Leading Information Systems Academic Teams to High Performance

Completed Research

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Abstract

Information Systems (IS) projects are creative processes implemented by teams. To succeed, such projects require teams to perform at their best. A way to tackle this challenge is to enhance the human resources potential through team leadership. High-performing teams have been studied for some years. However, little has been written about academic IS projects and on how to lead teams to high performance. Building upon Thamhain’s (2004) recommendations to lead teams to high performance, our primary aim was to investigate the influence of these recommendations on IS project teams’ performance in an academic environment. Twenty-eight teams of masters students involved in the development of academic IS projects were invited to participate in our study. Results regarding the correlation between Thamhain’s (2004) recommendations and project teams’ performance of IS students are given and analyzed. We also discuss the implications of these recommendations on enhancing academic IS project teams’ performance.

Keywords

Academic teams, high performance, information systems, projects.

Introduction

Information Systems (IS) projects are characterized by uncertainty and complexity, as they are frequently initiated and implemented in response to organizational strategic initiatives. Teams are meant for projects like this (Leonard and van Zyl 2014). Quite often IS project teams are organized hierarchically and technical professionals are called upon to lead peers because of their superior technical competencies. As a result, research (Thamhain 2004; Collins and Schragle-Law 2010; Leonard and van Zyl 2014; Stagnaro and Piotrowski 2014) shows that many technology-based projects fail apparently because of management, behavioral, and socio-organizational issues rather than technical difficulties. Moreover, it suggests that team leadership (e.g., the ability of project managers to coordinate their teams) plays a critical role in project teams’ performance, as project managers are expected to create and accomplish positive outcomes for their projects. Therefore, IS project team leaders should be able to make their teams achieve high performance.

Thamhain (2004) examined several factors (e.g., leadership, communication, trust, expertise, and cooperation) that may influence the performance of technology-based project teams, whether they are multidisciplinary or designed for specific tasks. Such factors may help team leaders identify (1) issues that result from putting together different personalities or (2) best practices to overcome unforeseen difficulties, which can benefit project teams. Thamhain’s (2004) findings (which continue to summarize more recent and relevant literature on those factors, see Salas et al. 2008 and Weimar et al. 2013) led the author to suggest some recommendations to lead project teams to high performance. Examples of such recommendations are: staff and organize the project team; build a high performance image for the team; build and maintain team member commitment; and manage conflict and problems. Build and maintain team member commitment (to project plans), for instance, is found to be a reliable predictor of project team performance (Thamhain 2004).
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Even though high-performing teams have been studied for some years, little has been written on how to lead them to high performance in the IS projects’ domain. Furthermore, engineering leadership scholars assert that adequate models of how engineers lead do not exist and that traditional leadership models are contrary to the collaborative norms of engineering practice (Novoselich 2016). Building upon Thamhain’s (2004) recommendations, the primary aim of this study is to investigate their influence on IS project teams’ performance in an academic environment and the research question: “Is the team performance in academic IS projects influenced by the actions to lead project teams to high performance recommended by Thamhain’s (2004)”.

In general, we advocate that each of Thamhain’s (2004) recommendations is positively associated with team performance in the domain of academic IS projects if implemented by IS masters students in their leading practices.

A total of 28 teams of masters students involved in the development of academic IS projects were invited to participate in this study. Its aim is to provide empirical support for Thamhain’s (2004) recommendations so that they can be considered as conducive aspects to high team performance in the domain of academic IS projects. The remainder of the paper is organized as follows.

The next section reviews and discusses related work on project teams and team performance. Then, we present the method and cohort characteristics. Results are reported and discussed afterwards. Finally, the last section summarizes and introduces future work.

Teams and Team Performance

Authors (Katzenbach and Smith 1993; Kozlowski and Ilgen 2006; Salas et al. 2008) agree on a team being a group of two or more individuals who: (1) socially interact (face-to-face, virtually, or both ways); (2) are committed to general purposes and common goals to reach those purposes; (3) are brought together to perform organizationally relevant projects; (4) exhibit interdependencies with respect to goals, workflow, and outcomes; (5) have complementary skills and different roles and responsibilities; and (6) are together embedded in an encompassing organizational system, with boundaries and linkages to the broader system context and task environment. A team is also characterized by its own (1) direction and momentum (e.g., pulling together in the same direction to achieve something); (2) common approach (e.g., particular organizational and motivation methods); and (3) mutual accountability (e.g., with each team member being accountable for his/her actions, as these add to the team as a whole) (Moura et al. 2014).

While working on a project, each team member engages in both individual and team work given that teams must integrate, synthesize, and share information; and they also need to coordinate and cooperate with one another. Individual work refers to the components of a team member’s activity that do not require interdependent interactions with other members of the team (e.g., each team member plays a specific role). Teamwork refers to the interdependent components of team activity required to coordinate the performance of multiple individuals effectively. It is also conceptualized as the set of interrelated cognitions, attitudes, and behaviors that contributes to the dynamic processes of team performance (Salas et al. 2008). Team performance can be defined as the multilevel process that comes up as team members engage in managing both their individual and team levels of work and teamwork processes and it can be evaluated in terms of effectiveness. Effectiveness assesses the degree to which a team meets the expectations of quality for the outcomes of team performance processes (Weimar et al. 2013).

Literature (Katzenbach and Smith 1993; Bragg 1999; Hakanen and Soudunsaari 2012) suggests that high-performing teams: (1) have a supporting and encouraging leadership; (2) possess the right mix of technical and functional expertise and problem-solving, decision-making, and interpersonal skills; (3) shape their purposes usually in response to the firms’ high management; (4) invest a large amount of time and effort exploring, shaping, and agreeing on a purpose that belongs to them both individually and collectively; (5) translate their purposes into explicit, measurable, and attainable performance goals, with purposes and goals building on one another and being combined with team commitment; (6) develop strong commitment to how they will work together to accomplish their purposes; and (7) hold themselves responsible, both as individuals and as a team, for the team’s performance. Thus, a high-performing team is an ideal one (with 25 members, tops) that combines individual talents and abilities into a high performing whole with capabilities that exceed those of its most talented member (Ross 2008).

Theoretical and empirical findings support team leadership as a key leverage point for enhancing project teams’ performance. In fact, leadership is critical to project teams’ performance (Kozlowski and Ilgen...
2006; Collins and Schragle-Law 2010; Leonard and van Zyl 2014; Stagnaro and Piotrowski 2014). Thamhain (2004) suggested a set of recommendations to help team leadership (e.g., project leaders): (1) to have a better understanding of the criteria and organizational dynamics that can drive project team performance; and (2) to provide some broad guidelines and benchmarks to lead project teams to high performance. These recommendations explain (to a good extent) the support and encouragement that characterizes high-performing teams’ leadership (Moura and Varajão 2016).

Higher education institutions are receiving steady pressure to better prepare students for project management positions. Thus, in the IS domain, the value being placed on project management courses is increasing (Tabatabaei et al. 2009). Since little has been written on how to lead teams to high performance concerning IS projects, we decided to conduct this study in an academic setting using Thamhain’s (2004) recommendations as a foundation. Our primary aim is to answer the following research question: “Is the team performance in academic IS projects influenced by the actions to lead project teams to high performance recommended by Thamhain’s (2004)” Next, we review and discuss possible associations between Thamhain’s (2004) recommendations and project teams’ performance.

**Linking Recommendations for Team Leadership to Team Performance**

For projects with high levels of complexity (e.g., IS projects), Thamhain (2004) argues that project leaders can only come up with an appropriate project plan as a result of collective efforts made by team members. According to Stagnaro and Piotrowski (2014), IS project teams can attain innovative products if their leaders empower them by, for instance, letting teams participate in early project planning. Appropriate leadership planning has been shown to have a positive effect on team performance (see Kozlowski and Ilgen 2006). Therefore, “involve team in project planning” (i.e., Thamhain’s 2004 first recommendation) is found to be a predictor of project team performance. In other words, involving IS project teams in project planning is positively related to team performance (hypothesis 1).

Thamhain’s (2004) second recommendation (“define work process, interfaces, and team structure”) has to do with team leadership putting in place a proper infrastructure, including properly defined interfaces, task responsibilities, reporting relations, and communication channels and work transfer protocols. For instance, a cross-functional teamwork infrastructure can be a primary tool to create high-performing teams if it supports: (1) information exchange (e.g., sharing ideas, coordinating efforts, and providing feedback among team members); (2) delivery of information to the right person; and (3) information being interpreted in the way the sender intended to (Salas et al. 2008; Weimar et al. 2013). Mealiea and Baltazar (2005) also suggest that the existence of open communication channels creates a work environment designed to facilitate team performance. For that reason, a properly defined infrastructure is found to be a predictor of project team performance. As this is a compound recommendation, we propose splitting it into three hypotheses. In other words, defining the work process, interfaces, and team structure for IS project teams are positively related to team performance (hypothesis 2, 3, and 4, respectively).

“Staff and organize the project team” is Thamhain’s (2004) third recommendation. That is, carefully organized teams by team leaders (which appropriately match team members to job requirements) are likely to avoid conflict and leverage high morale and optimum decision-making among their members. Research identifies several issues concerning team composition (e.g., cognitive ability, personality, and cultural factors) that may influence team performance. For instance, theory suggests that members having appropriate combinations of knowledge, skills, and abilities (to perform assigned tasks) make up high-performing teams. Empirical studies show that the average of team members’ cognitive ability has a positive impact on team performance (Kozlowski and Ilgen 2006; Salas et al. 2008). Consequently, staffing and organizing the project team appropriately is found to be a predictor of project team performance and for IS project teams, it is positively related to team performance (hypothesis 5).

Thamhain’s (2004) fourth recommendation (“build an image of high performance”) suggests that, team leaders provide the most visible indicator of project teams’ values and practices that potentially makes them distinct from other project teams. Such well-defined team boundaries lead to perceptions of high performance for a project team. This high-performing image of the team perceived by its members is argued to stimulate team members’ pride of participation and ownership and build professional confidence and desire to reach out and think creatively. Additionally, the prestigious image of the project team perceived by its members may influence how much effort they are willing to spend on a team’s
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behalf, as well as how cooperatively members work together (Ammeter and Dukerich 2002; Collins and Schragle-Law 2010). Therefore, building an image of high performance is found to be a predictor of project team performance and for IS project teams, it is positively related to team performance (hypothesis 6).

Factors satisfying team members’ personal and professional needs (e.g., personal interests, job satisfaction, accomplishments and recognition) may have a positive effect on project teams’ performance. Thus, “stimulate enthusiasm, excitement, and professional interests” of project team members is Thamhain’s (2004) fifth recommendation. This recommendation is in line with both transformational leadership (generally defined as “leader behaviors to motivate their subordinates to improve the collective good”, see Kozlowski and Ilgen 2006) and shared leadership (another general approach to leadership that entails “empowering individuals at all levels and providing them the opportunity to take the lead”, see Stagnaro and Piotrowski 2014). Regarding transformational leadership, theoretically, team leadership can positively influence member performance by transforming and motivating team members through leaders' individualized consideration (i.e., leaders’ sensitivity to individual members’ needs and feelings). Empirically, individualized consideration has a positive and significant influence on team performance both directly and indirectly through team climate (i.e., basically the members’ interpretation of the team situation, see Kozlowski and Ilgen 2006) (Sun et al. 2014). Regarding shared leadership, stimulating enthusiasm, excitement, and professional interests should be part of coaching activities among teams, as these activities tend to enhance the effectiveness of shared leadership (Stagnaro and Piotrowski 2014). As a result, stimulating enthusiasm, excitement, and professional interests is found to be a predictor of project team performance. Thus, stimulating IS project team members’ enthusiasm, excitement, and professional interests is positively related to team performance (hypothesis 7).

According to Thamhain’s (2004) sixth recommendation (“create proper reward systems”), there should be systems which recognize both individual and team performance. This is in line with research in project teams (Katzenbach and Smith 1993; Kozlowski and Ilgen 2006). Leadership can thus improve team performance by rewarding (Sun et al. 2014). For instance, rewarding team members who demonstrate high levels of responsibility and group morale might enhance the effectiveness of shared leadership in teams and in turn facilitate high team performance (Stagnaro and Piotrowski 2014). Team-based reward systems create work environments designed to facilitate team performance (Mealiea and Baltazar 2005). Individual and team evaluation as well as rewards (e.g., recognition, accomplishments, career opportunities, and job security) are strongly associated with team performance (Thamhain 2004). Therefore, creating proper reward systems is found to be a predictor of project team performance and is positively related to IS team performance (hypothesis 8).

Senior management usually: (1) negotiates the required resources with sponsor and support organizations; (2) obtains resource commitment; and (3) deals with a team’s political challenges (Katzenbach and Smith 1993; Thamhain 2004). Thus, project teams need senior management to be aligned with their environmental contexts and possess adequate resources to accomplish consistent task goals with desired standards and within acceptable time frames (Kozlowski and Ilgen 2006). For instance, the benefits (e.g., facilitating high team performance) of shared leadership strategies can only occur if IS project team managers seek out the support of senior management (e.g., to identify and implement rewards to support shared leadership behaviors among project team members) (Stagnaro and Piotrowski 2014). Therefore, to “ensure senior management support” (i.e., Thamhain’s 2004 seventh recommendation) is found to be a predictor of project team performance and for IS project teams, it is positively related to IS team performance (hypothesis 9).

Thamhain’s (2004) eighth recommendation (“build and maintain commitment”) has to do with team leadership in establishing and keeping members’ commitment to the team’s task (e.g., project plans, goals, and results). Members’ commitment to the team’s task is shown to be positively related to team performance. This relationship strengthens as team workflow demands increased interdependence and requires greater coordination of information and effort among team members (Kozlowski and Ilgen 2006). IS project teams’ performance can be higher if: (1) team leadership inspires member commitment (e.g., for the leaders’ shared vision so that team spirit is enhanced); and (2) team members have shared project goals, an understanding of why these are important, and commitment to achieving them (Collins and Schragle-Law 2010). Therefore, building and maintaining commitment is found to be a predictor of
project team performance. In other words, building and maintaining IS team members’ commitment to the project is positively related to team performance (hypothesis 10).

Conflicts (e.g., frictions due to multiple individuals’ goals, approaches to work, and personalities) are common phenomena in teams. Generally speaking, the higher the level of conflict between members, the lower tends to be team performance (Kozlowski and Ilgen 2006; Collins and Schragle-Law 2010; Greer et al. 2011). Understanding how to manage conflict in teams is essential to reduce it. Thus, teams should develop appropriate internal mechanisms and interpersonal sensitivity (e.g., social competences, people skills, and human skills) which is necessary to manage the full range of conflicts that occur among members. Transformational leaders can set individual examples that may reduce inner conflict and improve team performance (Sun et al. 2014). Therefore, “manage conflict and problems” (i.e., Thamhain’s 2004 ninth recommendation) is found to be a predictor of project team performance. For that reason, managing conflict and problems among IS project team members is positively related to team performance (hypothesis 11).

Thamhain’s (2004) tenth recommendation (“conduct team building sessions”) states that team leadership should conduct organized team-building efforts (i.e., a process intervention that prompts team members to reflect on their behavior and interpersonal relations, see Kozlowski and Ilgen 2006) throughout the project life cycle. These efforts are necessary to unite workgroups (e.g., with personnel with different functional expertise within an organization) into effective mission-focused project teams. For instance, IS project team managers often lead teams of experts of various technology domains (e.g., hardware, operating systems, networks, databases, web services, and information security) and the various business application modules as well as related business processes. Shared leadership (widely used in IS projects), advocating the involvement of team members in the creation of team building programs, has been positively associated with team performance (Mealiea and Baltazar 2005; Stagnaro and Piotrowski 2014). Therefore, conducting team-building sessions is found to be a predictor of project team performance and for IS project teams, it is positively related to team performance (hypothesis 12).

Project managers’ actions are supposed to influence the attitude and commitment of team members toward the project objectives (Thamhain 2004). Thus, to promote team performance, transformational team leaders should (see Sun et al. 2014): (1) be their team members role model (by, e.g., guiding them effectively); (2) encourage members to be enthusiastic at work (by, e.g., motivating and helping them understand and drive forward the project’s objectives, goals, and products, see Stagnaro and Piotrowski 2014); (3) pay attention to members’ job needs and career development (through, e.g., individualized consideration especially toward knowledge-based team members such as IS workers); and (4) build the team climate (by, e.g., making members acknowledge team objectives, as shared goals act to spark team effort by providing clear direction, see Mealiea and Baltazar 2005). When it comes to deriving more accountability from team members shared leadership seems suitable for IS project teams when building team relationships. This leadership style may promote collaboration and build highly effective sub-teams within the project team as a whole (Stagnaro and Piotrowski 2014). Therefore, “provide proper direction and leadership” (i.e., Thamhain’s (2004) eleventh recommendation) is found to be a predictor of project team performance and for IS project teams, it is positively related to team performance (hypothesis 13).

Thamhain’s (2004) last recommendation (“foster a culture of continuous support and improvement”), asserts that project teams should continuously update and fine-tune established project management processes as well as themselves to adapt to ever-changing business environments (Kozlowski and Ilgen 2006). Transformational team leadership (through, e.g., individualized consideration and charisma, i.e., leader’s unique and inspirational idealized influence) may provide members with a supportive environment; and involves, for instance, encouragement of new technical methods and the construction of feedback systems to improve the quality of work processes. Both supportive and learning team climates are positively associated with team performance (Collins and Schragle-Law 2010; Sun et al. 2014). Shared leadership may establish an agile culture and promote creative and rational thought among team members. This leadership style is also viewed as a social influence process in which individual members lead one another to higher achievement levels. As a learning experience, shared leadership roles eventually tend to lead members to greater shared understanding and positive action, which may improve team performance. Overall, team leadership engaged in building high-performing teams should continuously improve deficient team characteristics through, for instance, training, practice, and a better alignment between team member skills and task requirements (Mealiea and Baltazar 2005; Salas et al.
2008; Stagnaro and Piotrowski 2014). Therefore, fostering a culture of continuous support and improvement is found to be a predictor of project team performance and for IS project teams, it is positively related to team performance (hypothesis 14).

In general, we advocate that each of Thamhain’s (2004) recommendations is positively associated with team performance in the domain of academic IS projects if implemented by IS masters students in their leading practices.

**Method**

Our method involved a survey where data was analyzed using descriptive statistics and reliability estimates. We gathered team members’ perceptions on the implementation of Thamhain’s (2004) recommendations in their project teams using a 7-point Likert scale (1 indicating total disagreement and 7 indicating total agreement). We collected data from a structured survey administered to self-selected teams of IS masters students. Each team was enrolled in one of the following three one-semester courses – “Technologies and Information Systems Project”, “Information Systems Development”, and “Information Systems Project Management”. By collecting data from different courses, we aimed at minimizing bias caused by possible specific course characteristics. These courses are part of the integrated Master Degree in Information Systems Engineering and Management and Master Degree in Information Systems. Each team was involved in the development of a semester-long academic IS project (that lasted, on average, three months and was meant to prepare students for the work context in IS). Team leaders (one per team) were chosen among team members.

Our study used items identical to those of Thamhain’s (2004) (thus taking advantage of previous validation) except for the second recommendation, which we split into three so its meaning could be better understood by our population. Before administering the survey, we conducted a focus group with five team members to assess the face validity of the survey. Results indicated minor refinements, such as, rephrasing one of the survey’s questions to improve readability. These refinements did not affect construct validity. Next, we contacted 28 project managers inviting their teams to participate in the survey. Each participating project team had between three to six members. There was a total of 131 participants (to whom we promised complete confidentiality) who were asked to fill out and return the surveys on site. Out of the 118 received surveys, three could not be used due to incomplete responses. Therefore, the 115 surveys used in our analysis represent a final response rate of 87.8%. A total of 15.7% of the respondents were female; 35.7% were student workers; and the majority (55%) was between 23 and 30 years of age. At least one “crisis” situation occurred (either due to a member leaving the team prematurely, or because of internal conflicts or due to team members’ underperformance) in nine of the 28 project teams (32.1%). Frequent monitoring to track teams’ behavior enabled a timely solution for certain situations (including team members not completing tasks or not completing them to the required standards). Most teams had at least two students who had already worked together. Based on the responses we received, the academic projects were categorized into four types: custom development (32.1%); information systems analysis (25%); consulting (25%); other, including business intelligence, workflow, etc. (17.9%). Such projects’ success was indexed according to the benefits obtained by project customers (internal or external entities of the university where the projects were developed). Thus, they share the same characteristics of professional IS projects. Since each student was granted a final grade based on his/her project team, this grade was used to assess student teams’ performance.

**Results and Discussion**

We computed the Cronbach’s Alpha value to test the reliability and internal consistency of the responses regarding the recommendations. Cronbach’s Alpha is higher than 0.8 (14 items) – an excellent value (Cohen 1988), which indicates a high degree of internal consistency in the responses.

Table 1 shows participants’ perceptions (on average) on the implementation of each recommendation and the IS projects’ average grade (on a 0-20 scale) (i.e., the average performance for teams of IS students). Results show that all of Thamhain’s (2004) recommendations were implemented (i.e., an average of 5.68 points per recommendation was reached). The most implemented recommendations were “define team structure”, “involve team in project planning”, and “manage conflict and problems”; whereas the least
implemented were “create proper reward systems”, “conduct team building sessions”, and “stimulate enthusiasm, excitement, and professional interests”.

<table>
<thead>
<tr>
<th>Recommendations (n = 115)</th>
<th>Mean (SD)</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Involve team in project planning</td>
<td>6.00 (1.026)</td>
<td>3.00</td>
<td>7.00</td>
</tr>
<tr>
<td>Define work process</td>
<td>5.77 (0.946)</td>
<td>3.00</td>
<td>7.00</td>
</tr>
<tr>
<td>Define interfaces</td>
<td>5.86 (1.131)</td>
<td>2.00</td>
<td>7.00</td>
</tr>
<tr>
<td>Define team structure</td>
<td>6.28 (0.874)</td>
<td>4.00</td>
<td>7.00</td>
</tr>
<tr>
<td>Staff and organize the project team</td>
<td>5.91 (1.056)</td>
<td>1.00</td>
<td>7.00</td>
</tr>
<tr>
<td>Build an image of high performance</td>
<td>5.63 (1.120)</td>
<td>1.00</td>
<td>7.00</td>
</tr>
<tr>
<td>Stimulate enthusiasm, excitement, and professional interests</td>
<td>5.36 (1.390)</td>
<td>1.00</td>
<td>7.00</td>
</tr>
<tr>
<td>Create proper reward systems</td>
<td>4.42 (1.522)</td>
<td>1.00</td>
<td>7.00</td>
</tr>
<tr>
<td>Ensure senior management support</td>
<td>5.87 (1.159)</td>
<td>1.00</td>
<td>7.00</td>
</tr>
<tr>
<td>Build and maintain commitment</td>
<td>5.77 (1.415)</td>
<td>1.00</td>
<td>7.00</td>
</tr>
<tr>
<td>Manage conflict and problems</td>
<td>5.97 (1.304)</td>
<td>1.00</td>
<td>7.00</td>
</tr>
<tr>
<td>Conduct team building sessions</td>
<td>5.22 (1.462)</td>
<td>1.00</td>
<td>7.00</td>
</tr>
<tr>
<td>Provide proper direction and leadership</td>
<td>5.66 (1.337)</td>
<td>1.00</td>
<td>7.00</td>
</tr>
<tr>
<td>Foster a culture of continuous support and improvement</td>
<td>5.79 (1.151)</td>
<td>1.00</td>
<td>7.00</td>
</tr>
</tbody>
</table>

Performance (n = 115)

| Final grade | 16 | 10 | 19 |

Table 1. Participants’ Perceptions on the Implementation of Recommendations (Means and Standard Deviations) and Average Team Performance

To test our hypotheses, we analyzed potential associations between perceived implemented recommendations and team performance (that we assessed using students IS projects’ final grades). The number of participants in our sample (n = 115) points to the use of nonparametric tests. In fact, several variables were skewed, which violates the assumption of normality. Thus, we used the Spearman rho statistic to compute those correlations. Table 2 and Figure 1 show the statistically significant correlations between perceived implemented recommendations and team performance.

<table>
<thead>
<tr>
<th>Thamhain’s (2004) recommendations</th>
<th>Define work process</th>
<th>Define team structure</th>
<th>Build an image of high performance</th>
<th>Stimulate enthusiasm, excitement, and professional interests</th>
<th>Foster a culture of continuous support and improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team performance</td>
<td>0.259&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.307&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.236&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.226&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.187&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>p = 0.005</td>
<td>p = 0.001</td>
<td>p = 0.011</td>
<td>p = 0.015</td>
<td>p = 0.045</td>
</tr>
</tbody>
</table>

<sup>a</sup> Correlation is significant at the 0.01 level (two-tailed). <sup>b</sup> Correlation is significant at the 0.05 level (two-tailed).

Table 2. Spearman rho Statistically Significant Correlations Between Perceived Implemented Recommendations and Team Performance
Involve team in project planning
Define work process
Define interfaces
Define team structure
Staff and organize the project team
Build an image of high performance
Stimulate enthusiasm, excitement, and professional interests

Create proper reward systems
Ensure senior management support
Build and maintain commitment
Manage conflict and problems
Conduct team building sessions
Provide proper direction and leadership
Foster a culture of continuous support and improvement

Legend:
Correlation is significant
Correlation is not significant

Figure 1. Significant Correlations Between Perceived Implemented Recommendations and Team Performance

Note that Table 2 includes only the significant correlations. Thus, we found no correlation between each of the remaining nine recommendations and team performance. That is, we found positive and statistically significant correlations between team performance and the following actions (recommended by Thamhain 2004) taken during the academic IS projects: “define work process” ($r_s = 0.259, p = 0.005$); “define team structure” ($r_s = 0.307, p = 0.001$); “build an image of high performance” ($r_s = 0.236, p = 0.011$); “stimulate enthusiasm, excitement, and professional interests” ($r_s = 0.226, p = 0.015$); and “foster a culture of continuous support and improvement” ($r_s = 0.187, p = 0.045$). This means that the more often students implemented each of these recommendations, the higher the grade on their project (or their team performance). The effect sizes of these correlations ranged from small to moderate (Cohen 1988). Additionally, the $r$ squared indicates that approximately 4% to 10% of the variance in team performance can be predicted by these five recommendations (see Table 2). Thus, our study supports hypotheses 2, 4, 6, 7, and 14.

Our goal was to examine the effect of Thamhain’s (2004) recommendations, perceived as implemented by IS students, on their IS project teams’ performance. Findings suggest that the more often team leadership properly defined work processes and task responsibilities (i.e., “define work process and team structure”, see hypothesis 2 and 4, respectively), the greater the academic project team’s performance (or the IS project final grade). Most of the students in our cohort were used to work together; and could easily define ways of accomplishing tasks and accountabilities for team members. This may have led our teams of IS students to higher performances. These results are partially in line with Thamhain’s (2004), as this author found that (to be a predictor of project team performance) appropriate infrastructures should also include properly defined interfaces, reporting relations, and communication channels. However, in our study the hypothesis that covers these topics (i.e., “define interfaces”, see hypothesis 3) was not supported. Our results also indicate that the more often team leadership properly defined team boundaries (i.e., “build an image of high performance”, see hypothesis 6), which stimulate, for instance, student members’ pride of participation and members working together cooperatively, the greater the academic project team’s performance. These findings are in line with previous research (Ammeter and Dukerich 2002; Thamhain 2004; Collins and Schragle-Law 2010). Our results also suggest that the more often team leadership motivated and transformed team members through leaders’ sensitivity to members’ personal and professional needs and feelings (i.e., “stimulate enthusiasm, excitement, and professional interests”, see hypothesis 7), the greater the academic project team’s performance. These findings are in line with previous research (Thamhain 2004; Sun et al. 2014). Results also indicate that the more often team leadership provided supportive and learning team climates during the course of the academic project, for instance, to improve the quality of work processes (i.e., “foster a culture of continuous support and
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improvement”, see hypothesis 14), the greater the academic project team’s performance. These findings also confirm previous research (Thamhain 2004; Mealiea and Baltazar 2005; Collins and Schragle-Law 2010; Sun et al. 2014).

In the domain of academic IS projects, most of Thamhain’s (2004) recommendations to lead teams to high performance have frequently been perceived as implemented by team leadership. However, our study has shown that only a few of these recommendations are correlated with team performance. They are: “define work process and team structure” (part of Thamhain’s 2004 second recommendation); “build an image of high performance”; “stimulate enthusiasm, excitement, and professional interests”; and “foster a culture of continuous support and improvement” (i.e., Thamhain’s 2004 fourth, fifth, and twelfth recommendation, respectively). “Build an image of high performance” and “stimulate enthusiasm, excitement, and professional interests” were among the least implemented recommendations, even though the former has been implemented more often than the latter. On the one hand, our cohort of IS students seems to have compensated for the enthusiasm, excitement, and personal interests that were not properly stimulated by team leadership (Moura and Varajão 2016). On the other hand, some of the students seem to lack the knowledge and skills: (1) to properly define team boundaries (that create a high-performing image of the IS project team perceived by its members, see Ammeter and Dukerich 2002; Collins and Schragle-Law 2010); and (2) to satisfy team members’ personal and professional needs and feelings (see Thamhain’s 2004 fifth recommendation). Thus, instructors should be aware of IS students’ limitations so they can improve future implementations of these types of courses (by, e.g., providing tips and guidance on creating work environments designed to facilitate team performance).

Conclusion

Since firms should be able to rely on high-performing teams (e.g., effective teams that include knowledgeable and skillful professionals) (Moura et al. 2014), higher education institutions are receiving steady pressure to better prepare students for project management positions. Therefore, the value being placed on project management courses is increasing in higher education, especially in the domain of IS (Tabatabaei et al. 2009).

Hopefully, we expect that this study will help improve the understanding of leading practices and processes concerning high-performing academic IS project teams so that students (future project team members and managers) can achieve better results in today’s demanding business environment. Reported results suggest that “define work process”, “define team structure”, “build an image of high performance”, “stimulate enthusiasm, excitement, and professional interests”, and “foster a culture of continuous support and improvement” can enhance the performance of academic IS project teams. Therefore, as only these recommendations were empirically supported in the reported higher education environment, they are the only ones that can be regarded as conducive aspects to high team performance in the domain of academic IS projects.

It is worth noting that there are differences between the consequences of a bad grade and those experienced on the job when working in teams. However, since the studied projects shared most of the characteristics of professional IS projects, the teams felt that they were participating in “real” projects and were very responsible in carrying out the tasks (which was reflected in the final grades).

Before discussing directions for future research, it is appropriate to point out the main limitations of our study. This means that we have based our findings on a limited number of participants from one university and on the assumption that all of our groups of IS students worked as a team. Thus, we need to gather more empirical data to test for the generalization of the impact of those recommendations on academic IS project teams’ performance (and on other types of teams, e.g., organizational IS project teams). In spite of the limitations, we believe that our study represents a substantive advance on earlier exploratory work.

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