Electron Markets (2012) 22:37–48
DOI 10.1007/s12525-011-0082-y

SPECIAL THEME

Leader delegation in global software teams: occurrence and effects

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Received: 16 April 2011 / Accepted: 13 December 2011 / Published online: 19 January 2012

Abstract Global teams are an important work structure in software development projects. Managing such complex global software projects presents many challenges to traditional leadership wisdom, in particular, how, why and when the leaders should delegate responsibility and authority. Delegation is considered an important leadership component to motivate and grow subordinates. Cultural differences, skill level disparity and potential competition between different software development sites creates a management context which is much different from where traditional leadership theories were developed. This study investigates leader delegation behaviors in global software teams and explores the reasons and impact of delegation strategies on global team performance. Semi-structured interviews and a survey was used to collect data from global software team managers and members from four countries of a Fortune 100 IT service company. The results of this study include in-depth analysis of hows and whys of leader delegation in global teams and a theoretical model for analyzing global team leader delegation occurrence and effects.

Keywords Global software team management · Leader delegation · Leadership vs. management

JEL M15

Responsible editor: Nicholas C. Romano

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Introduction

For the past several years, it has been common for companies to offshore IT-based business activities. The development of software has become an increasingly global operation and the use of globally distributed software teams is commonplace. As IT offshoring activities are evolving to include more business processes such as logistics, payroll, human resources and R&D, global software team has gained significant global momentum of a magnitude that demands attention and understanding. Global software teams provide a variety of organizational benefits such as access to otherwise unavailable expertise and lower cost human capital, bridging temporal and geographical distances, allowing flexibility in work arrangements, and enhancing cross-functional interaction (Duarte and Snyder 2001; Townsend et al. 1998). However, global software team management presents many challenges. While software team leaders and

managers are now frequently given global teams to manage, they have not been given clear directions on how to effectively manage such teams. One important issue regarding global virtual software team management is when and how team leaders should *delegate* authority and responsibility to the team.

Delegation means that one has been empowered by one's superior to take responsibility for certain activities, which were originally reserved for the superior (Bass 1990). It is an important practice of management and leadership. Intense global business competition has resulted in downsizing and massive layoffs in the IT departments of numerous organizations, thus leading to human resources stretch. Delegation gives novices opportunity to practice and grow into leaders thus improving the performance of IT departments with less headcounts. Also by developing novices and newcomers through delegation (Klein et al. 2006), organizations can better manage turnover in key positions which has been an widespread problem in IT profession. Therefore, how to effectively utilize delegation as a beneficial leadership strategy in global software teams is an urgent and important question. This paper aims to answer this question.

However, there has been very limited research on delegation in global teams. Leadership research has a long history and leadership has been studied from many perspectives including traits of leaders, leadership skills and styles (e.g. transformational, transactional, directive and participative leadership styles), impact of situation on leadership (e.g. situational leadership, path-goal theory), leader and follower, many leadership (e.g. distributed leadership, shared leadership), leadership and culture, psychology of leadership, etc. While voluminous literature examines the patterns of leadership in traits, skills, behaviours or styles, the complication of leadership and the ever-changing work environment merits more exploration into specific leadership components so to generate detailed actionable guidance to today's managers who needs to be versatile to deal with different situations. There is a rich body of studies in traditional leadership research that has investigated delegation, mostly as a feature of leadership style or as a combination of related leader behaviours. Nonetheless, little empirical research has focused on delegation as a distinct management practice. Therefore, it is hard to interpret the effect size of delegation as a distinct leadership component in the aforementioned leadership studies. The few studies focusing on delegation were limited to either traditional one-to-one leader-follower leadership context (Leana 1986, 1987; Schriesheim et al. 1998; Yukl and Fu 1999) or to a domestic or face-to-face team context (Klein et al. 2006; Zhang et al. 2009). The Global software teams bear several deep-rooted differences from traditional leadership context. First, compared to face-to-face management, global software teams span significant geographical, time zone, and cultural distances. Second, unlike traditional virtual teams in which all team members are distributed to decompose a large and complicated project, global software development projects are often partially distributed and consist of several co-located sub-teams, each working on a particular part of the project. Members of each sub-team are often co-located at one site, and they mainly use electronic media to interact and collaborate with sub-teams at other sites. Therefore, two research gaps exist: first, traditional leadership theories about delegation are to be verified in global software team context; second, additional investigation is needed to explore the occurrence and effects of delegation behaviors in the cross-cultural dispersed global software teams. This study strives to bridge these gaps and to contribute to the knowledge about leadership in global IT collaboration. For this purpose, the authors collected quantitative survey data to verify the hypotheses which are developed based on existent literature and also qualitative data to explore leadership delegation in global software teams in a more in-depth and broader way.

This paper is structured as follows: first, conceptualizations of leader delegation are presented and based on existent literature, specific research hypotheses regarding global software team leader delegation are explained; and then, the study design and results are presented. Finally, a discussion session presents the contributions and limitations of this research and a final section addresses the implications for global software team management.

Delegation

What to delegate?

Delegation means that one has been empowered by one's superior to take responsibility for certain activities, which were originally reserved for the superior (Bass 1990). Except for a few studies (Klein et al. 2006; Leana 1986, 1987; Schriesheim et al. 1998; Yukl and Fu 1999; Zhang et al. 2008, 2009), delegation has barely been investigated as a distinct management practice. One important limitation of previous delegation studies is that little differentiation has been done as to which aspects or activities the leader delegates. This greatly undermines the value of existent literature as it hardly gave practical guidance to managers how to delegate under certain circumstances. To overcome this limitation, this study delineates four major categories of management functions that can be delegated. The four delegation categories summarize the leader management functions recognized by multiple existing taxonomies from traditional and virtual team leadership studies (Davis 1942; Urwick 1952; MacKenzie 1969; Hertel et al. 2005). The existent taxonomies categorize leader functions in different ways and use different labels for these leader functions.

Integrating these different categorizations, Table 1 summarizes four major leader function categories which can be delegated to virtual team members.

How to delegate?

To study leader delegation, researchers also need to examine variations in the delegation process. First of all, delegation does not mean that a leader abdicates his or her responsibilities. For instance, delegation may be followed up with support and encouragement and with periodic requests for progress, as well as with praise and reward (Bass 1990). Delegation also should not be confused with laissez-faire leadership. A leader who delegates still remains responsible for follow-up to see whether delegation has been accepted and whether the delegated activities have been carried out (Bass 1990).

Second, delegation may occur in different degrees and the dichotomy of delegation vs. non-delegation is oversimplistic. Schriesheim et al. (1998) distinguished among three type of delegation: advisory, informational, and extreme. In advisory delegation, subordinates share problems with their supervisor, asking their supervisor for his or her opinions regarding solutions; however the subordinates make the final decision themselves. With informational delegation, the subordinates ask a supervisor for information, and then make decisions themselves. Extreme delegation occurs when subordinates make decisions by themselves without any input from their supervisor. Other researchers have used similar categorizations of the degrees of delegation, some of them more fine-grained. For example, Tannenbaum and Schmidt (1958) proposed the following structure: the leader decides and announces the decision; the leader "sells the decision"; the leader presents the ideas and invites questions; the leader presents tentative decisions that are subject to modification; the leader presents problems, gets suggestions and makes decisions; the leader defines limits and asks for consensual decisions; the leader permits followers to function within limits. Hersey and Blanchard (1988)'s situational leadership theory proposes that depending on specific situations, a leader may "tell", "sell", "participate" or "delegate". Reviewing empirical studies regarding virtual team management, Hertel et al. (2005) argued that a virtual team leader may closely control the team he or she leads through electronic monitoring, grant the team a limited degree of autonomy and lead the team by setting team goals and giving feedback, or allow a team to self-manage.

This study distinguishes the degree to which a global software team leader delegates and measures delegation by a set of 7-point Likert scale questions instead of simple Yes/No questions. The measurement of delegation will be discussed in Research study section.

Delegation in global software teams

When to delegate?

Previous studies found that delegation occur for two reasons: one is to reduce the management's workload; the other is to develop novices (Klein et al. 2006). A manager uses her positional power to direct, supervise and manage organizational resources. Through delegating authority and responsibility to experienced competent subordinates who can

Table 1 Four virtual team delegation categories

Delegation categories	Key activities
Planning-related	Scheduling the team's work
	Setting the team's long-term goals
	Setting the team's short-term objectives
	Setting the team budget
People-related	Selecting team members
	Removing members from the team
	Determining team members' training needs
Process-related	Assigning work to team members
	Selecting the tools they will use in their work
	Determining team's operating procedures and work instructions, e.g., which analysis method to use
	Determining communication and coordination protocols and practices, e.g., which media to use for data sharing
Control-related	Determining quality assurance procedures
	Evaluating the progress of the team's work
	Evaluating team product quality
	Determining corrective actions when performance objectives are not met

handle the work independently, a manager manages the organizational resources more efficiently while the subordinates make independent decisions in a more timely manner and thus, perform their tasks faster (Zhang et al. 2008). Global team mangers are also expected to play the complex role of leaders. Leaders inspire and influence people to achieve the organization's vision (Bass 1990). Developing subordinates' skills and confidence also motivates leaders delegate or consult their followers, especially when followers' skill sets are still to be developed (Yukl and Fu 1999; Klein et al. 2006).

Reducing manager's workload by delegating to competent follower and developing novices through delegating may be contradictory goals in global software teams, at least in the short term. First, a global software team is often formed for completing certain tasks more quickly. The short-term nature of the project requires avoidance of any productivity loss. Delegation can cause short term productivity loss as a delegatee will need time to learn the delegated responsibility. The leader also needs to spend more time coordinating and monitoring the delegated tasks (Milewski and Lewis 1997). Second, in the distributed global team environment, close monitoring and timely feedback is difficult because "management by walking around" cannot be used as a managerial strategy (Paré and Dubé 1999). Therefore, in global software teams, a manager would delegate only when effective coaching and monitoring can be given and the delegatee can quickly master the delegated tasks. Third, in delegating to less competent followers, unlike line managers who may treat the costs of delegation as an investment to be redeemed later, global software team managers are faced with the costs of sacrificing team performance, which may affect the manager's own promotion and career growth. Based on this argument, Hypothesis 1 is put forth:

Hypothesis 1 Leader delegation will be positively correlated with global software team competence.

Existing leadership literature implies that delegation style may also vary in different cultures. Leadership styles differ by culture according to Martinsons and Davison (2007). Based on Hofstede (1980) earlier work they reported that Chinese business leaders had a greater preference for a directive (authoritarian) leadership style in comparison to American and Japanese leaders. They further suggest that this can be attributed to their high power distance and high degree of collectivism in comparison to US leaders who believe in individual freedom and manage more through delegation. This is further supported by Conte and Novello (2008) who suggest that in general Chinese leadership style is very top-down with a wide communications gap separating the leaders from the rest. As a result, people in the lower echelons do not feel appreciated or respected, and they do not see themselves as part of the team, but "just labour." On the other hand Singh (2010) found in a study of Indian software companies that there is a need for more empowerment than any other leadership style. This is different from other industries in India perhaps because the psychodynamic profile of the people at work in software organizations. The Indian software firms require a delegation style of leadership and a scientifically designed set of roles along with friendly organizational structure and processes. Given the cultural diversity among global software team members, it is of value to study how delegation style relates to the cultural background of the leader and the followers. However, as previous research has hardly investigated the direct relationship between culture and delegation style, no hypothesis is proposed here but the case study findings will explore this issue in Effects of Leader Delegation section.

Effects of delegation

Motivation Hertel et al. (2005) found that improving virtual team members' motivation is an important task for virtual team leaders. Improving global software team members' motivation helps to retain talent and reduce turnover rates. Therefore, this study investigates the effect of delegation on global software team's motivation.

According to Herzberg's (1968) motivation theories, recognition fulfils workers' esteem needs and can significantly improve employee's performance. A competent global software team typically expects the team leader to recognize the team's competency by delegating more responsibility. Leader delegation will then improve the team's sense of self-worth and motivate the team to work more effectively. An empirical study found that the autonomy of virtual team members in determining work objectives and methods improved the intrinsic motivation of the team (Kirkman et al. 2004). Piccoli and Ives (2003) found that student virtual teams were more motivated and satisfied with less behavior control. Also a team's decision acceptance is greatest when the decision is made by the group (Brez and Arad 1986) and the team is motivated to execute these decisions.

In addition to intrinsic motivation, increased flexibility is another factor that delegation can contribute to global software team member motivation. Most global software teams are knowledge teams, which are formed to solve customer problems or to develop new products (Kirkman et al. 2004). The complex, knowledge-based tasks many virtual teams perform require behaviors such as planning and executing, managing team performance, improving team processes, and influencing organization-level direction and resource allocations (Mohrman et al. 1995). In conducting these activities, teams have to make sense of their tasks, improvise their work processes, and adjust how they make progress toward agreed upon goals. This requires that team members

are given flexible decision making freedom. Such flexibility is especially important to sub-teams remote from the global software team manager. The reluctance of central management to delegate to sub-teams is not rare in software engineering projects and may produce negative consequences. One consequence is that due to lack of understanding about the activities and cultures in the sub-team, the central management may not manage the sub-team as effectively as a local manager or self-managed sub-team (Meadows 1996). In contrast, delegation will increase the autonomy of the sub-teams and reduce the need for cross-site collaboration (Treinen and Miller-Frost 2006) and thus reduce the complexities and difficulties the remote sub-team members might experience in virtual interaction. Being delegated, the sub-teams will feel a sense of being trusted by their leader and will enjoy the autonomy in their day-to-day work. They will be able to structure tasks in ways that are intrinsically motivating.

Based on the above arguments, Hypothesis 2 is put forth:

Hypothesis 2 Leader delegation to global software teams will be positively correlated with said team's motivation.

Satisfaction with team leader Existing studies also demonstrate that delegation influences global software team members' satisfaction with the team leader. Delegation allows the team members to utilize their capability to adapt to immediate opportunities and changes without waiting for decisions to be made by the distant leader. IS research also indicates that IT workers who perceive higher levels of autonomy report lower levels of overload (Moore 2000) and derive greater satisfaction from their jobs (Guimaraes and Igbaria 1992). Also delegation allows participating in or controlling the team management decision-making, which is an important form of power-sharing in organizations (Heller 2003). Imbalanced power sharing is a serious source of within-team conflicts when certain in-group members participate in team decision-making while the remote teams are excluded (Huang and Ocker 2006). Sharing power with all sub-teams in a global software team would result in the remote team members feeling that they are being treated fairly by the organization, thus reducing the potential for conflict. Treinen and Miller-Frost (2006) found that mutual responsibility/goals are an important part of this power-sharing and that no sub-team should have secondary responsibilities in a global software project. A fair leader will be welcomed by the sub-teams in a global software project.

Based on the above arguments, the following hypothesis is presented:

Hypothesis 3 Delegation to a global software team will be positively correlated with the team members' satisfaction with team management.

Integrating the three hypotheses, Fig. 1 presents an initial research model on the occurrence and effects of leader delegation in global software teams:

Research study

Research site and research sample

This study uses a multi-method approach to examine leader delegation in global software teams by conducting both a survey and open-ended interviews with software development teams in a Fortune-100 software development and service company, Company A. This company has more than 350,000 employees worldwide. The survey was distributed online to about 150 employees in the testing department of this company, located in four countries: Ireland, United Stated, India and China. Ninety-three employees completed the survey. The survey response rate was 60% eliminating concerns about a biased respondent sample. During and after the survey, 13 employees from the four countries were interviewed.

Out of the 93 employees who took the survey, 28 are female and 65 male; 5 are under the age of 25; 55 are in the age group 26–30; 23 in the age group 31–35; 9 in the age group 36–45; none in the age group 45–60, and 1 in the age group above 60. One respondent was a project manager; 36 were technical leaders of a project sub-team; 50 were project team members. On average, the survey respondents have worked in the company for 6 years; the sub-team size is about 15 people and each team has been in place for about two and a half years.

Survey measurement

The survey instrument was created by a panel of two Ph.D. students and three professors, who have extensive research and work experiences related to virtual teams. The measurements of the variables are adapted from previously published studies or created by the research panel. Besides the variables in the research model, the survey will also collect the respondents' background information such as gender, age, native

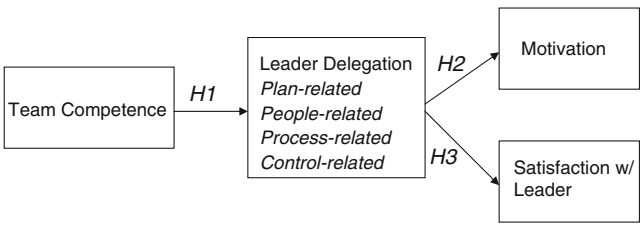

Fig. 1 Initial research model of leader delegation occurrence and effects in global software teams

language, dominant cultural background, role in the team project, the duration of the team, etc.

Delegation The four categories of virtual team leader delegation were measured by 13 Likert-scale items in the survey. Seven of the items were adapted from Janz et al.'s (1997) study and six were created by the study panel. The questions are as follows:

How much is the team able to:

(Planning-related) set team's long-term goals? set the team's short-term objectives? schedule the team's work? decide team's discretional expenditure e.g. travel?

(People-related) select members for the team? determine team members' training needs? remove members from the team?

(Process-related) select the tools they will use in their work? determine team's operating procedures and work instructions e.g. which analysis method to use? decide your team's tools and procedures for communication and collaboration, e.g. email? assign work to team members according to their expertise?

(Control-related) determine its own quality assurance procedures? evaluate the quality of the team's work? monitor the progress of the team's work? determine its own corrective actions when performance objectives are not met?

Team competence This measurement decomposes a virtual team's competence into several skills or capabilities that are important to performing the team task. It consists of seven items suggested by three software project managers who have intimate knowledge of software project requirements and practices are used. A sample item is: how do you evaluate your team on problem-solving skills? (on a 7-point Likert scale).

Team member's motivation Hackman and Oldham (1976) measurement of motivation is used to measure motivation. A sample statement is "I feel bad and unhappy when I discover that I have performed poorly on this project".

Team member's satisfaction with team management Three Likert-scale items were created by the study panel to measure this variable. A sample statement is "I am very dissatisfied with the way this project is managed".

In this study, there are five formative constructs—Competence (team competence), PlanDele (planning related delegation), PeopleDele (people related delegation), ProcessDele (process related delegation) and ControlDele (control related delegation). In formative construct model, the indicators cause the construct so the construct is derived by its measurement. One would not require a simultaneous increase in all of the indicators. Due to the direction of causality with formative models, high correlation between the indicators is not expected, required or a cause for concern (MacKenzie et al. 2005). Therefore, formative constructs cannot be validated using methods which rely on covariance or correlation between indicators such as confirmatory factor analysis and Cronbach Alpha. Instead, the multicollinearity of the formative construct indicators should be examined. The variance inflation factor (VIF) should not exceed ten (Kleinbaum et al. 1998). Regression tests with the full-scale survey data show that the highest VIF values of the competence construct, PlanDele construct, PeopleDele construct, ProcessDele construct and ControlDele construct are respectively 4.41, 1.97, 1.81, 2.21 and 3.53. Therefore multicollinearity should not pose a problem as the VIF values are below the common cut-off threshold of ten.

The reflective constructs of motivation and satisfaction with team leadership had acceptable reliabilities with composite reliability = .73 and .89 respectively.

Survey data analysis

Basic statistical analyses were conducted and include descriptive statistics, scale reliability test, factor analysis, etc. As four categories of leader functions could be delegated, Hypotheses 1, 2 and 3 are assessed in regards to delegation in each category. The Partial Least Squares (PLS) method is used on the construct data obtained from the survey to test the research model. PLS is especially useful for models in which there are multiple predictors and there exist intermediate factors that lead to correlations. Also, PLS allows for incorporating formative as well as reflective measurement models. Therefore, PLS is selected in this study.

Interview study

Semi-structured interviews were conducted with 13 team members working on large globally distributed projects in Company A. Seven of them were located in Ireland, one in India, three in China and two in the U.S. Two of them are senior managers. Except for three Chinese participants, the other participants have experience being managers or technical leaders of a sub-team. As the interviewees come from different organizational levels or with different work experience, their opinions add to an understanding of the research questions in this study from different perspectives.

The interview guide consists of open-ended question regarding leader delegation behaviors, team competence and the interviewee's work motivation and satisfaction with project team management.

Interview data analysis

Each interview was conducted face to face to on the phone by two interviewers and took approximately 45 min on the average. The Interviews were videotaped or recorded with the interviewee's permission. The interview data will then be analyzed using an iterative explanation building approach. Two IS Ph.D. students, a master's student and two IS professors who are experienced in IS research will analyze the data. Each of them will build explanations separately then will compare and validate their findings together.

The final step in the data analysis is comparing the results of the survey data analysis with those of the inductive analysis of interview data to corroborate findings or to reveal conflicting evidence. The survey data provides statistical rigor while the interview data provides contextual detail about why and how.

Survey results

Table 2 presents the descriptive statistics and bivariate correlations for all variables.

The descriptive statistics show that the team competence level, leader delegation level and team members' motivation and satisfaction in Company A are at a high level, as the means of these variables are close to 5 or above 5 on a 7-point scale.

Bivariate correlations in Table 2 should be interpreted carefully because they do not take into account non-independence within the data. To assess the research model in Fig. 1 on the whole and to measure the correlations excluding the influence of within-data inter-dependence, the results of PLS analysis are reported in Table 3. T statistics from bootstrapping are also reported.

Hypothesis set 1 predicts that the project management would delegate more to competent sub-teams. The PLS results supported these hypotheses. The path coefficients are all greater than 0.6, which suggests a strong relationship between competence and delegation. Comparing the four path coefficients, it is found that competence has the strongest influence over control related delegation. This is followed by process related delegation, then planning related delegation and finally people related delegation. This means that if a team is competent, the project management will readily trust them to self evaluate their work quality and progress and to develop their own quality assurance related procedures. They will also delegate planning and people related functions but are slightly less likely to delegate these tasks to sub-teams even if the teams are perceived to be competent. This may be because some of the planning work was completed before the teams were assembled. People related functions such as selecting or removing team members from a sub-team may be part of a standard way of assigning people to teams and thus, not possible to delegate. For example, Company A maintains a database about the expertise areas of the employees so the managers may be able to use the database to find talents needed in the project instead of consulting the sub-teams.

Hypothesis sets 2 and 3 predict that the more delegation a team get, the more satisfied with the leader and the more motivated the team members are. The PLS analysis provided partial support for these hypotheses. It was found that only hypotheses H2c and H3c were supported. This means that autonomy in work processes such as tools, methodology, and communication patterns to will increase the team members' satisfaction with the project leadership and motivate then to work harder. The PLS analysis did not find that PlanDele, PeopleDele and ControlDele impact the team members' satisfaction with the leader or their motivation. Process related management functions relate to how one goes about his/her daily work, and thus have the greatest impact on the work being performed. Autonomy and flexibility in daily work are particularly important when the managers are remote, since one does not need to communicate and coordinate frequently with the remote managers. This, in turn, saves time and effort and allows one to structure his/her work in ways most suitable to his/her immediate work environment.

Using the latent variable scores from PLS output, further regression tests were conducted to test the research hypotheses with control variables included such as team size, age, gender, and team duration. The regression results did not significantly alter the findings made above.

Table 2 Descriptive statistics and bivariate correlations

	Mean	STD	1	2	3	4	5	6
Competence	5.8	1.23						
PlanDele	4.98	1.64	.658**					
PeopleDele	4.79	2.27	.615**	.646**				
ProcessDele	5.58	1.31	.697**	.722**	.612**			
ControlDele	5.27	1.33	.759**	.663**	.618**	.801**		
Motivation	5.92	0.98	.263*	.262*	.240*	.276**	0.1168	
Satisfaction	4.54	1.59	.293**	.325**	.264*	.413**	.366**	.271**

(*P<0.05; ** p<0.01)

Table 3 PLS analysis results

Hypothesis	Path coefficient	T statistics	Support for hypothesis
H1a: Competence–> PlanDele	0.66**	8.86	Yes
H1b: Competence–> PeopleDele	0.61**	8.69	Yes
H1c: Competence–> ProcessDele	0.70**	10.72	Yes
H1d: Competence–> ControlDele	0.76**	12.23	Yes
H2a: PlanDele–> Motivation	0.09	0.4	No
H2b: PeopleDele–> Motivation	0.45	0.81	No
H2c: ProcessDele–> Motivation	0.33*	1.44	Yes
H2d: ControlDele–> Motivation	0.27	1.19	No
H3a: PlanDele–> Satisfaction	0.05	0.25	No
H3b: PeopleDele–> Satisfaction	0.02	0.1	No
H3c: ProcessDele–> Satisfaction	0.31*	1.57	Yes
H3d: ControlDele–> Satisfaction	0.1	0.42	No

(*$P<0.05$; ** $p<0.01$)

Interview findings

In this section, interview findings are presented. For privacy reasons, pseudonames are used in place of the interviewees' real names.

Occurrence of leader delegation

The interview findings also support hypothesis 1. In Company A, project management judges whether a team is competent enough to take over decision-making responsibilities. When the management does not trust a team's capabilities, they are very reluctant to delegate authority to the sub-teams. Company A has been expanding quickly in India and China and a large number of newly hired employees have started working on projects. However, due to the fast expansion rate, newly hired employees may not receive enough training before they work on the project or and may not have intimate knowledge of the practices they are nominally trained to follow. One Irish manager was disappointed to find that one Indian team did not follow the procedures they were trained in Ireland to follow after they went back to India. The interviews found that after this incident, the manager emphasized the importance of daily meeting with the Indian team so to make sure they are on the right track.

Another project manager reported that when they (the Irish managers) did not trust the competence of the China sub-team, they were "*doing a lot of monitoring verifying the Beijing employees are around working out things correctly.*"

It is difficult for managers to accurately judge the competence level of remote team members. There is a lack of opportunities for the manager to easily find out the work situation of the remote teams. The remote team may be considered as incompetent even when their work progress was stalled for legitimate reasons. In the interview process, it was found that one team consists of a sub-team at the U.S. site and also a sub-team at the Ireland site who report to a manager in the U.S. The Irish employees felt they had to worker harder than their U.S. counterparts to prove their expertise to the manager. One interviewee commented:

> "All Tom (the manager) knows about those people is some of their past history though some reports and reviews. He can only see how well they stick to the schedule because he doesn't see them every day. Whereas if he could come here and ask why you did not finish work that day, he would see your broken leg, that explains everything. But he does not see that in Dublin, so he relies on how well they perform their tests and the numbers (of cases) they pull in…… They are remote so in order for them to establish themselves, they work hard to stick to the schedule, maybe beating the schedule as much as possible."

In addition to competence, the interviews uncovered another factor which affects the occurrence of leader delegation in global software teams. This factor is the competition between different subteams for more higher level tasks and higher status within the company. Company A has been expanding its sites in "new" countries such as India and China to develop local market and to capitalize on large local talent pool. Teams at these "new" sites compete for higher status in the organization, for recognition from the headquarters and for more challenging assignments. The new teams are eager to prove their capabilities and to take control of projects independently. The offshore employees are not satisfied with "second-class citizen" position and aspire for more leadership roles. On the other hand, "old" site teams strive to defend their traditional turf of conducting

high-level challenging tasks and management roles. The work in these turfs is important to the core competence of the company and contributes to a group's superior position in the global network of IT units. Layoffs triggered by off-shoring in countries such as U.S. and West European countries also cause concern and complaint among employees at the established sites. The competition for jobs and status becomes intense among different sites as IT development is increasingly globalized. The competition dampens "old" site leaders' motivation to delegate.

In the interview, for example, one Chinese interviewee was quoted as saying, "We all work hard. My colleagues are prepared and ready (to take over more responsibility). I think the headquarters should trust us more". Irish managers also mentioned the Indian team members were found skipping over contact with the Dublin teams and interacting directly with U.S. central management. One senior Irish manager complained about a request for more decision-making power from Indian teams. She believed that this kind of request stemmed from inappropriate competition between different sites and was unjustified. She was quoted as follows:

> "In the past, I had an India team and there was… quite strong competition…. I felt the team wanted to make decisions but weren't quite ready. They felt they wanted to prove themselves to be on par with the people in Dublin. There was certainly competition".
>
> "They would have liked to be ahead of where they were. They felt that they would like to be stronger and play a stronger role".

Adding the factor of competition into the initial research model, the following figure shows a new way to view the occurrence of leader delegation in global software teams (Fig. 2):

Effects of leader delegation

Interview findings corroborated survey finding about Hypothesis 2c and 3c. Being able to flexibly structure one's work is a commonly mentioned reason why delegation was welcomed. One Chinese interviewee talked about her experience working with development teams and management in the U.S. She mentioned that one disadvantage of the cross-country work arrangement was the lack of knowledge on the U.S. side about the work environment and work practices of the Chinese team. She said "*the U.S. colleagues should know us better*". She wished the project management would ask about the Chinese team's opinions, so she could enjoy "*more flexibility in scheduling my work.*" Given the geographical, time zone and cultural distances between managers and sub teams, process related delegation gave more autonomy to distant team members in their daily work and reduced the workload of cross-site communication and coordination. This finding supports the contention that the Chinese typically seek to maintain social order through a harmony-within-hierarchy arrangement (Martinsons and Davison 2007).

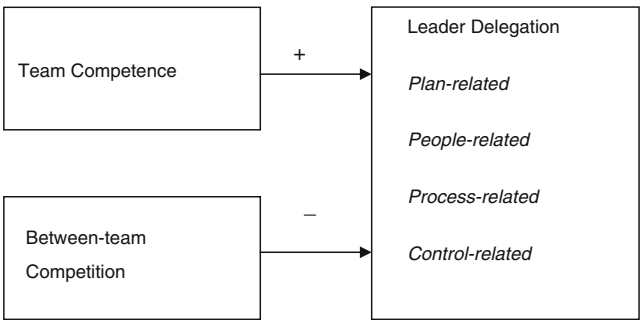

Fig. 2 Predictors of leader delegation occurrence in global software teams

Several interviewees expressed a hope to be assigned more authority and to get more involved in the team decision-making process. They felt that being delegated authority and responsibility meant recognition and trust from management. Gaining recognition from headquarters was a significant source of intrinsic motivation for teams that recently joined the company or teams that were far away from headquarters. The Chinese team members were often willing to compromise their personal life and work extra hours to prove their competence so win such trust and recognition from executive management. In the interview, one Irish manager reported that members of the Beijing team he was leading worked 12 h a day.

However, not all team members enjoyed being delegated more responsibility and authority. Some interviewees mentioned one undesirable consequence of being delegated more decision-making responsibility. One Irish employee has a busy schedule in life and work. She does not want to add more responsibility to her already overwhelming workload. She is therefore happy that in her team "*the decisions are made between the project manager, the local manager and the technical leader*". She explained that: *"You can be under a lot of pressure, you do not really want to have, say, more participation; I am aware it means a lot of, a lot of pressure; I am comfortable with what the mangers decide to do".* Chinese Interviewees gave a different reason why getting decision-making authority may cause pressure. One interviewee said that "*I'd like to get involved in some management things but I am afraid of making wrong decisions*". This confirms previous research finding about the power-driven and directive style of Chinese leadership. In this cultural environment, delegation is viewed with caution by the leaders and the followers. Without full confidence of being able to make correct decisions, the Chinese followers may hesitate to assume more managerial responsibilities.

In conclusion, the interviewees generally recognized and enjoyed the autonomy and flexibility from process-related leader delegation but one's self-perceived readiness and capacity for receiving delegated responsibility and authority moderates whether delegating leader functions. Such self-concept of readiness and capacity may not conform to one's actual capability to take on the delegated responsibility. However, as motivation and satisfaction is an intrinsic emotion, self-concept might be more influential than one's actual capability. When one's self-concept is positive, the beneficial effects of delegation would be amplified. When the self-concept is negative, the effects of delegation may be less beneficial or even turn to be detrimental.

Summarizing the preceding discussion of survey and interview findings, Fig. 3 shows an expanded framework for examining the occurrence and effects of leader delegation in global software teams.

Discussion

This study yields important conclusions and implications for global software team managers and organizations which develop IT system through global collaboration.

First, for global software team managers, delegation is double-edged sword. On the one hand, delegation to distant competent team members would greatly motivate remote teams to work harder as this delegation means recognition and trust from upper management. When delegation is made by management in company headquarters, the impact is even more prominent. Also delegation allows the remote sub-team members to structure their work flexibly and to accommodate local team contextual factors such as holidays and leaves. But such positive effects would not be achieved without the leaders taking time to assess the delegatees' capabilities then coaching and mentoring them according to their progress. In some cases, such assessment and coaching is not easy. For example, for the software professional working in testing teams, the number of testing cases finished is an important index of their work progress and can

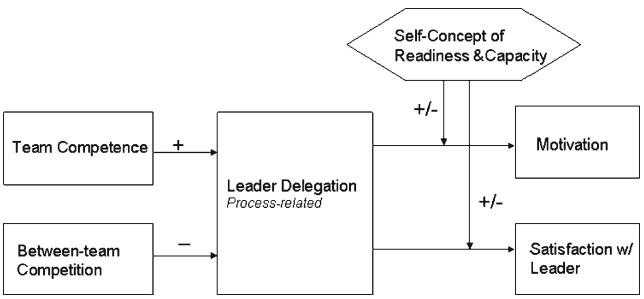

Fig. 3 Framework of occurrence and effects of leader delegation in global software teams

be stored in databases for the managers to readily check. But for global software project members who are in other software engineering functions, they need to qualitative approaches to demonstrate their capabilities. For example, requirement engineering workers may need to be judged by indicators which are not as easily quantified. In this kind of situation, much more effort and time would be needed to understand the remote team's work and their work quality and progress. This issue is further compounded by the geographical, time zone and cultural distances between leaders and subteams in global software projects.

Global team managers shoulder the responsibility of completing projects in a timely fashion and of utilizing organizational and human resources effectively. If the team members are competent enough to master the delegated task quickly, the leader's workload of coaching and mentoring the team members will be minimal. In this case, delegating certain functions to team members would reduce the manager's workload. If the team members are novices or newcomers, delegation will cost the leader much more efforts to develop the followers. Faced with the pressure of completing projects on time and on budget, global software project management often chooses to delegate more to competent sub-teams, as found in this study.

On the other hand, delegation to novices will help develop their proficiency and leadership skills, and then in the long term improve the overall quality and reliability of the team. Therefore, short-term productivity loss as a result of delegation to novices is a price the global team leaders pay for the long term prosperity of the organization. From this angle, managing project efficiently and growing novice subteams or team members are not contradictory goals. Depending on whether the managers focus on short term efficiency or long term organizational gain, global team managers may take different delegation strategies, but it is a difficult decision to make. The cultural diversity among global team members and the different expectations about how leaders may delegate further compounds the issue.

To help global team managers to balance the tradeoffs of delegation, organizations need to create policies, processes and systems which compensate the short term productivity loss of delegation. Also organizational culture and processes which values developing novice members are needed to improve or complement individual leaders' judgment, which may be biased by their personality and preferences.

To that end, the authors first suggest organizations provide guidelines and resources for global team managers to accurately assess remote team or team members' competence. When the management is distant from team members, traditional walk-around management is not applicable, so it is hard for the management to judge a remote sub-team's competence level. But resources could be built to reduce managers' workload of assessing remote sub-team members' competence. For

example, database about team members' expertise area, experiences and prior evaluations could be made available to the team managers. Rotating managers through teams at multiple sites will also facilitate them to build deep understanding of different team's capabilities.

The authors also suggest organizational structure to mitigate the negative impact of between-site competition on leader delegation preferences. For this purpose, the organizations should encourage open communication and make sure opinions of all competing sites represented and heard at the headquarters. Due to the geographical distance, headquarters may lack knowledge about the development and capabilities of offshore teams and their decision-making may more likely be swayed by the biased onshore teams. To solve this problem, headquarters managers should be designated as liaison for internal offshore teams. These liaisons should maintain close frequent communication with offshore teams (ideally they physically work with the offshore team for a period of time), understand offshore teams' competency and needs, know the innovation opportunities at offshore sites and represent them at the headquarters. This is done to ensure that the headquarters hear from all competing sites, not underestimate the potential of any site and reach unbiased decisions when assigning tasks, management roles and resources.

Finally the authors suggest the organizations to create a reward system which favors both short-term project management performance and manager's contribution to long-term subordinate development. Evaluations regarding project or team managers' performance can incorporate opinions of team members at different sites about the managers' project management skills and also leadership behaviors.

From the above three aspects, organizations can build a system and culture to aid global software team mangers' delegation strategy and also to offset the influence of personal bias.

Contributions and limitations

For researchers, first, this study investigates a very important yet under-researched area: leader delegation in global software projects. This study creates a more fine-tuned leader delegation categorization, validates existent theory on delegation in global software team context and yields a broadened framework for examining the occurrence and effects of leader delegation. This research also uncovers two new interesting issues for global software project management research including long-term effects of leadership strategy in a time-constraint environment and competition between different sites. In addition, this study conducts in-depth analysis into the phenomenon of leader delegation behaviors in global software teams through multiple-channel data collection. Based on the study findings, practical guidance is also given to global team managers regarding how and when delegation might not be appropriate and to organizations regarding how to foster long-term oriented leadership behaviors.

This study is not without its limitation. First, the survey length is constrained. More control variables such as time zone distance and cultural difference could be included. Due to the size constraint of a single study, potential factors which may influence delegation style and the effects of delegation are not comprehensively included. For example, the competence and experience of leaders may influence how leaders behave when they decide to delegate. Future studies may explore other important factors influencing delegation which are not included in this study. Second, the survey relies on respondents' self-report and this may introduce response bias. In future studies, objective data from third parties such as evaluations from team managers can be used to cross-check survey data. Third, the study was conducted with a small sample from one company. In the future, studies with more varied types of teams from different contexts can be conducted to verify findings of this study.

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