numerous team effectiveness models which include Driskell, Hogan and Salas (1987), Salas, Dickinson, Converse and Tannenbaum (1992), Tannenbaum, Beard and Salas (1992), Cannon-Bowers, Tannenbaum, Salas and Volpe (1995), Klimoski and Jones (1995), Cohen and Bailey (1997), Shanahan (2001), Rasker, Vliet, Den Broek and Essens (2001), Blendell, Henderson, Molloy and Pascual (2001). Among these models, Cohen and Bailey's (1997) team effectiveness framework encompasses the widest breadth whereby it covers the most categories of factors as well as cited more frequently in project management literature (Walters, 2004; Scott-Young & Samson, 2009; Randeree & Ninan, 2011; Sessa, London, Pingor, Gullu & Patel, 2010).

According to Cohen and Bailey (1997), team effectiveness is a function of the following four categories of factors which include: (a) environmental factors, (b) design factors, (c) group processes, and (d) group psychosocial traits. Environmental factors are external characteristics that an organization is exposed to e.g. industry turbulence. Design factors are features of the task, group and organization that managers can use to create conditions for effective performance. Examples of task design factors are autonomy and interdependence. Examples of group composition design factors are size, tenure, demographics and diversity. Examples of organizational context design factors are rewards, supervision, training et al.

Group processes include interactions like communication and conflict that takes place among team members as well as external others. Lastly, group psychosocial traits include shared understandings, beliefs or emotional tones e.g. norms, cohesiveness, team mental models and group affects. Following Figure 1 depicts the Cohen and Bailey's (1997) team effectiveness framework.
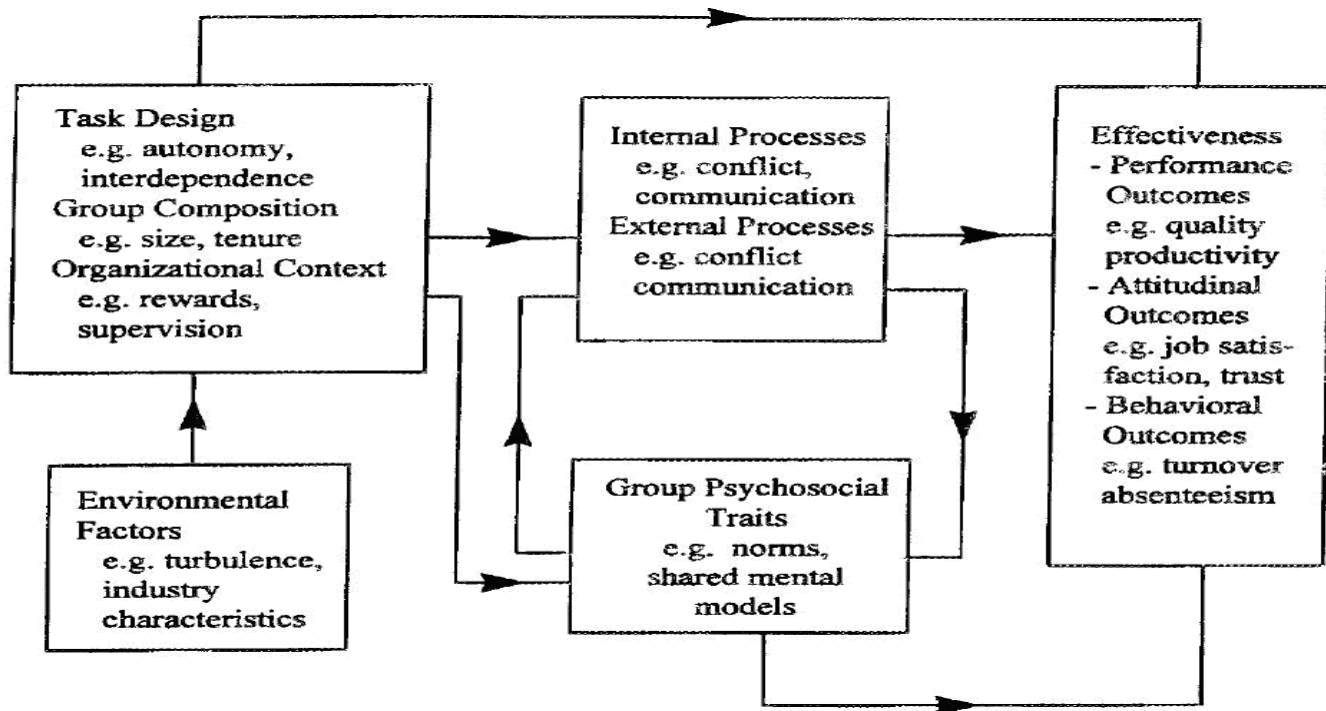

Figure 1: Cohen and Bailey's (1997) Team Effectiveness Framework

The above framework illustrated that design factors are having direct impact on team effectiveness outcomes as well as indirect impact on team effectiveness outcomes through group processes and psychosocial traits. Both group processes and psychosocial traits are also correlated with each other. At the same time, environmental factors have a direct influence on design factors. Altogether, environmental factors, design factors, group processes and group psychosocial traits can predict team effectiveness outcomes.

Within the organizational context of design factors (see Figure 1), supervision is one of the items that can influence both group processes and group psychological traits. In project

management context, supervision is a form of leadership duty that a project manager needs to perform in order to ensure that the project is progressing onto the right direction (Shanahan, 2001; Pinto, 2007). In the study of Cohen and Bailey (1997), supervision was not being discussed in isolation but rather was used to compare and contrast with leadership theory and leader's supervisory behaviors, moods and expectations. Instead of using supervision, in this study it has been expanded and substituted with leadership roles in order to evaluate how leadership roles can influence TSMM and team building & participation in a research model.

Team processes are team events or behaviors that transform a team or organization resources into team performance (Gladstein, 1984). Team processes also refer to conflict, communication, cooperation, collaboration and interaction that impact team effectiveness (Cohen & Bailey, 1997). From project management literature, it is unclear whether team building & participation can influence TSMM. In this study, team building & participation is selected as one of the team processes to evaluate how it influences TSMM.

Since this study encompasses project managers from different industries which might have different industrial characteristics and subject to different market influences, environmental factors are excluded from this study. Dependent variable in this study is TSMM which is derived from the group psychosocial traits of Cohen and Bailey's (1997) team effectiveness framework. Independent variables comprise leadership roles and team building & participation.

1.1. Team Shared Mental Models

According to Rouse and Morris (1986), mental model is a mechanism whereby an individual is capable to produce understanding of a system's purpose, the system's form, explanation on how the system is working, the system's current states as well as prediction of its future states. In a different perspective but referring to the same concept, mental model is

an internal cognitive view formed in an individual's mind after what he or she had perceived from the external world (McShane & Von Glinow, 2008). An individual's mental model can be e.g. a house (object), an accident (event) or a process such as a caterpillar's development to a butterfly which reflect the individual's perception of reality. Mental model can serves as an important roadmap to provide understanding, explanation and predictability to guide an individual's decision making, preferences and behaviors.

At any one time there are multiple mental models reside in different team members and these mental models are actively helping each team member to conceptualize and process information about their team, other team members, task as well as equipment the project team is using (Rouse & Morris, 1986; Levine & Moreland, 1991; Klimoski & Mohammed, 1994). When individual team members come together and interact, their mental models overlap and will share as common mental models whereby they are referred as shared mental models (Blickensderfer, Cannon-Bowers & Salas, 1997). With these shared understandings, the project team is likely to incur fewer errors and the team will also develop coherent decision making during project activities.

According to Cannon-Bowers et al. (1993), Shared Mental Models refer to common knowledge structures that enable team members to picture accurately the details and expectations of a task. These common knowledge structures will further guide the team members' actions, coordination as well as their behavioral adaptations to meet the demands of the task. Figure 2 below depicts the process required to develop a shared mental model:
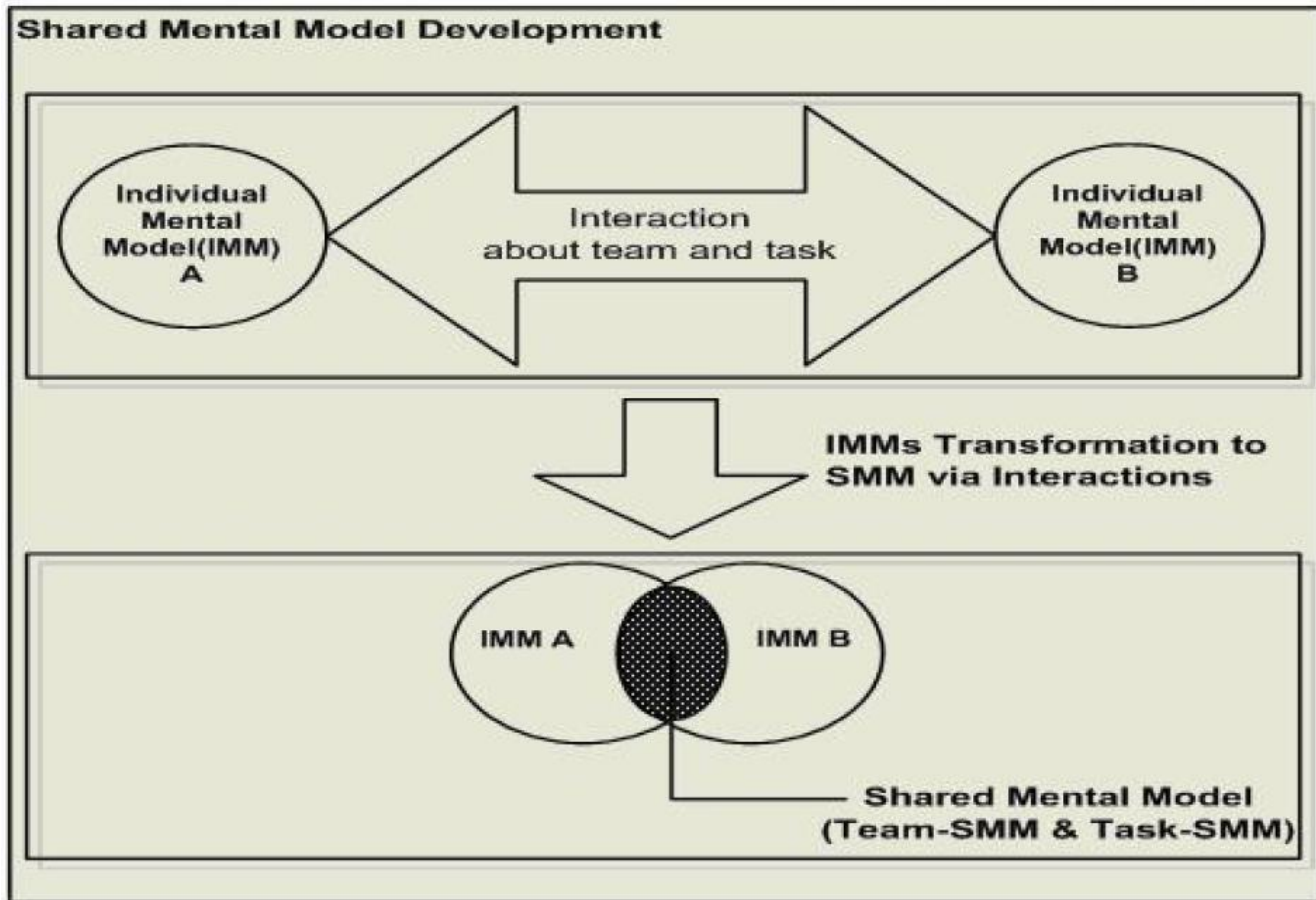
Figure 2: Process to Develop a Shared Mental Model (Lee, 2007)

Shared mental models are divided into two categories i.e. task shared mental models and

team shared mental models (Cannon-Bowers et al., 1993; Klimoski & Mohammed, 1994;

Mathieu et al., 2000; Mathieu, Heffner, Goodwin, Cannon-Bowers & Salas, 2005). Following

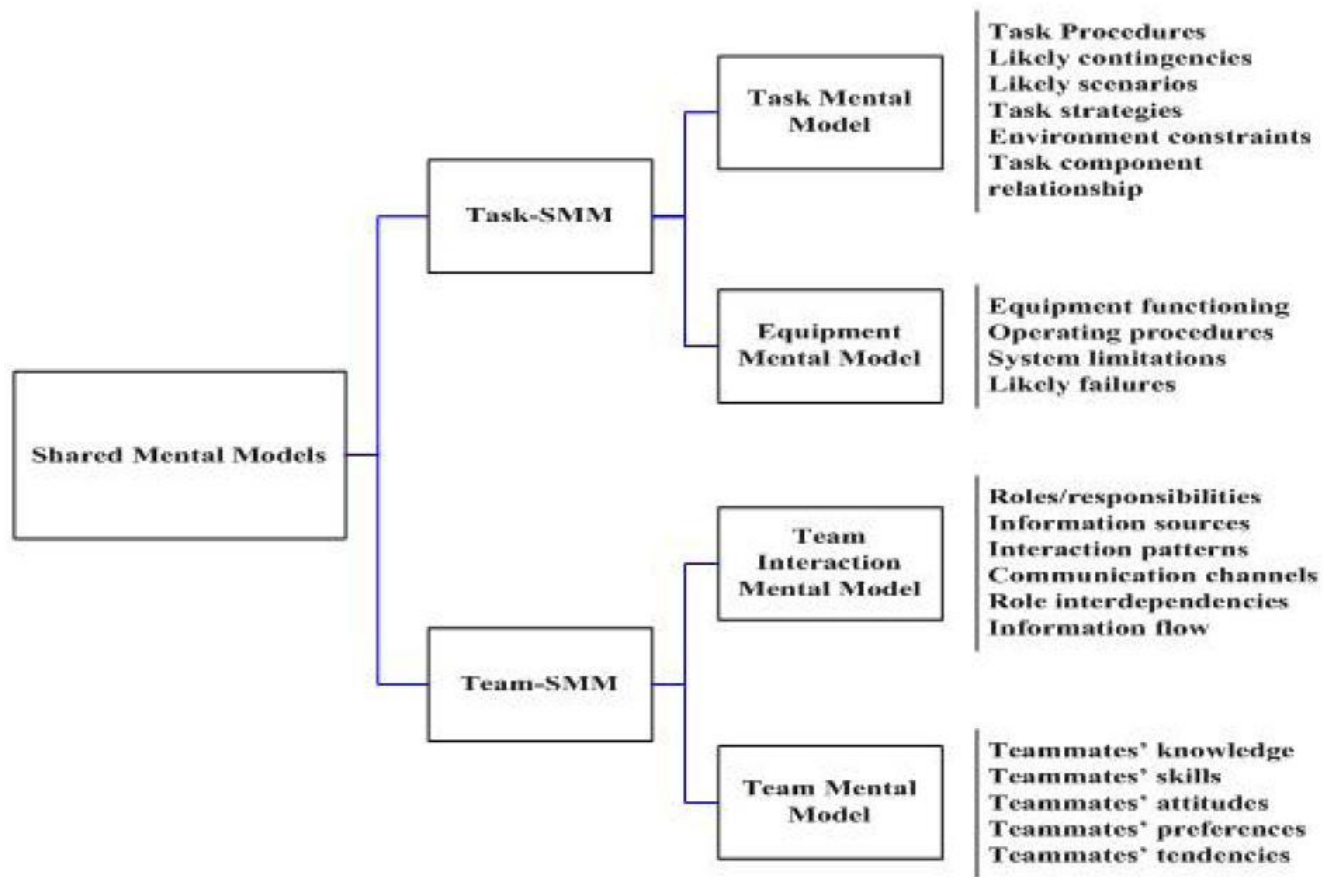Figure 3 depicts the two categories of shared mental models (see 2nd column from left):

Figure 3: Team Shared Mental Models and Task Shared Mental Models (Lee, 2007)

Team Shared Mental Models (TSMM) are subdivided into team interaction mental model and team mental model. Team interaction mental model refers to common knowledge of team roles, responsibilities, interdependencies and interaction patterns among team members. Team mental model refers to shared knowledge pertaining to individual team member's knowledge, skills, attitudes and preferences.

In this study, the focus is on TSMM whereby it is the dependent variable. Only both team interaction mental model and team mental model are considered as they are more relevant to team in a project environment. According to Mathieu et al. (2000), task shared mental models are only related to technology / equipment and job / task. Task-related knowledge is only relevant to specific job or task whereby it is very contextual, domain-specific and it is being

used specifically for that purpose. Consequently, task shared mental models decrease the need for team members to communicate or interact about their tasks because the contents within these models are relatively more stable in comparison with TSMM. Hence, task shared mental models are excluded from this study.

In order for the team to be successful, team members not only need to perform well on task functions but also need to work together and work well as a team (Mathieu et al., 2005). There are findings indicated that TSMM is more significant than task shared mental models in influencing team performance (Heffner, 1998; Mathieu et al., 2000; Leversque, Wilson & Wholey, 2001).

1.2. Leadership Roles

According to Yukl (2010), leadership is a process to facilitate others to acknowledge what needs to be achieved and how it can be accomplished in order to meet the stated objectives. In a project management context, leadership is the capability of a project manager to influence a team to complete works required in order to reach a common goal (Project Management Institute [PMI], 2008). The above definitions hi-light the following three common elements: leader, followers (those who are being led) and the goal (or objective). These three elements of leadership co-exist in an environment setting whereby they are subject to different political, economical, social and technological influences. All the leadership theories, models and styles are theorized and ameliorated surrounding the above three elements in different situations of the environment. The following Figure 4 depicts the three common elements and some of the well-known leadership theories that had been researched and practiced.
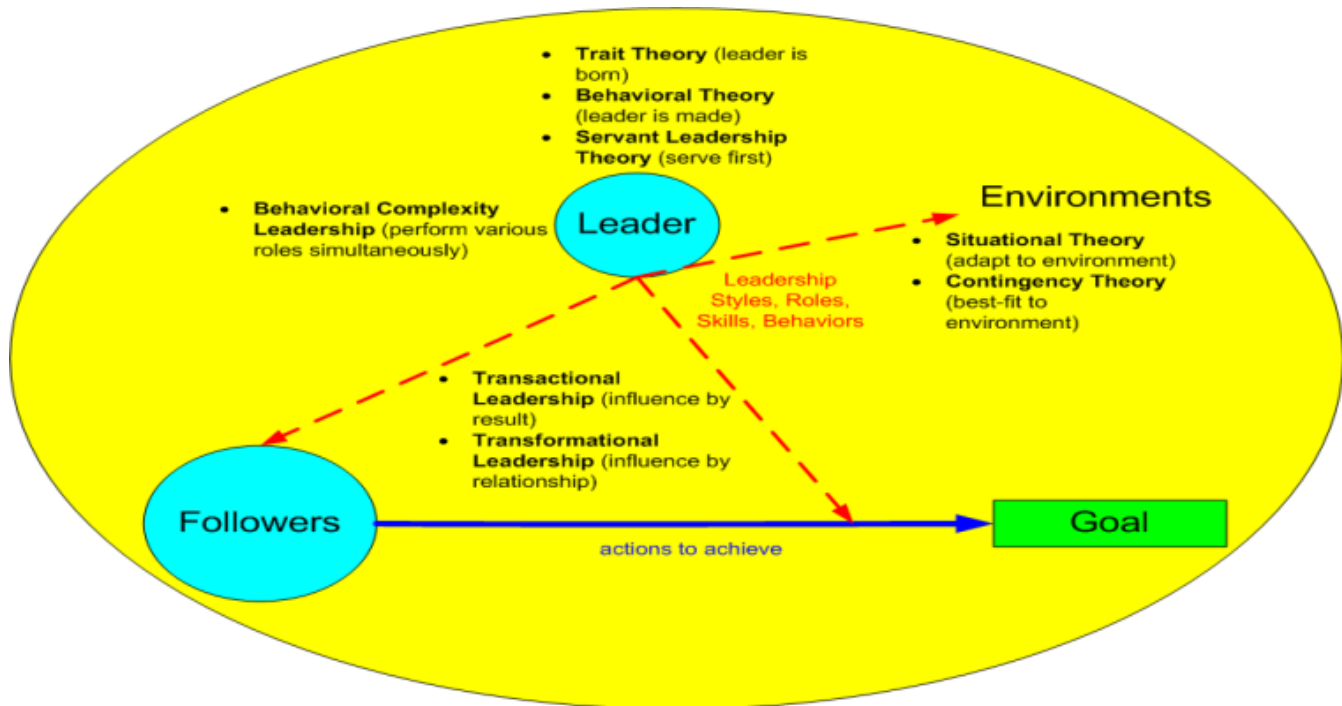
Figure 4: Leader, Followers, Goals and Major Leadership Theories

From literature, studies have shown that a project manager's leadership style did impact his or her perception of success in different situations instead of directly impacting project success itself (Turner & Muller, 2005). Generally in a project management realm, being task-oriented is the preferred leadership style to having people-oriented leadership style (Turner & Muller, 2005). However, according to Turner and Muller (2005), different project leadership styles are appropriate at different stages of a project life-cycle as well as for projects with different cultural values. Even though Turner and Muller (2005) had conducted a very thorough literature review on project manager's leadership theories and styles like: trait school, behavioral school, contingency school, visionary or charismatic school, emotional intelligence school, competency school, behavioral of team members et al. However, there was no review on Behavioral Complexity in Leadership (BCL). Project management literatures are generally silent on BCL but other leadership theories like transactional

leadership (Neuhauser, 2007) and transformational leadership (Prabhakar, 2005) are well researched whereby results shown that they had influence over project success.

Behavioral Complexity in Leadership (BCL) theory explains that effective leaders will equip and perform various leadership roles and opposing behaviors simultaneously when confronted with complex and fast changing environments (Denison, Hooijberg & Quinn, 1995). Opposing behaviors refer to competing or contrasting behaviors like creative and routine, strict and lenient et al. These various leadership roles and opposing behaviors are extracted from a repertoire of roles and behaviors which grew over time and affected by the experiences of the leaders. More roles and behaviors that a leader can display in a particular situation, more effective is the leader. Effective leaders are capable in identifying the needs of his followers within a particular situation and he or she will adjust, behave or perform the roles that will meet those needs. According to Yukl (2010), BCL theory is not new but it is still evolving whereby it has emerged in recent years as a new approach to conceptualize leadership.

In this study, BCL theory is adopted instead of other leadership theories because only BCL theory focuses on the complexity and contradiction of a leader's behaviors whereby the simultaneous and various opposing roles and behaviors of the leader enable him or her to deal with different complex situations more effectively (Denison et al., 1995). On the other hand, in more traditional leadership theories, situation is presented and leadership style is displayed in an absolute "either or" manner e.g. either Theory X or Theory Y, autocratic or democratic, task oriented or relationship oriented, autocratic or democratic, transactional or transformational subject to a particular situation (Denison et al., 1995). Displaying the right leadership style in a right situation demonstrates effective leadership. In today's complex and rapidly changing environment e.g. in situations whereby multiple objectives are contradicting each other, traditional leadership theories might not be as effective as BCL theory in handling

different complex situations at the same time e.g. a project may need to be completed at much lower cost, shorter duration and higher quality than previously agreed. In such situations, BCL leaders can display multiple leadership roles to handle the situation more effectively.

From literature, there are numerous theories about leadership roles. Some researchers had proposed what should be the leadership roles and complex behaviors in the repertoire of a leader e.g. Mintzberg's ten leadership / managerial roles which can be classified into (a) decision making related, (b) information processing related; and (c) interpersonal contact related (Mintzberg, 1973). Jessup (1990) proposed that leadership roles should include (a) advisor, (b) administrator and (c) coach. According to Stephen (1998), leadership roles consist of 13 sub-dimensions which include: (1) coaching, (2) effective communication, (3) encouraging teamwork, (4) establishing high standards, (5) effective delegation, (6) rewarding performance, (7) developing and releasing employees, (8) building consensus, (9) supporting reasonable risk taking, (10) forecast thinking, (11) improving the organization, (12) managing diversity, and (13) overall effectiveness. Gunnar and Torodd (1999) also suggested that various leadership roles can be categorized into four main roles i.e. (a) producer, (b) administrator, (c) integrator and (d) entrepreneur. Nevertheless, Quinn's (1988) model is adopted in this study as its leadership roles are well-known, well-balanced (i.e. encompasses internal, external, flexibility and control dimensions) and attracted the most citations (Quinn, 1988; Denison et al., 1995; Chen, Wu, Yang & Tsou, 2008; Wakefield, Leidner & Garrison, 2008; Zafft, Adams & Matkin, 2009).

Quinn (1988) proposed a model of leadership roles which consists of eight roles namely, facilitator, mentor, innovator, broker, producer, director, coordinator and monitor. These eight roles are spread over 4 quadrants (or sometimes refer also as profiles) in which each quadrant consists of two roles that are very close in terms of role's attributes versus roles in other quadrants (see Figure 5 below). The four quadrants are: 1) Relating to People, 2) Leading

Change, 3) Producing Results and 4) Managing Processes. These four quadrants are divided

by both x- and y-axis in which x-axis continuum consists of two extreme dimensions i.e.

focus on internal or external environment. Y-axis continuum comprises highly flexible and

highly controlled / stable environment. Each role consists of opposing attributes compared to

the role that is located on the opposite side e.g. mentor role attributes are opposite against the

director role attributes; likewise facilitator role is opposite against the producer role. All the
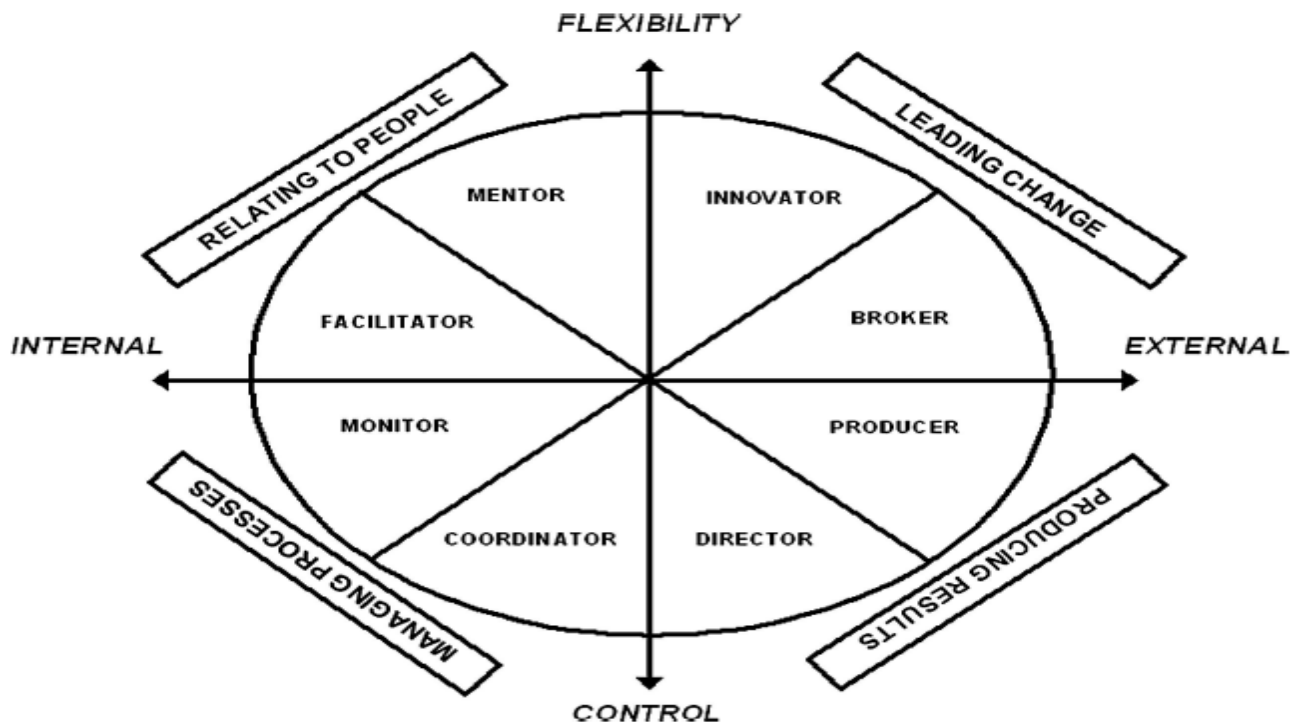
eight roles are defined as per Table 1 below.

Figure 5: Quinn Model of Leadership Roles (Quinn, 1988)

Table 1: Leadership Quadrants and Role Descriptions (Quinn, 1988)

Quadrant	Leadership Role
Relating to People (RP)	• Mentor: Acknowledges personal needs, develops people, caring, empathetic.
	• Facilitator: Acknowledges personal needs, develops people, practices participation and teambuilding, focuses on consensus building, manages conflict and encourages participative decision-making.
Leading Change (LC)	• Innovator: Inspires, anticipates customer needs, initiates significant changes, new ideas, experiments, problem solves, adaptable.
	• Broker: Same functions as innovator including, sells ideas, influences decisions at higher levels, acquires needed resources, strong negotiator.
Managing Processes (MP)	• Monitor: Clarifies policies, expects accurate work, controls projects, monitors progress, develops measures and checkpoints.
	• Coordinator: Same functions as the monitor including brings order, plans schedules, provides stability, control and continuity.
Producing Results (PR)	• Producer: Focuses on outside competition, emphasizes speed, hard work ethic, motivates people, initiates action.
	• Director: Same functions as producer including providing clear direction, clarifies priorities, communicates the vision, plans and prioritizes.

Quinn's Model of Leadership Roles explains that a more effective leader will be able to cover more roles e.g. three to four quadrants of roles in his or her repertoire versus a less effective leader who may only have one to two quadrants of roles. All the roles covered by a leader co-exist simultaneously within the leader but when facing different situations, certain roles will be demonstrated highly while some opposite roles will be retracted to a minimum degree. In this study, **leadership roles** are being *defined as the collection of eight roles which includes facilitator, mentor, innovator, broker, producer, director, coordinator and monitor that an effective project manager can demonstrate appropriately in a complex and rapidly changing environment* (Denison et al., 1995). There was a study conducted on how team leadership in terms of leader's sensegiving had influenced TSMM (Randall, 2008) but there is still lack of research on whether BCL theory will also influence TSMM. In the Malaysian context, despite the numerous studies conducted on leadership, there is no conclusive evidence showing the more widely practiced leadership styles (Lo, Ramayah & Run, 2010).

Moreover, none of them is evaluating how BCL theory is influencing constructs such as TSMM in a project setting.

There was a study conducted by Marks, Zaccaro and Mathieu (2000) on how a leader's communication in the manner of sense-making can help teams to develop share mental models. There was another study indicated that shared leadership is correlated with respective team mental models and transactive memory systems (Carson, Tesluk & Marrone, 2007). However, it is unclear whether BCL can influence TSMM. To date, there is still a lack of research on whether BCL can influence team building & participation. Hence, following hypotheses are proposed:

H1: Leadership Roles will positively influence Team Shared Mental Models.

H2: Leadership Roles will positively influence Team Building & Participation.

1.3. **Team Building & Participation**

Team building is recognized as an important interpersonal skill for a project manager (PMI, 2008). According to PMI (2008, p. 418), team building refers to *"process of helping a group of individuals, bound by a common sense of purpose, to work interdependently with each other, the leader, external stakeholders and the organization"*. Some organizational managers encourage team building efforts in order to resolve conflicts which had arisen within the team in order to maintain the team performance. According to Cook, Hunsaker and Coffey (1997), team building consists of all activities aimed to improve team members' problem solving ability through resolving both task and interpersonal issues that hamper the team's functionality.

From literature, there is no commonly accepted set of team building activities. According to Guiney (2009), team building consists of many activities whereby the most frequent activities include: (1) staffing the team properly, (2) planning the project with the team, (3)

building commitment amongst team members, (4) developing strong communication channels, (5) ensuring the support of senior management, (6) empowering team members, (7) developing organizational interfaces, (8) managing conflict, (9) conducing team building sessions, (10) stimulating enthusiasm, (11) defining the work structure, and (12) building the positive project image.

According to Schermerhorn, Hunt and Osborn (2008), team building is a process consists of five evolving steps which include: (1) problem or opportunity identification, (2) data gathering and analysis, (3) planning for improvement, (4) actions for improvement, and (5) evaluation of results. The entire team building process should be highly collaborative whereby each member should actively participate in each step in order to achieve the expected result. There were instances whereby team members merely participated physically and not wholeheartedly as well as team members had ignored and did not follow through the required post-team building activities. As a result, despite undergone the team building activities yet the team members failed to achieve the desired objectives and benefits. **Team building & participation** in this study is adapted from PMI (2008) and is *defined as the process of helping a team of individuals bound with a shared goal to participate and work interdependently with other team members in completing a project.*

From literature reviewed, Hsu et al. (2007) had confirmed that team building is influencing TSMM in an Indian IT project team setting. However, from project management literature in Malaysia, there is still lack of research on how team building & participation will influence TSMM which is part of the intent of this study. Thus, the third hypothesis of the study is:

H3: Team Building & Participation will positively influence Team Shared Mental Models.

1.4. Research Model

After examining the literature of all the relevant constructs as posited in preceding section,

a research model is developed and illustrated in the following Figure 6. This model is a

subset and underpinned on Cohen and Bailey's (1997) Team Effectiveness Framework.
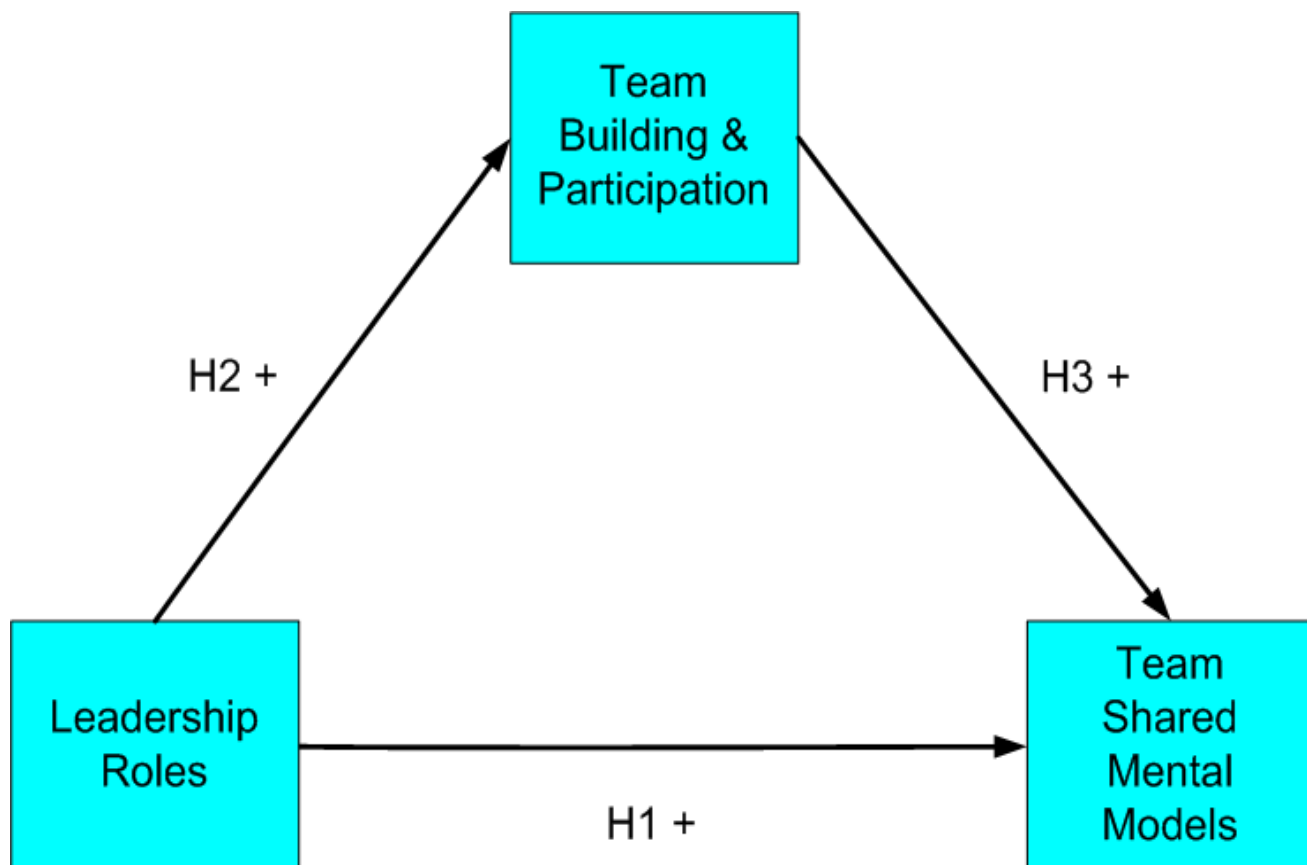

Figure 6: Research Model of this Study

2.   METHODOLOGY

2.1. Sample and Procedure

Based on the deductive research question of this study, cross sectional quantitative

research with online survey method was used. Emails embedded with questionnaire's

hyperlink were sent out to all the 420 target respondents (project managers) from Project

Management Institute (PMI) Malaysia Chapter. PMI Malaysia Chapter is a premier

representative body of project management in Malaysia and it has the national e-mailing list

of experienced and certified project managers. PMI is a global not-for-profit association for project management professionals that have presence in many countries including Malaysia. PMI has over 350,000 members worldwide and it was established in 1969 with headquarter outside Philadelphia, USA (PMI, 2008). Reason not obtaining responses from project team member is that unlike concentrated project manager's community which is more easily accessible whereby collecting data from previous project team members are challenging as more tedious efforts are required to track them. Moreover, this may not be feasible as they may have been disbanded, not contactable or too busy being involved in other projects (Webber, 2002).

Out of the total 420 respondents, only 48% had responded with useable sample of 201. Sample's margin of error at 95% confidence is 6.9% based on the formula $0.98/\sqrt{n}$ whereby "n" is the sample size i.e. 201. Among 201 respondents, 79% (159) of them were male and 81% (162) of them aged between 30 and 49 years. Sixty two percents of the respondents had more than 10 years project management experience and 93% of them hold a Bachelor or higher degrees. Sixty one percents of respondents were in firms with more than 500 employees. Ninety six percents of the respondents were project managers, the balance 4% consisted of project sponsor, quality manager, purchasing director and support manager who were involved in project management. In the online survey, respondents were requested to fill up the questionnaire based on a project that they had completed recently, regardless whether the project outcome was positive or negative. More than half of the projects completed were in chemical / petroleum, construction, financial and information communication technology (ICT) industries and cost more than Ringgit Malaysia five million each. Eighty two percents of the projects took less than two years to complete and each project has an average of 10 team members.

2.2. Constructs' Measurement

The following Table 2 depicts the measurement of all the constructs used in this study:

Table 2: Measures of Constructs

No.	Construct	Item Quantity	Scale	Measuring Instruments
1.	Team Shared Mental Models	10	7 pt - Likert	Adapted from Millward and Jeffries (2001)
2.	Leadership Roles	16	7 pt - Likert	Adapted from Denison et al. (1995)
3.	Team Building & Participation	12	7 pt - Likert	Adapted from Hsu et al. (2007), Carew and Carew (1990) and Law (1992)

In order to measure construct leadership roles, Likert scales (ranging from 1 to 7) with anchors ranging from "Almost Never" to "Almost Always" were used. All other constructs were measured using Likert scales (ranging from 1 to 7) with anchors ranging from "Strongly Disagree" to "Strongly Agree".

3. RESULTS

3.1. Reliability and Validity

Albeit Cronbach's Alpha is widely used as an estimator for reliability tests, it has been criticized for its lower bound value which underestimates the true reliability (Peterson & Kim, 2013). Composite Reliability can be used as an alternative as its composite reliability value is slightly higher than Cronbach's Alpha whereby the difference is relatively inconsequential (Peterson & Kim, 2013). In this study, Composite Reliability and Cronbach's Alpha for all constructs were above 0.7 which indicated that there was high reliability (see Table 3). Convergent validity was assured in the study because the

Average Variance Extracted (AVE) for each construct was higher than 0.5. In Table 4, correlation between pairs of constructs was below 0.9 and the square roots of AVEs (highlighted in bold) were listed in the diagonal line of the table. Correlation between pairs of constructs below 0.9 indicated there was no common method bias (Bagozzi, Yi & Phillips, 1991). Common method bias occurs when there is a variance attributable to the measurement method instead of the constructs that the measures try to represent (Podsakoff, MacKenzie, Lee & Podsakoff, 2003). Any highly correlated constructs are evidence of common method bias whereby usually results in extremely high correlations i.e. more than 0.9 (Bagozzi et al., 1991). All the square roots of AVEs were higher than the correlations between constructs indicated the existence of dicriminant validity.

Table 3: Reliability and Average Variance Extracted (AVE)

Construct	Composite Reliability	Cronbach's Alpha	AVE
Team Shared Mental Models	0.88	0.82	0.65
Leadership Roles	0.87	0.80	0.70
Team Building & Participation	0.91	0.89	0.59

Table 4: Mean, Standard Deviation, Correlation between Constructs and Squared Roots of

AVEs (Diagonal Line)

Construct	Mean	Std Dev	TSMM	LR	TBP
Team Shared Mental Models (TSMM)	5.47	0.66	**0.81**		
Leadership Roles (LR)	5.19	0.58	0.24	**0.94**	
Team Building & Participation (TBP)	5.80	0.65	0.69	0.25	**0.77**

**: Correlation is significant at the 0.01 level (2-tailed)

3.2. Normal Distribution

Partial Least Squares (PLS) were used as part of the statistical analyses in this study. Despite normality test is not required as PLS can handle sample data sets which are not normal (Chin, 1998; Gefen, Straub & Boudreau, 2000), it is insightful to find out whether the data sets collected are normal or not. Normality test via Statistical Package for Social Sciences (SPSS) was conducted on each construct to evaluate whether the data was forming a normal distribution curve. According to Chua (2008), data is normally distributed when each construct's skewness and kurtosis magnitude is less than 1.96. Table 5 depicted both the skewness and kurtosis information for all the constructs.

Table 5: Test of Normality

Construct	Skewness	Skewness Std Error	Kurtosis	Kurtosis Std Error
Team Shared Mental Models	-0.32	0.17	0.38	0.34
Leadership Roles	0.64	0.17	0.81	0.34
Team Building & Participation	-0.42	0.17	0.45	0.34

Magnitude of skewness and kurtosis for all constructs were < 1.96. Based on all the evidence mentioned above, it was concluded that all constructs were normally distributed.

3.3. Hypotheses Testing

SmartPLS v2 was used to perform path analysis in PLS. According to Hsu et al. (2007), project team size and project duration can be potential control variables. In order to prevent any possible interference from demographic factors, project team size and project duration were incorporated as control variables. The analysis results were showed

in Figure 7. Hypothesis H1 was not supported i.e. Leadership Roles did not influence TSMM (b = .08, p > .05). However, Leadership Roles were positively influencing Team Building & Participation (b = .25, p < .001). Hence hypothesis H2 was supported. Hypothesis H3 was also supported i.e. Team Building & Participation is positively influencing Team Shared Mental Models (b = .67, p < .001).

Generally R^2 values for TSMM and team building & participation were not strong in this study i.e. lower than 50%. 48% of the variance in TSMM was explained by the influence of team building & participation. Meanwhile only 6% of the variance in team building & participation was explained by leadership roles.
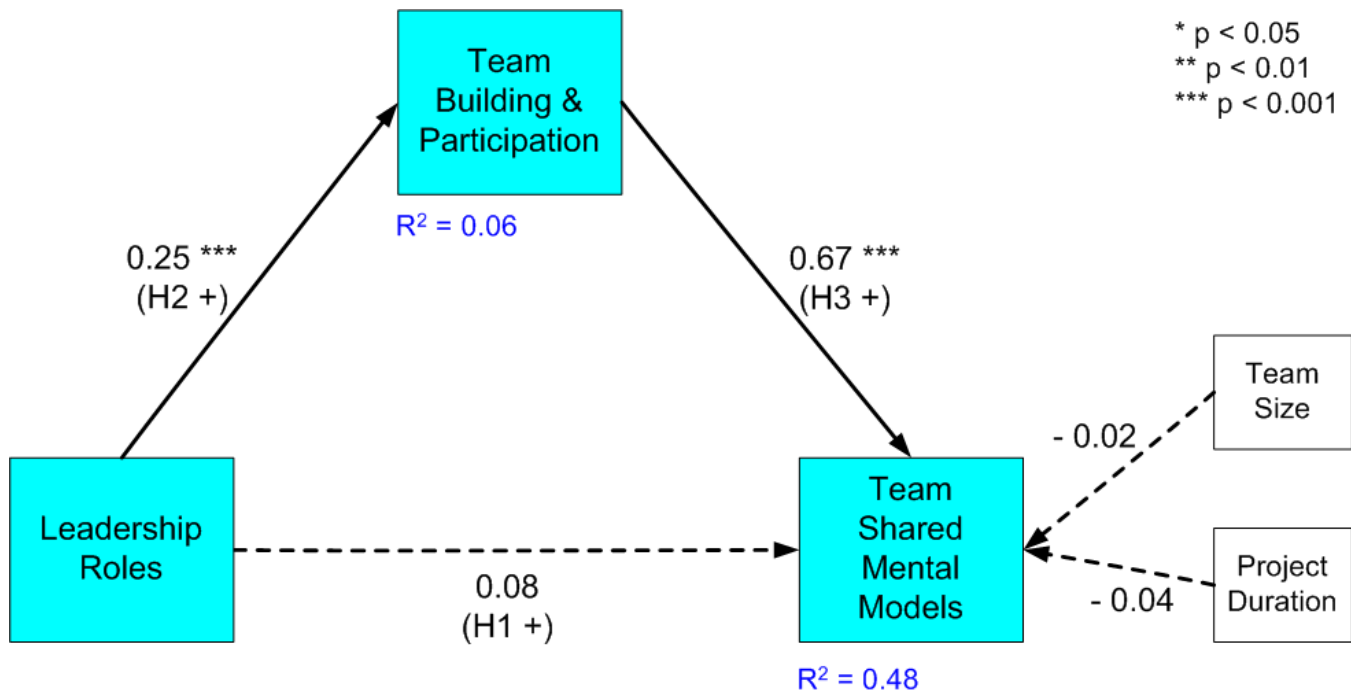

Figure 7: Path Analysis Result

4. DISCUSSION

As hypothesized, when a project manager demonstrates more of his or her leadership roles within a project team, this will lead to higher team building & participation. However, exhibiting more of the project manager's leadership roles do not positively influence TSMM.

Insignificant relationship between leadership roles and TSMM suggests that leadership roles alone cannot improve TSMM directly. Meanwhile, team building & participation improves TSMM directly. In another words, leadership roles can only influence TSMM indirectly via team building & participation.

There are some lessons learnt from this study. Firstly, leadership roles are not directly influencing TSMM. This finding is not in line with what had stated in Cohen and Bailey's (1997) Team Effectiveness Framework i.e. design factors supposed to influence group psychosocial traits. One explanation is that TSMM is only developed based on other mediators rather than influenced directly by the leadership roles of a project manager. For example, team members will only develop TSMM upon experiencing the team building & participation activities delivered by their project manager, rather than witnessing the leadership roles performed by the same project manager. In other words, the outcomes of team building & participation are more important than the result of leadership roles.

Another explanation is that the simultaneous exhibition of different leadership roles which are focusing on people, processes, changes and results might provide an impression to project team that the project manager is changing his or her mind rather fast, thus TSMM becomes more difficult to develop. Moreover, since a project timeline is temporary, this will pose further challenge to form the TSMM timely while the project manager is performing different leadership roles concurrently.

Secondly, leadership roles are directly influencing team building & participation. When a project manager exhibits more of his or her different leadership roles, s/he can understand and analyze the team issues better and faster. As a result, this will help the project manager to develop the appropriate team building activities that can address the team issues. Moreover, through leadership roles, the team building activities that the project manager is driving will become more relevant and encourage higher team members' participation. This finding is in

line with Cohen and Bailey's (1997) Team Effectiveness Framework whereby design factors are impacting team processes.

Lastly, in this study, team building & participation is directly influencing TSMM. Team building & participation can includes activities to improve communication, clarify team objectives, promote mutual supportiveness, enable problem and conflict management as well as facilitate team empowerment. These activities can increase interaction among team members which can help generate more TSMM. This finding supports the conclusion of previous studies conducted by Cohen and Bailey (1997) and Hsu et al. (2007) whereby there is a relationship between team processes and group psychosocial traits.

The outcome of this study enables project managers or management to focus more on factors like team building & participation as well as leadership roles. Reason being these factors can directly and indirectly influence TSMM as demonstrated in this study based on a research model underpinned on Cohen and Bailey's (1997) Team Effectiveness Framework. With regard to the two control variables included in the study, both team size and project duration were not influencing TSMM. These indicated that the relationships among leadership roles, team building & participation, and TSMM in this study are free from the interference of team size and project duration.

In answering the research question on whether leadership roles significantly influence TSMM, this study indicated that leadership roles by themselves did not influence TSMM. As for whether leadership roles significantly influencing team building & participation, it can be observed from Figure 7 above that leadership roles with 0.25 regression weight was positively and significantly influencing team building & participation. Lastly, the research question on whether team building & participation is influencing TSMM, the 0.67 regression weight indicated that team building & participation is positively and significantly influencing TSMM.

5. CONCLUSION

Today, more and more project teams are formed to achieve organizational objectives as organizations generally recognized the importance and benefits of project teams. Numerous studies indicated that TSMM which is one of the outcomes as a result of working in a team had improved project team learning, effectiveness as well as performance (Druskat and Pescosolido, 2002; Carley, 1997; Heffner, 1998; Kraiger & Wenzel, 1997; Mathieu et al., 2000; Kang et al., 2006; Marberry, 2007; Hsu et al., 2007; Yang et al., 2008; Hamilton, 2009; Barnes, 2009). However, in order to improve TSMM, management or project managers need to put in extra effort and focus on leadership roles and team building & participation. Based on a sample of 201 respondents / project managers in Malaysia, this quantitative empirical study had concluded that a project manager's leadership roles can only influence TSMM indirectly via team building & participation.

There are some limitations in this study. Firstly, this study only surveyed the views of project managers. Future study can include project team members as part of the respondents to evaluate their views as well. Secondly, only one factor was selected from three categories of Cohen and Bailey's (1997) Team Effectiveness Framework. The categories include design factors, group processes and group psychosocial traits. Future studies can include other different factors from the same categories to form a separate research model. For example, within the category of group processes, team building & participation can be supplemented by other factors within the group processes like team information processing, team knowledge sharing, team dynamics et al. Thirdly, qualitative interview and data analysis can be conducted in future with some of the surveyed project managers. This is to understand how and why leadership roles did not influence TSMM directly whereby this will provide deeper

insight for knowledge contribution. In conclusion, this study had contributed a small step into

deeper understanding on how team-related factors are influencing project TSMM in Malaysia.

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