Antecedents and Results of Emotional Capability in Software Development Project Teams*
Ali E. Akgün, Halit Keskin, John C. Byrne, and Ayse Gunsel

Emotional capability is considered an emerging phenomenon in the group behavior literature. However, little attention is given to the role of emotional capability in heterogeneous work groups in general and cross-functional product development teams in particular in an empirical context. In this study, the antecedents and results of the emotional capability in software development project teams using Huy's (1999) dynamics of encouragement, displaying freedom, playfulness, experiencing, reconciliation, and identification constructs were investigated. By studying 95 software development project teams in the IT departments of 52 firms, it was found, on the basis of using the Partial Least Squares (PLS) method, that the dynamics of encouragement is positively related to the speed-to-market, and the dynamics of encouragement and experiencing is positively related to the market success of new software products. In addition, it was demonstrated that team autonomy has a positive influence on the dynamics of encouragement; collaboration among team members has a positive impact on the dynamics of encouragement and experiencing; and team experience has a positive effect on the dynamics of experiencing. This study has several theoretical and managerial implications. In terms of theoretical implications, this study enhances the empathy concept by operationalizing it at the team level, i.e., collective empathy, and tests its impact on the project performance. This study also highlights the roles of collective hope, joy, and enthusiasm in a project’s performance by empirically demonstrating the benefits of working in a fun environment. Further, this study empirically shows that team emotional capability mediates the relationship between collaboration among team members and market success of the software products, indicating that management and regulation of the emotions acts as a platform to actualize the joint behavior toward some goal of common interest for the successful products. In terms of managerial implications, this study suggests that managers should enhance the team’s emotional capability to enhance the project performance. In particular, managers should promote courage, joy, and hope, and increase communication among people to develop collective empathy and the “liking” of one party for the other. Managers should also promote collaboration and mutual interaction among team members; give autonomy to project team members to make important decisions about the software product; keep control of the project’s process to some level; and encourage people to use their previous experience during the projects to increase the team’s emotional capability.

Introduction

As software development is a complex problem-solving or decision-making process, the sharing and integration of knowledge among individuals is a crucial task of the software development project teams (Walz, Elam, and Curtis, 1993). The technology and innovation management (TIM) literature indicates that the success of software projects depends on the interaction of knowledge and skills among team members, which is inherently a process that requires intense social interactions (Hoegl and Parboteeah, 2007; Nicholson and Sahay, 2004). Although, as noted by Reus and Liu (2004), such social interactions are imperative for knowledge generation and exploitation, they also elicit many emotions. Indeed, while team members bring their knowledge and skills, they also bring their emotions (Kelly and Barsade, 2001). Interestingly, many scholars have conducted research to garner a better understanding of knowledge and skill management practices rather than the emotional aspects of the project teams as a whole (Rhee, 2007). As project teams develop routines regarding the manner in which the emotions of its members are managed, e.g., setting of practices to either foster or discourage the development of expressed emotions, an investigation of a team’s capability to develop and manage the emotions of its members through the team processes, i.e., emotional capability, is thus warranted.
Based on the organizational level of study, emotional capability refers to a team’s ability to perceive, understand, monitor, regulate, and use its members’ emotions and to manifest them in the project team’s routines and structures (Akgün, Keskin, and Byrne, 2009; Huy, 1999). It is interesting to note however that we know little about the role of a team’s emotional capability on the project team performance. Here, we propose that emotional capability, so far applied to individuals (Offermann et al., 2004) and organizations (Akgün et al., 2009; Huy, 1999) to enhance their effectiveness, can be applied to make teams work more effectively. This is achieved by bringing individual and collective emotions to the surface and developing an understanding of how they affect the work of the project team. In addition to the team performance, especially from a managerial perspective, the antecedents of emotional capability should be investigated empirically. Antecedents of emotional capability, for example, act as facilitators to develop a team-level emotional capability during the projects. Based on the research model of Kessler and Chakrabarti (1996, 1999), which identified a number of capability development factors that affect the innovation speed through the implementation of policies and objectives, we argue that team-related capability development factors are likely to influence the development of emotional capability of the team during the projects. Specifically, this includes the collective perception of the experience of project team (i.e., team experience), the degree of representativeness of internal and external interest groups on project teams (i.e., collaboration among team members and external integration), and the degree of empowerment or decision-making autonomy of the project team (i.e., team autonomy and project leader’s control). These factors indicate generic administrative/methods-based interventions and management tactics for capability development (e.g., they are in the control of management and project team members), and the roles of these factors, on emotional capability development are relatively unexplored, and no systematic framework for their relationship has been developed in the TIM literature.

The aim of this study is to investigate the predictions of the emotional capability theory using software development project teams. Specifically, as shown in Figure 1, this paper investigates: (a) the impact of emotional capability on the software development product effectiveness, operationalized as speed-to-market and market success of new software products; and (b) which software development team processes improve a project team’s emotional capability, such as team autonomy, collaboration among team members, external integration, team experience, and project leader’s control.

**Emotional Capability in Project Teams**

Derived from the resource-based view of organizations and emotional intelligence theory, the concept of emotional capability has received significant attention in the management (e.g., Ashforth and Humphrey, 1995; Bolton, 2005; Huy, 1999) and TIM (e.g., Akgün et al., 2009) literature. The emotional capability theory puts forward that organizations are emotional arenas in which the employee’s emotions can be regulated and managed effectively (Huy, 1999). Theoretical studies indicate that emotional capability is a multidimensional concept involving six subprocesses...
to enhance firm performance and effectiveness (Huy, 1999). For instance, Huy (1999) notes that organizations manage peoples’ emotions using subprocesses named “emotional dynamics,” such as dynamics of (1) encouragement, (2) displaying freedom, (3) playfulness, (4) experiencing, (5) reconciliation, and (6) identification. Huy (1999) further discusses that these emotional dynamics indicate how people perceive, appraise, understand, and express emotions in their interactions with others, and reflect the display and regulation of feelings among people. Also these emotional dynamics identify and consider the processes and mechanisms (such as organizational routines, culture, and managers) that evoke, inspire, or elicit emotions which foster the visible and shared development of emotions in organizations. It should be noted, however, that Huy’s (1999) theoretical work was specific to the emotional dynamics associated with radical change. Subsequently, Akgün et al. (2009) investigated the emotional capability theory in the product and process innovation context by operationalizing the constructs of emotional dynamics. They empirically demonstrated that a firm’s emotional capability influences a firm’s product and process innovations. Demonstrating the importance of emotional capability on the firm innovativeness in greater detail, Akgün et al. (2009) further suggest an empirical investigation of how a project team’s emotional capability influences the project’s operations and performance, and how one can leverage the emotional capability of the project teams. Indeed, there is a gap in the TIM literature addressing the empirical investigation of the emotional capability of project teams.

A review of the literature shows that studies on emotional capability are restricted to a few theoretical studies in the group/team behavior literature (Rhee, 2007). For instance, in their theoretical paper, Reus and Liu (2004) studied how knowledge-intensive work groups develop emotional capability, and the role of emotional capability on the group’s behavior and performance. The authors propose that emotional capability is composed of a group’s ability to recognize and regulate emotions. Further, the authors assert that at the group level, recognition of emotions refers to a group’s ability to anticipate, differentiate, and understand the emotional experience of its members so that it can effectively attend to group member emotions (p. 255). Emotional regulation indicates the efforts of a group to manage felt and expressed emotions of members so that the members’ emotional experiences function in a manner that facilitates intellectual task performance (p. 255). The authors also wrote that such ability to recognize members’ emotions can be accomplished if a deeper level of appreciation of emotions is established in a group’s norms and routines. It is interesting to note that these two classifications or subprocesses of emotional capability are a narrowly defined version of Huy’s (1999) six emotional dynamics. Also, it should be noted that Reus and Liu (2004) did not specify which knowledge-intensive work group they are arguing in the emotional capability context, and they did not provide empirical evidence on how emotional capability is operationalized and tested in the work groups. Consequently in order to address this gap in the TIM literature on the concept of emotional capability in heterogeneous work groups, software development project teams will be used. Based on emotional capability theory in organizations (Akgün et al., 2009; Huy, 1999) and theoretical studies on group emotions (Reus and Liu, 2004), it is argued that a project team demonstrates its emotional capability when the team has: (1) the ability to instill hope and joy among all of its members (i.e., dynamics of encouragement); (2) the
ability to facilitate the variety of authentic emotions that legitimately can be displayed during the project (i.e., dynamics of displaying freedom); (3) the ability to create a context that encourages experimentation and that tolerates mistakes during any action (i.e., dynamics of playfulness); (4) the ability to link people to salient team characteristics including core values and beliefs (i.e., dynamics of identification); (5) the ability to identify a variety of emotions, to accept and internalize them, and to act on a deep level of understanding (i.e., dynamics of experiencing); and (6) the ability to bring together two seemingly opposing values about which people have strong feelings during the development process (i.e., emotional reconciliation). Based on these characteristics, consistent with previous organizational-level studies, it is proposed that studying and applying the emotional capability theory contributes to the understanding of the social side of software development efforts and its importance to the organization. Because software development is a predominantly social activity (Oshri, Kotlarsky, and Willcocks, 2007), it is important to view software development teams as social bodies imbued with emotions. Indeed the web of relations among team members is particularly strong in software development teams (Nicholson and Sahay, 2004) where its major component involves intellectual work colored by emotions. For instance, the feelings of hope, anxiety, fear, and so on are emotional experiences that tie with the most basic elements of the member’s behaviors during the development process. Also, the emotional capability helps teams to value, embrace, and cultivate the strength of emotionality during the development process. Here, team autonomy enhances intrinsic motivation, which “refers to doing something because it is inherently interesting or enjoyable” among IT professionals (Ryan and Deci, 2000, p. 55), and thereby helps the competence development of the members of the team (Ryan and Deci, 2000). Also, granting autonomy lessens the formal aspect of the recognition, development, and expression of certain emotions through standardized procedures and methods. As team members become more autonomous and feel greater control over the processes and procedures (Kessler and Chakrabarti, 1996), they may violate organizational/team rules when those rules conflict with their own genuinely felt emotions. Here, team members are able to use their skills and behave according to their inner feelings. Further, team autonomy promotes the development of new feelings, e.g., a willingness to take chances. As team autonomy suggests an exchange-based relationship and participation, the members exchange relevant ideas and feelings more openly and have greater motivation to implement them. Therefore:

H1: Team autonomy is positively related to the development of emotional capability in software development project teams.

Another factor that facilitates the development of emotional capability is collaboration among team members (Reus and Liu, 2004). Collaboration among team members creates a common appreciation of the feelings and emotions which were apparent and untapped. For instance, during the projects, team members are likely to seek out the views, ideas, and
feelings of others to better understand the problem and then interactively apply them for effective solutions (Hoegl and Parboteeah, 2007). Collaboration can reduce people's fear and increase their openness in sharing their feelings with others, and eliminate the stereotypes and thus synergistically combine their feelings (Garcia-Prieto et al., 2007; Griffin and Hauser, 1996). In fact, collaboration creates an impetus for each person to enter relationships to improve the team's effectiveness through retrospective reflection on each others' emotions. Also, collaboration among team members regulates communication flow, making the team emotions transparent to enhance team emotional capability (Moenaert et al., 2000). This ensures that team members are willing and have the ability to identify and deal with their own and others' emotions, through self-observation and direct communication in relationships with others (Bolton, 2005). Next, collaboration among team members fosters a feeling of affinity for each other and a desire to remain part of the team reflected through emotions, displaying an emotional predisposition to maintaining the relationships (Rodríguez, Pérez, and Gutiérrez, 2008). Therefore, it is hypothesized that:

**H2:** Collaboration among team members is positively related to the development of emotional capability in software development project teams.

In addition to collaboration among team members, integrating external parties such as customers and suppliers with the team's activities may have benefits on emotional capability development during the projects. For example, the integration of external parties provides access to new feelings during the projects (Koufteros, Vonderembse, and Jayaram, 2005). This external integration helps project teams to share tacit and specialized knowledge as well as emotions throughout the development process (Chamorro-Koc, Popovic, and Emmison, 2008). For instance, users might express doubts and suspicions, or trust and belief in the existing ways of solving software-related difficulties by discussing or creating an open dialogue, and by having meetings with a project team. That is, the interactions among team members and customers, suppliers, and others permit an in-depth understanding of each others' feelings and leads to concurrent consideration of specification, design, and production issues. This integration of externals also ties customers and suppliers emotionally to the project team. As a team gets to know its customers/suppliers better and becomes committed to understanding and meeting their needs, a stronger emotional linkage is forged between the team and its customers (Allen and Hecht, 2004). Therefore:

**H3:** External integration is positively related to the development of emotional capability in software development project teams.

As the depth and variety of skills and the experiences of employees are considered to be important elements of innovation in software and capability development (Koc, 2007), it is argued that the experience of the project team members is important to the development of an emotional capability during the software development projects. Specifically, since team members bring a set of experiences and contacts from their prior projects, they are likely to have an improved ability to rapidly interpret new emotions and promote the collaboration of emotions. Also, team members would be better able to facilitate internalization and socialization activities of emotions and have a tacit understanding of working with others (Jordan, Lawrence, and Troth, 2006). Next, team experience facilitates the development of emotional history, which is required for emotional capability development (George and King, 2007). Kelly and Barsade (2001), for instance, mention that every emotional experience felt by a group, whether it is intense or mild in nature, adds to and becomes part of the group's particular emotional history. This history then influences expectations for emotional expression in future group interactions as well as behaviors in those interactions. For example, if a product/software development group has an angry exchange about a part of a design, this experience will in all likelihood affect the emotional tenor of the group the next time they meet (Kelly and Barsade, 2001). Therefore, it is hypothesized that:

**H4:** Team experience is positively related to the development of emotional capability in software development project teams.

The last antecedent is the project leader's control during the project (Reus and Liu, 2004). It indicates to what extent the project leader remains closely involved in project details, receives feedback, and adjusts resources as needed during the projects (Piccoli and Ives, 2003). In this way, the project leader's approach to controlling the development process directly influences emotions of project team members as indicated by Reus and Liu (2004) and Pescosolido (2002). Indeed, based on the team management literature, the perceived control mobilizes the emotions of the team by
blending functional identities (Thompson and Findlay, 1999, p. 172), such that mutual obligations are crystallized and the possibility of employee misconduct in the team is reduced (Piccoli and Ives, 2003). Also, that control leads to higher emotional commitment in the project team. Here, the more a member identifies with and feels committed to the project team, he or she is willing to accept direction and cooperate as part of the team. On the other hand, an increased level of a project leader’s control may have a diminishing effect on emotional capability of project teams. For example, the literature indicates that software work is usually conducted in nonbureaucratic working environments with loose forms of management (Scholarios and Marks, 2004). Software workers require minimal supervision partly because they derive identity from their occupation. Here, a project leader’s extensive control structures a paternalistic approach and contains and restricts options rather than supporting connected thinking within the team. Also, as most of the software development efforts are performed with less information about customers, control remains less effective. In the case of incomplete information, a project leader’s control reduces the emergence of free display of emotions and experimenting activities of different feelings of the team members. Accordingly, it is proposed that increasing the leader’s control during the project increases its emotional capability development to a point, and then declines as a leader’s control proceeds beyond some moderate level. Therefore:

**H5:** The control of the project leader will have an inverted-U relationship with the development of emotional capability in software development project teams.

### Results of Emotional Capability

The arguments on the role of emotional capability on team performance are limited to a few theoretical studies, such as Jordan and Troth (2004). In a software development team context, it is argued that emotional capability will have a positive influence on the speed to market, i.e., developing the software quickly. Since emotional capability promotes collaboration and cooperative behavior, enhances communication among team members, and reduces the risk of relationship conflicts, people will have a greater willingness to exchange project-related information in a timely manner and work on their tasks for team spontaneity, enhancing the speed-to-market. Also, as emotional capability discourages the suppression of emotional expression, which tends to consume cognitive resources of individuals, team members concentrate and monitor more on project tasks rather than those emotions (Jordan et al., 2006). Here, accurately monitoring the social dynamics occurring in the team and managing both one’s own emotions and the emotions of others is another important requirement for developing a software product faster.

In addition to speed to market, emotional capability will also have a positive impact on the team’s ability to develop successful software in the marketplace. Specifically, based on the organizational level of emotional capability theory (Huy, 1999), emotional capability helps teams to overcome the barriers that are likely to confront creativity and entrepreneurial practices (Isen, Niedenthal, and Cantor, 1992). When team members feel free to voice and show their emotions without fear of criticism, they generate ideas and solutions for products through discovery, discussion, and reflection (Fredrickson, 2001). Indeed, based on the concept of emotional energy of Collins (1990), emotional capability gives energy to teams to take the initiative in social interaction, to be enthusiastic, and to take the lead in setting the level of emotional entrainment. Emotional capability also facilitates the feeling of togetherness and emotional support to complete projects more successfully. Here, the emotional ties linking individuals and formation of emotional attachments based upon reciprocated interpersonal care and concern form the basis for the development of synergistic team relationships, which can lead to superior performance (Massey and Kyriazis, 2007). Next, emotional capability promotes information and knowledge exchange, which is critical for the market success of a software product. Nicolas (2004, p. 26) wrote that: “In practice, we observed that people need to argue their choice with explicit knowledge in order to share efficiently what they think and in which solution they believe. But, before explicating this knowledge, individuals are influenced by their feelings and emotions.” Therefore:

**H6:** Emotional capability of a software development project team is positively related to the: a) speed-to-market, and b) market success of software.

### Research Design

**Measures**

To test the above hypotheses, multi-item scales adopted from prior studies for the measurement of
constructs were used. Each construct was measured using 5-point Likert scales ranging from “strongly disagree” (1) to “strongly agree” (5). However, the project team size question was assessed with ratio scale. The Appendix presents the measures used. It should also be noted that some variables were included as controls because they were shown to affect key variables in this study. Team size, measured as number of persons in the team, affects emotional capability development. For instance, the emotional capability level may be more intense in smaller teams than larger teams due to less hierarchical approval and bureaucracy. In addition to the team size, the literature indicates that project outcomes are related to environmental uncertainty (e.g., Lu and Yang, 2004).

By using the parallel-translation method, items were first translated into Turkish by one person and then retranslated into English by a second person to make sure that the meanings of question items were correctly transformed from English to Turkish. A draft questionnaire was developed and then evaluated and revised in discussions with four academics from Turkey, with knowledge of organizational behavior and innovation as expert judges. The suitability of the Turkish version of the questionnaires was then pre-tested by five part-time graduate students working in industry and involved in at least one software development project. Respondents did not demonstrate any difficulty understanding the items or scales. After refining the questionnaire, based on interviews with the pretest subjects, the questionnaires were distributed and collected by one of the authors, using the “personally administrated questionnaire” method.

**Sampling**

The initial sample consisted of 200 firms’ IT departments, which have affiliations with European and American firms, located in Istanbul. First, the firms’ managers were contacted by telephone and the aim of our study was explained to them. Of the 200 firms contacted, 140 agreed to work with this study. At least two respondents, who are the most knowledgeable about the projects, were asked to fill out the surveys to avoid single-source bias in each software development project team in IT departments of firms. Those respondents are expected to serve as key informants for others who work in the same project team, representing the beliefs or attitudes of the team. These respondents are also members of other “teams” within the same IT department. Here collecting information from the same respondent for the different projects was avoided to prevent mixing the perceptions of the different projects. After qualifying the respondents, each respondent was informed that his/her responses would remain anonymous and would not be linked to them individually, their companies, or software (products). This was done to assure anonymity, increasing the motivation of informants to cooperate without fear of potential reprisals. Also, respondents were assured that there were no right or wrong answers and that they should answer questions as honestly and forthrightly as possible (Podsakoff, Mackenzie, Lee, and Podsakoff, 2003).

Of the 140 firms’ IT departments that agreed to participate, 65 completed the questionnaires, returning 212 surveys from 107 software development projects. However, 8 firms’ IT departments responded with only one survey, resulting in 54 firms’ IT departments with 204 surveys. Since multiple responses from project teams were asked, these firms’ surveys were discarded from the analyses. In addition, since a cross-sectional research design was employed and independent and dependent variable questions were asked in the same survey, to control the internal validity, the same questions were asked on different pages of the survey. For instance, “in our project team, people are encouraged to express their full range of emotions without fear of reprisal” question appeared twice in the survey. If the responses to these “consistency” questions were not close to each other in a survey (our decision rule was ±1), that survey was deleted from the analysis. Because of data screening, 8 out of 204 surveys were discarded. However, if the eliminating process resulted in only one response for a project team, that project team was also dropped from the sample. The means of variables and team size of the eliminated surveys were compared with the rest of the surveys used for the analysis, and no statistical difference was found among them. Thus, usable data for the analysis is the 196 surveys from 95 software development projects in 52 firms’ IT departments. In the sample, 26 firm’s IT departments responded with one, 17 responded with two, 5 responded with three, 2 responded with four, and 2 responded with six software development projects. In the sample the projects were related to information and communication technologies (43%), business services (39%), and financial services (18%). The respondents were engineer/programmer (56%), senior engineer/technical leader (15%), product/project
managers (12%), IS specialist/analyst (11%), and department managers (6%).

Analysis and Results

The partial least squares (PLS-Graph 3.0) approach was used to estimate the measurement and structural parameters in our structural equation model (SEM) (Chin, 1998). Before doing any analysis, since the unit of analysis is the “project team,” the team scores of each question item was aggregated. The inter-rater agreement (r_wg) on team level measures needed to be demonstrated and all r_wg values ranged from .68 to .90. This is well above the .60 benchmark (Hurley and Hult, 1998), indicating a satisfactory level of inter-rater agreement for each aggregate measure in a software development project team (see Appendix).

Measurement Validation

In this study, following Kleijnen, Ruyter, and Wetzels (2007), reflective indicators for all constructs was used (see Appendix). To assess the psychometric properties of the measurement instruments, a null model with no structural relationships was estimated. The reliability was evaluated by means of composite scale reliability (CR) and average variance extracted (AVE). For all measures, PLS-based CR is well above the cut-off value of .70, and AVE exceeds the .50 cut-off value. In addition, the convergent validity was evaluated by inspecting the standardized loadings of the measures on their respective constructs and it was found that all measures exhibit standardized loadings that exceed .60. Next the discriminant validity of the measures was assessed. As suggested by Fornell and Larcker (1981), the square root of AVE for each construct was greater than the correlations between pairs of constructs (see Table 1). Consequently, it is concluded that all constructs exhibit satisfactory discriminant validity.

Hypothesis Testing

The PLS Graph 3.0 and Bootstrapping resampling (i.e., 500 subsamples) method was used to test their statistical significance. As shown in Table 2, with regard to antecedents it was found that team autonomy is positively associated with dynamics of encouragement ($\beta = .20, p < .1$), displaying freedom ($\beta = .36, p < .01$), and reconciliation ($\beta = .24, p < .1$), marginally supporting H1. Collaboration among team members is positively associated with dynamics of encouragement ($\beta = .45, p < .01$), displaying freedom ($\beta = .45, p < .01$), experiencing ($\beta = .29, p < .1$), reconciliation ($\beta = .33, p < .05$), identification ($\beta = .53, p < .01$), and playfulness ($\beta = .29, p < .1$), supporting H2. It was also found that team experience is positively related to dynamics of experiencing ($\beta = .20, p < .05$), marginally supporting H4. The results further demonstrated that leaders’ control is positively related to dynamics of playfulness ($\beta = .38, p < .01$) and quadratic form of leader’s strength is positively related to the displaying freedom ($\beta = .33, p < .05$), marginally supporting H5. It is interesting to note, however, that no statistical association was found between external integration and emotional capability, so H3 is not supported. Regarding the results of emotional capability, the results showed that dynamics of encouragement ($\beta = .26, p < .01$) are positively associated with speed-to-market, marginally supporting H6a, and dynamics of encouragement ($\beta = .35, p < .01$) and experiencing ($\beta = .22, p < .1$) are positively related to the market success of software, marginally supporting H6b.

Finally, the results in Table 2 show that the antecedents explain 44% of the variance in dynamics of encouragement, 38% of the variance in dynamics of displaying freedom, 38% of the variance in dynamics of experiencing, 29% of the variance in dynamics of reconciliation, 32% of the variance in dynamics of playfulness, and 46% of the variance in dynamics of identification. Capability development variables, emotional capability and control variables the model presented, explain 34% of variance ($R^2 = .34$) in speed-to-market, and 38% of variance ($R^2 = .38$) in market success of new software products.

Discussion and Implications

In this study, the emotional capability theory in the project team context was investigated and its role in project outcomes was empirically demonstrated. The results of this study demonstrate in particular that the emotional dynamics of experiencing, such as collective empathy of the project teams, is a critical factor for the fast development and market success of software products. This finding especially extends the understanding on the concept of “collective empathy” in the TIM literature. First, previous researchers in the TIM literature have demonstrated the importance of
### Table 1. Correlations of Latent Variables

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Diagonals show the square root of AVEs.

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Empathy on supplier and customer interactions (Croom, 2001) and cross-functional integration (Griffin and Hauser, 1996). Most of those studies examined the empathy implicitly with theoretical arguments and focused on the empathy at the individual level. This study enhanced the empathy concept by operationalizing it at the team level, i.e., collective empathy. It is seen that collective empathy places greater emphasis on the notion of mutuality and the dynamic of reciprocal interaction and joint ownership of process in order to be more successful in the market with new software products. Second, related to the operationalization issue of empathy it should be noted that the cognitive aspect of empathy has been the most widely accepted theoretical perspective in the TIM literature. The cognitive aspect of empathy resonates with the notion of attitude or taking the perspective of the other, and understanding the others’ world (Irving and Dickson, 2004). Unlike the cognitive aspect, the other two aspects of empathy mentioned by group behavior researchers—affective and behavioral aspects—are underemphasized in the TIM literature, and should be operationalized at the team level (Gladstein, 1983; Irving and Dickson, 2004). Our operationalization of dynamics of experiencing involves affective and behavioral as well as cognitive perspectives. For instance, based on the management and psychology literature, an affective view indicates emotional responsiveness to the experience of emotions, “feeling-with” (Nelson-Jones, 1983), and “responding with the same emotion to another person’s emotion” (Gladstein, 1983, p. 468). Further, a behavioral view demonstrates the discriminating affective cues in others (Nelson-Jones, 1983).

Besides the dynamics of experiencing, the dynamics of encouragement, such as collective hope, joy, and enthusiasm, were also found as a critical factor for a project’s performance, i.e., speed-to-market. Even the positive impact of hope of individuals received considerable support through empirical research in workplace and work unit effectiveness (Larson and Luthans, 2006). Little was known about it in the software development context in an empirical study. It is seen that emotional traits, e.g., hope, joy, and enthusiasm, in this context contributes to the members expending the requisite energy necessary to pursue and attain project-related goals, e.g., to launch the software products faster. Also, this finding improves the movement of positive psychology, which refers to the study and application of positively oriented human resource strengths and psychological capacities that
<table>
<thead>
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<th>Path coefficient ($\beta$)</th>
<th>Results</th>
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<td>.20* Marginally supported</td>
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<tr>
<td>Team autonomy → Dyn. of disp. freedom</td>
<td>.36**</td>
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<td>Team autonomy → Dyn. of playfulness</td>
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<td><strong>H6a</strong> Dyn. of encourage → Speed-to-market</td>
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Table 2. (Cont’d.)

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| Table 2. Results

A. E. AKGÜN ET AL.
can be effectively managed for performance improvement in the workplace (Luthans, 2002), in the TIM literature by empirically demonstrating the benefits of working in a fun environment. To our knowledge, there is a gap in the TIM literature testing the direct impact of collective hope and joy on project performance. This study demonstrated how team strengths and virtues and their positive experiences, i.e., an aspect of group psyche, and management’s role in setting an enjoyable arena for projects, effect a faster software product development process.

In this study, how team-related capability development factors influence a project team’s emotional capability was also shown. For instance, the results indicate that team autonomy has an effect on the team’s and its manager’s ability to instill hope, enthusiasm, and joy (i.e., dynamics of encouragement), supporting the studies on the team climate concept, which refers to the perceptions of individuals regarding the atmosphere or dynamics that exist within a team and influence their behavior (Shadur, Kienzle, and Rodwell, 1999), in the TIM literature. Specifically, despite the fact that autonomy and emotions are among the most commonly studied team climate features, their relations to each other and their interactive effects have yet to be assessed. It was seen that team autonomy humanizes the work settings and helps managers to create an emotionally stable team, which refers to a team’s level of self-confidence and balance with respect to work (Molleman, 2005) during projects. Emotionally stable teams facilitated by team autonomy experience an increase in confidence and a decrease in anxiety or fear of failure to develop faster software products. The results also show that team experience significantly influences the dynamics of experiencing, such as collective empathy, during the projects. This leads to improving the socio-emotional aspects of knowledge management practices, which highlights the norm of reciprocity that obligates individuals to respond positively to favorable treatment received from others, such as appreciation, friendship, and respect, and leads to opportunities for personal growth and development (Sels, Janssens, and Brande, 2004; Shapiro, 2002). For example, based on the cognitive view, researchers argue that past experience or knowledge of team members facilitate habitual routines (Gersick and Hackman, 1990), such that, the greater the team’s experience and expertise, the greater will be the team members’ resistance to use the information/knowledge of others and be empathetic. On the other hand, by emphasizing the socio-emotional perspective, it was empirically demonstrated that team experience facilitates interactions and creates a positive evaluation by being friendly, enthusiastic, and attentive, and showing empathy for others, such that the subjects took multiple perspectives on an issue, and reflected on these diverse points of view rather than resorting to simplistic or polarized ways of thinking (Kana and Aitken, 2007). Finally, the results showed that collaboration among team members has a significant impact on the emotional capability of a project team. This finding extends the current knowledge on the cross-functional team collaboration writings. For instance, previous studies demonstrated that collaboration within a team: (a) captures the ability of different functional areas to accommodate disparate views and to work around conflicting perspectives and mental models; (b) denotes how team members coordinate their activities during the project, putting aside functional interests for the good of the team as a whole; and (c) increases collective agreement on teamwork (see Jassawalla and Sashittal, 1998). However, how collaboration among team members influences the emotion management activities in the projects is still a matter of concern for project managers. For instance, Kahn (1996, p. 139) asserted that interdepartmental collaboration is more intangible and difficult for management to regulate or change. Here, with collaboration among team members, the project team and its manager will be able to develop and instill hope and joy, and collective empathy. Also it should be noted that post hoc analysis (a model that only involves collaboration, emotional dynamics, project performance, and control variables) demonstrated that team emotional capability mediates the relationship between collaboration and market success of the software products, indicating that management and

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<th>Fit measures</th>
<th>Endogenous construct</th>
<th>Final model</th>
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<td>$R^2$</td>
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</tr>
<tr>
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<td>Dynamics of displaying freedom</td>
<td>.38</td>
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<td>Dynamics of identification</td>
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<td></td>
<td>Speed-to-market</td>
<td>.34</td>
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<tr>
<td></td>
<td>Market success</td>
<td>.38</td>
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</table>

Path coefficients are not standardized.

* $p<.1$, ** $p<.05$, *** $p<.01$. 

Table 2. (Cont’d.)

Fit measures Endogenous construct Final model

$R^2$

Dynamics of encouragement .44
Dynamics of displaying freedom .38
Dynamics of experiencing .38
Dynamics of reconciliation .29
Dynamics of playfulness .32
Dynamics of identification .46
Speed-to-market .34
Market success .38
regulation of the emotions acts as a platform to actualize the joint behavior toward some goal of common interest for the successful products.

From this study, it seems clear that managers should enhance the emotional capability of teams during projects. From this perspective, managers should: (a) establish a psychologically safe environment where team members are safe to interact with each other without feeling punished, to exchange knowledge, skills, and feelings during the interactions; (b) promote collaboration and mutual interaction between members; (c) give autonomy to project team members to make important decisions about the software product while at the same time managers should keep control of the project’s process to some level; and (d) encourage people to use their previous experience during the projects. In order to enhance the market success of the software products and develop them faster, management should enhance the emotional capability of teams. Management should promote courage, joy, and hope, and sow the seed of the thought “I know I can” among the people to fuel and energize the people’s goal pursuits. Here, unlike wishing and dreaming, with the help of management each team member should be able to create an image of himself or herself in the present moment; an image of where he or she would like to be, and of a route to link the present to the desired future. Also, management should increase communication among people to develop collective empathy and “liking” of one party for the other. In this way, management can instill a protective policy for the inner situation of less confident, creative, and silent team members. However, at the same time, management should keep formal control of the project processes and people when it is required. Management involvement is desirable to develop emotional capability during the projects.

Limitations and Future Research

There are some methodological limitations to this study. Specifically, this study is prone to common method bias, since, in the questionnaire, the same respondents answered the dependent variable that answered the independent variable, in a cross-sectional manner. This potential problem was checked with the Harman one-factor test (Podsakoff and Organ, 1986). The results of an unrotated principal component analyses indicate common method variance is not a problem because several factors with eigenvalues greater than 1 were identified, explaining 73.71% of the total variance, and because no factor accounts for almost all the variance (i.e., highest single variance extracted is 24.33%). In addition, using objective measures, archival data for some variables, such as product performance, tend to give results that are more objective. Utilizing a cross-sectional design with questionnaires was also one of the limitations of this study. Even though surveying is a large and growing area of research in the natural environment, the method used (only a questionnaire) may not provide objective results about the flow of emotions, which is an inherently dynamic phenomena, throughout the project team. However, it should be mentioned that, as a cross-sectional field study, this research provides some evidence of associations. In addition to the nature of data, the generalizability of sampling is another limitation of this study. This research was conducted in a specific national context, Turkish software development teams. It is important to note that readers should be cautious when generalizing the results to different cultural contexts. Further, the sample size is relatively small; a larger sample might better represent the population of software development project teams.

The emotional capability of teams triggers the opportunity for future research. For instance, the impact of emotional capability on project performance and team activities in different types of environmental conditions, involving for example uncertainty and turbulence, can be investigated to understand the contingencies of the emotional capability concept. Also, how emotional dynamics affect different types of projects, such as radical or incremental, can be studied. Next, this paper studies the influence of positive emotions on project outcomes. However, how negative emotions (such as sadness, frustration, anxiety, uneasiness, discomfort) can have some beneficial effects on project outcomes can be further investigated. Also, as an emerging research area in project teams, hope theory and collective empathy can be investigated in a greater detail in software/product development teams.

In conclusion, this research sought to uncover the factors that promote emotional capability in project teams, and tested the influence of that emotional capability on project outcomes. The results show that emotional capability is positively associated with speed-to-market and market success of software products. Also, this research demonstrated that emotional capability can be facilitated by team autonomy,
collaboration, and experience. This research just scratches the surface of this important but understudied subject. Future researchers will find the area of emotional capability in project teams rich and fruitful for the literature.

References


Kana, P., and V. Aitken. 2007. “She didn’t ask me about my grandma”: Using process drama to explore issues of cultural exclusion and educational leadership. Journal of Educational Administration 45 (6): 697–710.


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**Appendix. Measures**

Standardized loadings are in parentheses.

CR: composite reliability; AVE: average variance extracted; \( r_{wg} \): inter-rater agreement

* denotes the dropped item; either they reduce the AVE to less then .50, or they have low loading weights.

**Emotional capability** (Modified from Akgün, Keskin, and Byrne, 2009)

**Dynamics of Encouragement**
- Our team has an ability to instill hope among of all its members (.87)
- Managers in our team encourage enthusiasm (.88)
- Managers in our team infuse hope and joy in the team (.87)

\[
\text{CR} = .91 \\
\text{AVE} = .77 \\
\text{\( r_{wg} \)} = .85
\]

**Dynamics of Display of Freedom**
- Our team has the ability to facilitate the variety of authentic emotions that legitimately can be displayed (.90)
- In our team, people are encouraged to express their full range of emotions without fear of reprisal (.84)
- Our team maintains order through emotional underpinnings such as fear, guilt, and embarrassment (reversed)*

\[
\text{CR} = .86 \\
\text{AVE} = .76 \\
\text{\( r_{wg} \)} = .81
\]
Dynamics of Playfulness

- Our team creates a context that encourages experimentation (.70)
- Our team tolerates mistakes of people who take initiatives (.84)
- In our team, a safe and protective work environment is created to test new team identities (such as new process, ideas) without premature lock-in (.67)

\[
\begin{align*}
    CR &= .75 \\
    AVE &= .51 \\
    rwg &= .68
\end{align*}
\]

Dynamics of Identification

- Members of our team express their deep attachment to salient team characteristics such as values and beliefs (.72)
- Members of team firm stay together because there are mutual benefits: among the most important of those are the emotional bonds that develop over time in relation to self-identified (.78)
- People defend our team’s name and reputation to outside work boundaries (80)

\[
\begin{align*}
    CR &= .82 \\
    AVE &= .60 \\
    rwg &= .71
\end{align*}
\]

Dynamics of Experiencing

- Our team members have the ability to understand others’ feelings (.84)
- People in our team experience the same or other appropriate emotions in response to others’ feelings (.79)
- People in our team communicate their emotions with others (.81)
- People are able to read the subtle social cues and signals given by others in order to determine what emotions are being expressed and understand the perspective of other individuals (.66)

\[
\begin{align*}
    CR &= .86 \\
    AVE &= .61 \\
    rwg &= .81
\end{align*}
\]

Dynamics of Reconciliation

- Our team has the ability to bring together two seemingly opposing values people feel strongly about (.60)
- People in our team can jointly develop a meaningful bridge between their various emotions (.86)
- People in our team feel the general feeling of another with no direct sharing of that person’s experience (.82)

\[
\begin{align*}
    CR &= .81 \\
    AVE &= .60 \\
    rwg &= .79
\end{align*}
\]

Market success of software products (Adapted from Cooper and Kleinschmidt, 1987)

Our product (software):

- Met or exceeded volume expectations*
- Met or exceeded the first year number expected to be produced and commercialized (.71)
- Met or exceeded overall sales expectations (.84)
- Met or exceeded profit expectations (.81)
- Met or exceeded return on investment expectations (.80)
- Met or exceeded senior management expectations (.72)
- Met or exceeded market share expectations (.79)
- Met or exceeded customer expectations (.74)

\[
\begin{align*}
    CR &= .91 \\
    AVE &= .60 \\
    rwg &= .90
\end{align*}
\]

Speed-to-market (Adapted from Kessler and Chakrabarti, 1999)

- This product (software) was developed and launched (fielded) faster than the major competitor for a similar product (.64)
- This product (software) was completed in less time than what was considered normal and customary for our industry (.76)
• This product (software) was launched on or ahead of the original schedule developed at initial project go-ahead (.83)
• Top management was pleased with the time it took us from specs to full commercialization (.81)
  CR = .85
  AVE = .58
  \( r_{wg} = .83 \)

**Collaboration among team members** *(Adapted from Kahn, 1996)*
There was an emphasis in our team to:
• achieve goals collectively (.83)
• have a mutual understanding (.82)
• informally work together*
• share ideas, information, and/or resources (.82)
• share the same vision for the team (.83)
• work together as a team (.87)
  CR = .92
  AVE = .70.
  \( r_{wg} = .89 \)

**Team experience** *(Adapted from Akgün and Lynn, 2003)*
• There was a critical mass of experienced people on the team who had developed and launched similar products before (.82)
• People in the team brought with them a wealth of information gained from prior assignments within this company (.89)
• Department managers in this team (engineering, manufacturing, marketing, etc.) had previously worked on similar products within the company (.66)
  CR = .84
  AVE = .63
  \( r_{wg} = .80 \)

**External integration** *(Adapted from Athaide, Stump, and Joshi, 2003)*
During the project:
• Our team co-designed the product with the customers and suppliers (.87)
• Our team co-developed this product with the customers and suppliers (.77)
• Our team worked consistently with the customer/suppliers to solve the specific problems related to the product (prior to installation) (.89)
  CR = .89
  AVE = .72
  \( r_{wg} = .89 \)

**Team autonomy** *(Adapted from Sethi, 2000)*
• The team had a major role in making important decisions about the product (.85)
• The team was allowed to do the project work as it deemed fit (.91)
  CR = .87
  AVE = .78
  \( r_{wg} = .84 \)

**Leader’s control** *(Adapted from Lewis, Welsh, Dehler, and Green, 2002)*
Project managers:
• Had control of the project’s process and had knowledge about the details of the project (.87)
• Received feedback about how the project is progressing (.87)
• Had control in altering resources, objectives, and schedules during the project (.89)
  CR = .91
  AVE = .77
  \( r_{wg} = .85 \)
Environmental uncertainty (Adapted from Jaworski and Kohli, 1993, and Lu and Yang, 2004)

- It is hard to know customers’ needs (.76)
- It is hard to understand competitors’ strategies (.77)
- It is hard to predict competitors’ product announcement (.83)
- It is difficult to acquire technology (.60)
- Technology changes rapidly*
  CR = .84
  AVE = .57
  $r_{wg} = .83$