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THE ROLE OF TEAM DEVELOPMENT IN USER-CENTERED DESIGN INTERVENTIONS: A SOCIO-PSYCHOLOGICAL APPROACH

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ABSTRACT

User participation in information systems development (ISD) has long been linked to systems success. Prior research has focused on identifying a range of contingencies such as task complexity, systems complexity, user influence, user-developer communication, and type of involvement etc. However, very little is known about the development and maturation of groups in (ISD) contexts. The purpose of this study is to examine the relationship between user participation and systems success from a developmental perspective. Using group development as a theoretical lens, a descriptive case study of two groups engaged in sequential user-centered design projects was conducted. The results revealed that social and cognitive forces constrained the development of both groups, resulting in a negative impact on the (ISD) outcomes. This study extends the (ISD) literature by proposing a model that links group development and systems success in ISD contexts.

Keywords

User Participation, IS Participation Theory, Group Development, User-Centered Design

INTRODUCTION

The positive impact of user participation on information systems development (ISD) outcomes is well established in the literature (Ives and Olson 1984; Kling 1977; Markus and Mao 2004; Newman and Noble 1990; Swanson 1974). As a result, user participation has become a standard paradigm in ISD contexts. However, it is commonly acknowledged that effective information systems development (ISD) outcomes require a team effort by the development team. As a result, cross-functional systems development teams are increasingly being used in ISD contexts in order to develop solutions that meet the needs and goals of organizations. Despite the increased attention on development teams in ISD contexts, very little research has focused on the development and maturation of groups over time.

As the use of systems development teams become more prevalent, it becomes increasingly important for researchers to understand why some groups engaged in user-centered design projects are more productive, better able to effectively organize, and more able to achieve successful ISD outcomes, while others struggle to establish social structure and thus are unable to achieve successful ISD outcomes.

The purpose of this study is to engage the debate on user participation and systems success from a team development perspective. Informed by Tuckman's (1965) classic stage model, the development of two newly-formed, self-organizing groups was analyzed. The results revealed that social and cognitive forces constrained the development of both groups, resulting in a negative impact on the ISD outcomes. This study concludes with implications for research and practice.

THEORETICAL BACKGROUND

IS Participation Theory

The concept of user participation has long been a central construct in IS theorizing on ISD (Swanson 1974). Over five decades of research has linked the concept of user participation (or user involvement) to systems success (Ives and Olson 1984; Kling 1977; Markus and Mao 2004; Newman and Noble 1990; Swanson 1974). Systems success is broadly defined in terms of systems quality, user satisfaction, user acceptance, and systems use. According to traditional IS participation theory, enhanced systems success is posited to result from three theoretical explanations: (1) the creation of psychological buy-in among participants; (2) the improvement of systems quality by getting the requirements right; and (3) the emergence of relationships among developers and users that shape development outcomes (Markus and Mao 2004).

Prior research has considered various contingencies such as task complexity, systems complexity, user influence, user-developer communication, and type of involvement etc. A key unresolved issue is the development of user groups involved in user-centered design projects over time.

Tuckman's Classic Stage Model

It is clear that groups have a developmental lifespan; they form, mature, and evolve over time (Morgan, Salas and Glickman 1993; Tuckman 1965; Tuckman and Jensen 1977). Group development refers to “the degree of maturity and cohesion that a group achieves over time as members interact, learn about one another, and structure relationships and roles within the team” (Mennecke, Hoffer and Wynne 1992, p. 526).

The most widely cited linear model is Tuckman's Classic Stage Model (Tuckman 1965). A central tenet of the classic stage model reflects the premise that groups are not ready to perform at inception (Tuckman and Jensen 1977). Instead, Tuckman's classic stage model predicts that groups follow a fixed linear sequence of developmental stages: *forming*, *storming*, *norming*, and *performing* (Tuckman 1965). Each stage operates in sequence and requires that developmental tensions be adjudicated before moving to the next. Change is characterized as gradual, incremental, and ongoing, while triggers to change result from internal forces. Furthermore, the stage model focuses on two dimensions: group structure and task activity.

The stages in the social or interpersonal realm are characterized as *testing-dependence*, *conflict*, *cohesion*, and *functional roles*. The pattern of interpersonal or social relationships is referred to as group structure. Stages in the task-activity realm are characterized by *orientation*, *emotionality*, *relevant opinion and exchange*, and the *emergence of solutions*. The former describes the ways that members act or relate to one another as the group evolves. The latter however, describes the content of the interaction that occurs in the group structure realm.

THEORETICAL FRAMEWORK

In order to impose some boundary conditions, the interest in this study is limited to the behavior of newly formed, self-management (i.e., self-organizing) or disrupted groups involved in ISD contexts. The theoretical framework posits that interaction process associated with the stage model of group development facilitate systems success (See Figure 1).

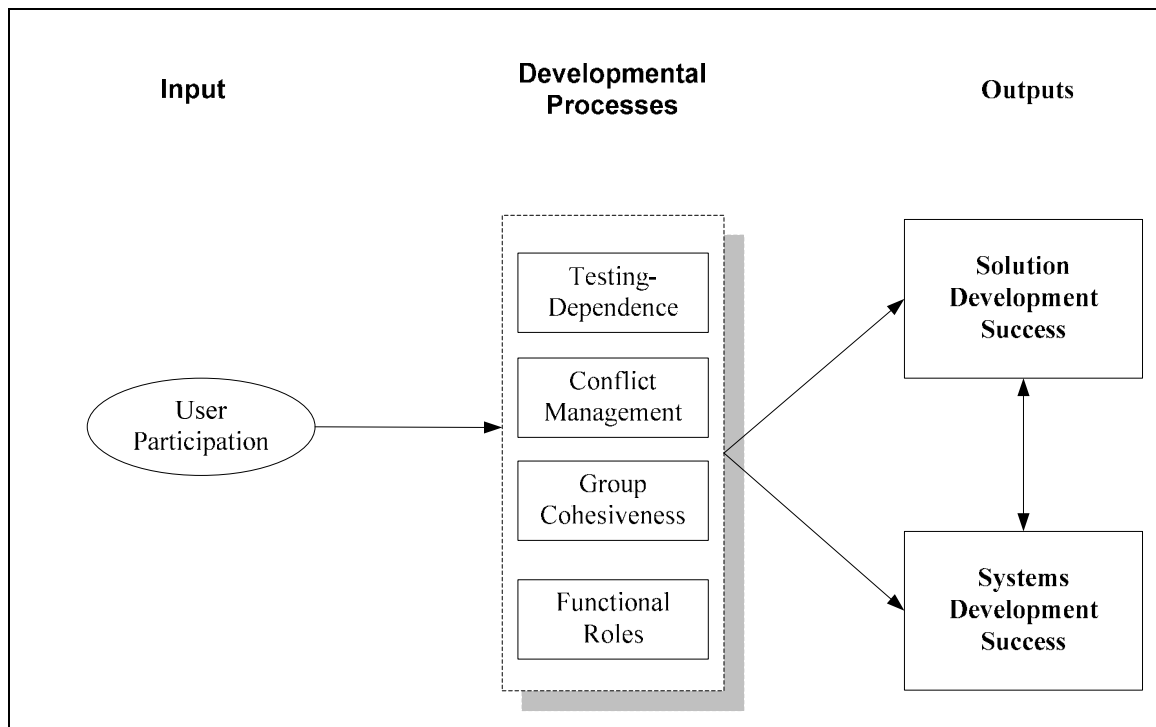


Figure 1: Theoretical Model of ISD Team Development

Systems Success: Solutions Development Success and Solution Implementation Success

Consistent with prior research, systems success includes two dimensions: solutions development success and solution implementation success (Markus and Mao 2004). Solution development success is defined as a high quality process of systems development and/or the outcome of systems development. The richness of user participation has been linked to solution development outcomes.

As indicated in Figure 1, solution development success is linked to solution implementation success. Solution implementation success is defined as the high quality process of preparing the users for use of the system and/or a high quality change outcome. The richness of participation and methods used to engage participants have been linked to solution implementation success.

Developmental Processes

Originally proposed by McGrath (1964), developmental processes are defined as mechanisms that enable or impede the group's capacity to combine their capabilities and behavior (Kozlowski and Bell 2003). Four developmental processes characterize the developmental trajectory of groups. These variables consist of: *testing-dependence*, *conflict management*, *group cohesiveness*, and *functional roles* (Tuckman 1965; Tuckman and Jensen 1977). Each of the four developmental processes represents the four stages of development: forming, storming, norming, and performing.

The dominant concern of the group structure realm in the forming stage is testing and dependence. Through their initial interactions, members test the limits of the group in order to learn what interpersonal behaviors are acceptable. The forming stage is also characterized by appointed or emergent leadership. The content of the interaction in the task-activity realm of the forming stage is characterized as orientation. Members become familiar with the group task, identify goals, and establish a plan to achieve the task.

The storming stage is characterized by conflict surrounding interpersonal relationships. During this stage, members begin to emphasize individual rights and autonomy. In the task-activity realm, the dominant issue is emotional response to task requirements. The capability to effectively identify and resolve conflict is a chief characteristic of effective groups. Groups that lack the ability to manage conflict are less productive, more hostile, and more likely to dissolve (Levine and Moreland 1990; Nemeth and Staw 1989).

The group structure realm in the norming stage is characterized by the development of interpersonal relationships and group cohesiveness. Cohesion refers to the forces acting on members to remain in the group (Festinger 1950). Cohesion is posited to result from task commitment, interpersonal attraction, and group pride (Festinger 1950; Mullen and Copper 1994). Task-activity development, however, is concerned with the *open exchange of relevant opinions* that are necessary to facilitate solution development outcomes.

The group structure realm of the performing stage is characterized by functional roles. In this late stage of development, issues related to group structure have been resolved. Group structure is internalized and roles become flexible and functional. Once in this stage, groups are more focused on the task and notice a surge in energy that is subsequently channeled into the task activity. The content of interaction in the task-activity realm is characterized by the *emergence of solutions*. The emergence of quality solutions enables groups to successfully complete its task and accomplish its goals.

RESEARCH METHOD

The behavior of two groups that were involved in sequential participatory design projects was analyzed using a multiple-case study format (Yin 2003). Both case studies took place against the backdrop of the Underground Railroad (UGRR) Network to Freedom Program, a federal program authorized by the United States Congress in 1998. The Network to Freedom Program was charged with coordinating a nationwide effort to foster networking and increase communication among interested parties.

User-Centered Design Projects

The first design project was the development of a community network for Group 1. Community networks support interaction and facilitate joint activity among individuals and groups. Some of the features of community networks include forums, chats, and the ability to publish simple web pages. The second design project was the development of an online collaborative work environment for Group 2. Similar to community networks, online collaborative environments consist of a suite of tools to facilitate distributed group work. These tools consist of forums, collaborative workspaces, calendar, chats, and the like.

Construct Operationalization and Measurement

Developmental processes were assessed by using four surrogates that represent the stage model: testing-dependence, conflict management, group cohesiveness, and functional roles. The approach to measurement followed the schema that was developed and tested by other IS researchers (Dennis, Garfield and Reinicke 2008), except for the fact that self-report data was also used for Group 2.

Testing-dependence refers to the degree to which members tested the task and goal boundaries. An examination of task goals and defining the boundaries of the task were coded as the examination of task goals. Similarly, questioning of roles and authority, and the emergence of leadership were combined into a single code. In some cases, there was not enough concrete evidence to demonstrate that a particular behavior occurred.

Conflict management is defined as the extent to which the group was effectively able to identify and resolve task, interpersonal, and process conflict. Behaviors associated with conflict were coded as problems of control, emotional responses, and hostility. The scale for measuring conflict was adopted from the Intragroup Conflict Scale (Jehn 1995; 1997; Jehn and Mannix 2001).

Group Cohesiveness is defined as the extent to which members are attracted to the group, committed to group task, and desire to remain in the group. Behaviors associated with group cohesiveness were coded as the establishment of action strategies, building mutual relationships, and the development of group cohesiveness. The scale for measurement was derived from the Seashore Cohesion Index (Seashore 1954).

Functional role-relatedness refers to the extent to which roles are functional and flexible. In order to determine that the behavior of the group fit the performing stage, three codes were used to assess functional roles: increased attention to the task, increased task activity, and increased attention to role in group. This study adds a self-report measure for Group 2. Participants were asked to describe their roles relative to others and where they thought they fit within the hierarchy. Participants were also asked if they felt that roles were clear. Responses were valued “yes” or “no.”

Case Analyses: Episodes of Group Development

Pattern-matching was chosen as the qualitative data analysis technique (for examples see; Keil 1995; Lee, Mitchell, Wise and Fireman 1996; Ross and Staw 1993). Pattern-matching is relevant to descriptive case studies as long as the predicted pattern is stipulated prior to the data collection. Outcome pattern matching, a technique consistent with analytic generation was used as the pattern-matching technique (Yin 2003).

Episode 1: Testing-Dependence

Group 1 consisted of a diverse, informal group of historians that were employed by various state and local organizations. During the first meeting with Group 1, the participants were asked to identify their goals. They were able to quickly agree that the goal was to document historic UGRG activity in Northeast. In addition, they identified challenges to developing a community network. However, they were unable to derive an action strategy. As such, there is some evidence to suggest that the group examined the boundaries of the task and task goals. However, there is no evidence to suggest that group established an action strategy. As a result, there was no evidence of behaviors associated with questioning the group’s action strategies in the first meeting.

Group 2 consisted of an informal group of volunteer historians. Each member identified himself or herself as follows: a business process specialist, a domestic relations officer, and a consultant. On the periphery were a historian, volunteer, and a graduate student. During the first meeting with Group 2, the primary stakeholder outlined the goals and objectives of the group. The goals of the group were to nominate two or three sites per round. During the course of her discussion, the primary stakeholder indicated that the nomination application was intimidating. She alluded to the fact that the nomination form and instructions were 46 pages long and was similar to a master’s thesis. The discussion that ensued concerning the complexity of the nomination process represented the examination of task goals. In addition, a discussion ensued regarding the complexity of developing and using an online collaborative environment.

The primary stakeholder concluded with a tentative action strategy. During this discussion, however, there was no evidence that the group questioned their action strategies. As it relates to the emergence of leadership, the primary stakeholder had volunteered to lead the initiative and was already considered the leader of the group. Therefore, the lead stakeholder could be best described as the self-appointed leader. Although there is some evidence to support that Group 2 engaged in testing behavior that is associated with the forming stage, there was no evidence to suggest that questioning of roles and authority occurred.

Episode 2: Conflict Management

The discussions that ensued during the second set of meetings with Group 1 provided evidence that interpersonal, task, and process conflict were present. As it relates to developmental processes, there is evidence that there were problems of control and emotional responses. However, the investigator was unable to determine if hostility was present. The conflict that ensued caused Group 1 to prematurely dissolve.

Because Group 2 met infrequently, conflict management was assessed by self-report. When asked how differences of opinions were resolved, one member responded “I don’t recall any issues that presented a problem that could be described as a conflict between group participants” (UA, p. 34). Another member indicated that “I haven’t noticed any disagreements” (UA, p. 31). Additionally, the primary stakeholder stated: “I think we’re open-minded and trusting of each other, and if there’s disagreement, we talk through it” (UA, p. 36). Therefore, there is no evidence of behaviors associated with the storming stage.

Episode 3: Group Cohesiveness

Mid-way through the design project with Group 2, the data provided evidence that the behaviors of the group such as the development of group cohesiveness, emphasis on building mutual relationships, and the establishment of action strategies did occur. However, there was no subsequent increase in task activity. It should be noted that the data was collected shortly after the group had been notified that the prior nominations had been accepted. Therefore, the responses may have been based on the recent success of the group.

Epilogue

An analysis of the behavior of Group 1 provides some evidence that the group formed and clear evidence that the group stormed. Because the group never made it past the storming stage, the behaviors associated with the development of group cohesiveness and functional role-relatedness that are associated with the norming and performing stages could not be analyzed. The results suggest that intragroup conflict and lack of an action strategy undermined the development of the group.

Although there was evidence of cohesion, Group 2 never reached the performing stage. Therefore, functional role-relatedness that characterizes the performing stage could not be assessed. Although there is evidence to support that Group 2 followed the stage model, it is rather weak. The factors that contributed to social disintegration were external. These issues were not examined in this paper because the stage model focuses solely on internal triggers to change and the space limitations.

DISCUSSION AND CONCLUSIONS

This study focused on the development of two groups that were involved in sequential user-centered design projects. The findings from this study revealed that there is some support that the stage model appropriately characterizes the developmental processes of self-organizing groups in ISD contexts. The case of Group 1 provided evidence that the group formed and stormed. However, the development of the group stalled in the storming stage. As such, the group was unable to develop a stable set of requirements that was necessary for solutions development success.

While the stage model provides a plausible explanation for social disintegration in the case of Group 1, it does not provide a reasonable explanation as to why the Group 2 stalled in the norming stage. The stage model focuses on group structure and task activity. Change results from internal forces as the group struggles to create a stable group structure and engage in goal-directed task activity. However, the stage model is not sensitive to organizational context, nor does the stage model acknowledge task complexity or external contingencies (Kozlowski and Bell 2003). Similar to the first case, the group was unable to develop a stable set of requirements that was necessary for solutions development success.

A final insight provided by this study is that newly formed, self-organizing groups are not as predictable as extant models suggest. Instead of forming, storming, norming, and performing, the development of Group 1 followed a slightly different trajectory. Over the course of the 27-month collaboration, the group would form very quickly, gather occasionally, disperse, and form again. In the case of Group 2, the members gathered casually and irregularly.

Although this study is largely exploratory in nature, there are several implications for both research and systems design. This study proposes a model that can be used to theorize group development in ISD contexts. However, future research is needed in order to link the stages of group development and the phases of systems design in order to draw definitive conclusions.

This research also contributes to information systems design. Designers should apply the postulates of group development instead of seeking solely technical solutions. First, the design team should incorporate strategic planning and teambuilding exercises. Strategic planning is a process that is used to develop a statement of purpose, assess strengths and weaknesses,

establish strategic goals, identify obstacles to achieving the goals, and develop action plans for overcoming the obstacles. Second, team building exercises that incorporate training on group dynamics and interpersonal relationships should be targeted to the stages of group development and the phases of systems design.

Finally, the limitations of case study research are well documented. These include the notion that explanations of cause-and-effect relationships in case studies are not as valid as true experiments (Yin 2003). In terms of the research setting, the theoretical generalizability is limited because only two groups were studied. A more intense study of multiple ongoing groups operating in different contexts is needed in order to support the generalizability of the findings.

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