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Neeraj Parolia
University of Central Florida

James Jiang
University of Central Florida

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The Role of Horizontal Coordination in Performance of ISD Projects

Neeraj Parolia

University of Central Florida
nparolia@bus.ucf.edu

James Jiang

University of Central Florida
jjiang@bus.ucf.edu

ABSTRACT

ISD projects depend on coordination among team members and stakeholders to be successful. In the past, researchers studied antecedents, strategies, contingencies and outcomes of coordination. This study examines how horizontal coordination can impact the performance of project team members. We propose a research model that horizontal coordination will result in increased leadership empowerment, knowledge transfer, and experimentation among team members. The results of the study can recommend suggestions for project managers to improve project performance by utilizing horizontal coordination.

Keywords

Horizontal coordination, leadership empowerment, knowledge transfer, experimentation, project performance.

INTRODUCTION

Coordination, refers to the linking together [of] different parts of an organization to accomplish a collective set of tasks (Van De Ven and Delbecq 1976). Coordination mechanisms can be further classified into two categories: vertical or horizontal coordination (Van De Ven and Delbecq 1976). In IS teams, the mechanisms for vertical coordination are usually project manager, steering committee and management while in horizontal coordination, the linkage function is assumed by an individual team member who communicates directly with other team members or users on a one-to-one basis in a non-hierarchical relationship. Due to nature of tasks in IS, horizontal coordination is believed to be more important than vertical coordination (Brown 1999).

Horizontal coordination is the extent of formal and informal contact between individuals in order to coordinate the work of two units (Mintzberg 1979). Using horizontal coordination, the stakeholders decide on requirement specification, share information, and collaborate on different activities (Kirsch and Beath 1996). The implementation of horizontal coordination could be structural (e.g., formal teams) or informal (spontaneous and voluntary contacts) (Li et al. 2003). Horizontal coordination across the project team, in terms of mutual adjustments and lateral communication, leads to an improved project performance while vertical coordination significantly reduces both project uncertainty and residual performance risk (Nidumolu 1995; Nidumolu 1996). Nidumolu (1995) and Nidumolu (1996) concluded that there is direct link between horizontal coordination and project performance. But their model has limitation in explaining how horizontal coordination leads to improvement in project performance and in turn specifying the mediator variables for this relationship.

Using contingency perspective, Andres and Zmud (2002) examined the moderating effect of task interdependence on the relationship between software project coordination strategy and development productivity. In addition, they found that an organic coordination (horizontal) strategy, which increases flexibility to external changes, had positive main effects on software development productivity and user satisfaction. Contingency perspective has been useful to the extent that it provides the conditions in which horizontal coordination should be used but it does not explain the effects of horizontal coordination.

In this paper, we address the limitations of existing research and answer the following research question: *How does horizontal coordination affect performance of IS development projects?* This paper aims to fill the gap by explaining that horizontal coordination leads to certain outcomes which lead to improvement in project performance. The results of this study can provide IS project managers with insights on how their horizontal coordination may affect their project.

THEORETICAL BACKGROUND

Coordination theory (Van De Ven and Delbecq 1976) posits that task interdependence and uncertainty determine the use of the modes of coordination. There are two general ways in which organizations can be coordinated: (1) by programming or (2)

by feedback (March and Simon 1958). Coordination by feedback is accomplished by two operational modes: personal and group. In the personal mode, individual role occupants serve as the mechanism for making mutual task adjustments through either vertical or horizontal channels of communication while in the group mode, the mechanism for mutual adjustment is vested in a group of role occupants through scheduled or unscheduled staff or committee meetings (Van De Ven and Delbecq 1976). As tasks increase in uncertainty, mutual work adjustments through horizontal communication channels and group meetings are used in lieu of coordination through hierarchy and programming. When task interdependence is high, horizontal direct contact between unit members will be added while the capacity and sophistication of impersonal and personal coordination modes will be expanded (Van De Ven and Delbecq 1976).

Past research on coordination in IS teams has focused primarily on antecedents, strategies, contingencies and outcomes of coordination. Unfortunately, limited attention has been paid to how (mediators) coordination impacts project performance.

Organization theory provides additional support for our model (for an in-depth treatment of the theory see (Daft 1998). Team (which is a subset of an organization) is a group of people, with ideas and resources, working toward common goals. The purpose of the organizing function is to make the best use of the organization's resources to achieve organizational goals. Tasks in organization are coordinated using organizational structures. Structures comprises of vertical and horizontal linkages with different capacities for carrying information. Vertical information linkages are used to coordinate activities between the organization hierarchies and designed primarily for efficiency and control while horizontal information linkages are used to coordinate across organizational departments and designed to overcome barriers and provide opportunities for coordination, learning and unity of effort (Daft 1998).

Since IS Project teams are a subset of the larger organization, we apply and extend organization theory to substitute traditional control/structure in organizations to coordination arrangement in teams. Teams can adopt either vertical or horizontal coordination mechanisms to accomplish variety of tasks. Consistent with organization theory, horizontal coordination will create an environment for learning and unity of effort within the team. Past literature has identified that transfer of knowledge, experimentation and team empowerment are critical for team learning (Andrea-O Brien and Buono 1996; Argote 1999; Nesan 2004). Integrating these concepts, in our model (Figure. 1) we hypothesize that horizontal coordination will lead to transfer of knowledge, experimentation and team empowerment and these in turn will result in project performance.

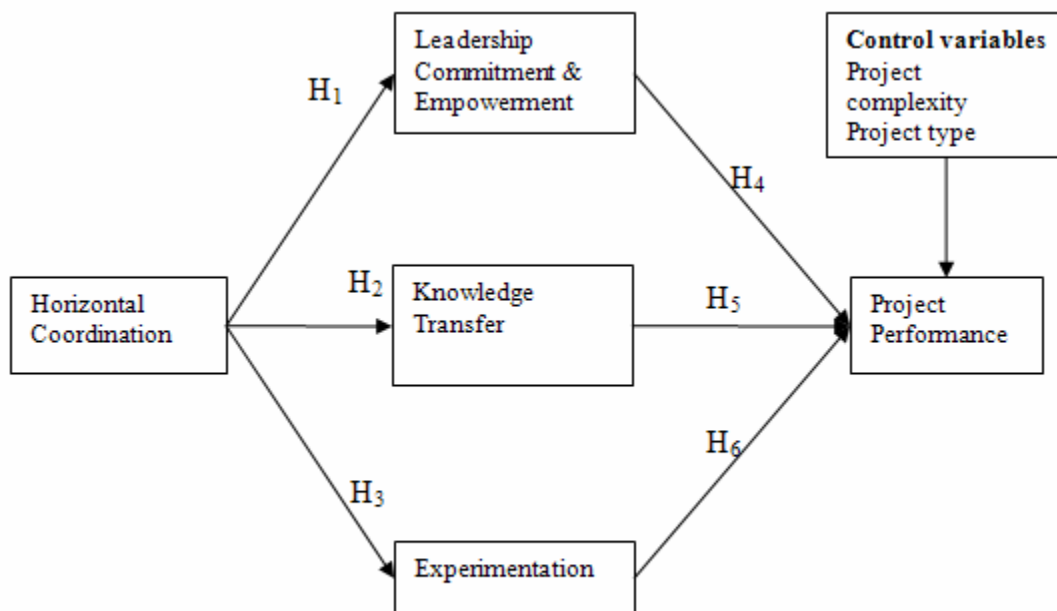


Figure. 1

DEFINITIONS

Variable	Reference	Definition
Horizontal coordination	Van de Ven et al. (1976), Nidumolu (1995)	The extent to which coordination between users and Information systems staff is undertaken through mutual adjustments and communications, whether through personal or group means
Leadership commitment & empowerment	Goh and Richards (1997)	The roles of leaders in the organization with respect to helping employees learn and elicit behaviors that are consistent with an experimenting and changing culture.
Experimentation	Goh and Richards (1997)	The degree of freedom employees enjoy in the pursuit of new ways of getting the job done and freedom to take risks.
Knowledge transfer	Goh and Richards (1997)	The systems that enable employees to learn from others, from past failures and from other organizations.
Project performance	Wang et. al (2005)	The success of the IS development project in terms of meeting cost, scope and schedule criteria.

HYPOTHESES

Organizations, where workers are empowered with a lot of flexibility are characterized by strong horizontal communication channels (Dessein and Santos 2003). Horizontal coordination mechanisms can be viewed as design tools that are used to increase communication and decision making across organizational unit boundaries (Brown 1999). Organization theory posits that horizontal structure in organizations leads to shared task and empowerment among employees (Daft 1998). Hence,

H1: There is a significant relationship between horizontal coordination and empowerment in the project team.

Organization theory postulates that horizontal information linkages results in collaborative integration (socialization, joint decision-making, and shared understanding) (Daft 1998). Horizontal coordination among employees leads to project team setting higher goals across activities (e.g., design, manufacturing, marketing) (Dess and Rasheed 1995). Organization forms such as the functional and multidivisional organization have been found to be less appropriate for the creation of knowledge (Hedlund 1994) while internal network forms of organizing provide an important context enabling knowledge creation. If group members work jointly on all tasks, they will be able to share knowledge and information and to adjust their activities without a central unit (Itoh 1994). Hence we hypothesize that,

H2: There is a significant relationship between horizontal coordination and knowledge transfer in the project team.

In research and development, communication across boundaries (horizontal coordination) is critical for team success (Allen 1984). According to organization theory, mutual adjustment or horizontal coordination is the most prominent coordination mechanism in organizations that support sophisticated innovation. For new product development, horizontal coordination is conducive to experimentation and learning (Uhlenbruck et al. 2003). IS team members are more likely to come up with innovative solutions to problems when they communicate directly with the stakeholders. Hence,

H3: There is a significant relationship between horizontal coordination and experimentation in the project team.

When leaders create a democratic climate, it results in free exchange of ideas, cross-functional knowledge fertilization, and helps convert tacit knowledge into explicit knowledge shared by many team members (Sarin and McDermott 2003). Empowered IS professionals are highly motivated to acquire new knowledge and skills that will help them progress in their careers (Chen 2005). In line with previous research, empowered IS staff is likely to begin and direct greater effort toward accomplishing their work, and also to sustain a greater amount of effort over time (and thus improve their performance). Hence,

H4: Leadership commitment & empowerment will significantly improve project performance.

The increasing complexity of products and processes calls for extensive knowledge sharing across disciplines or functions that can be achieved only through teams. Team performance increases with the strength of connections from the team to the broader organization and also with the kind of knowledge being transferred by the team (Hansen 1999). The importance of

effective knowledge transfer is underscored by a growing body of empirical evidence that indicates higher rates of productivity and survival of organizations that transfer knowledge effectively (Argote 1999). Hence,

H5: Knowledge transfer will significantly improve project performance.

The process of learning in organizations involves dynamics of exploration, i.e., processes by which organizations create variety in experience through experimentation, trialing, and free association (Marengo 1993). In case of teams, it consists of multiple, interdependent team actions (Gibson and Vermeulen 2003). The first action is identified by generation of ideas to improve its work through experimentation, in which team members search for potential improvements. Second, a team must arrive at a common understanding about the proposed solution (Gibson and Vermeulen 2003). Experimentation is the basis of prototyping approach which is utilized in innovative and R&D projects (Pomberger et. al 2001). Hence we hypothesize that,

H6: Experimentation will significantly improve project performance.

CONTROL VARIABLES

Several variables need to be controlled in this study because they have been shown to affect key variables in the model. Previous research suggests that project complexity, and project type can have significant influence on performance (Ancona & Caldwell, 1992; Sarin and McDermott 2003). Therefore, to ensure that the effects uncovered in our analysis are due to the relationships of interest alone, we control for the extraneous variance attributable to these project characteristic variables.

METHODOLOGY

Survey methodology is selected to validate the hypotheses. Measures are being developed for the constructs from the reference articles. 1000 randomly selected members will be selected from directory of IS project managers listed in Project Management Institute (PMI) in the USA. PMI is the professional association for practitioners of project management with over 53000 members worldwide. The sample was chosen because members of PMI represent a cross section of managerial positions extensively involved with project management (Larson and Gobeli 1989). To avoid common method bias, project manager and leaders will be mailed two surveys. Project manager and leaders will be asked to answer the dependent variable survey while they will be requested to get the second survey (comprising independent and mediator variables) answered from one team member in the same project.

REMARKS

This research contributes to our understanding of horizontal coordination mechanism in IS teams. It provides benefits for integrating horizontal coordination mechanism as part of IS strategy. Rapid application development and prototyping models under strict time constraints can better utilize horizontal coordination where speed to develop is greater and user feedback is required quickly. Startup firms involved in developing an innovative information system generally have a flat organization structure which reduces barriers in coordinating across teams or within a team.

With the IS development increasingly performed by virtual and distributed teams, adopting horizontal coordination have its advantages. This phenomenon coupled with IS development for new and emerging functional areas require teams to learn in real time. To do this, teams need to experiment, create and integrate new knowledge as they manage the development process. Even though this paper focuses on a single coordination mechanism, adopting a particular coordination mechanism (horizontal) totally in lieu of other (vertical) can have harmful results Future research can similarly investigate the impact of vertical coordination on project performance and specify activities where vertical coordination is better suited.

REFERENCES

1. Allen, T.J. (1984) *Managing the Flow of Technology*. MIT Press. Cambridge, MA,.
2. Ancona, D.G., and Caldwell, D.F., (1992), Bridging the boundary: external activity and performance in organizational teams. *Administrative Science Quarterly*, 37, 634–665.
3. Andrea-O Brien, C., and Buono, A. (1996), Building effective learning teams: lessons from the field. *SAM Advanced Management Journal*, 61, 3, 4-9.
4. Andres, H., and Zmud, R. (2002) A Contingency Approach to Software Project Coordination, *Journal of Management Information Systems*, 18, 3, 41-70.
5. Argote, L. (1999) *Organizational Learning: Creating, Retaining and Transferring Knowledge*. Kluwer, Boston, MA.

6. Brown, C.V. (1999) Horizontal Mechanisms Under Differing IS Organization Contexts, in: *MIS Quarterly*, MIS Quarterly & The Society for Information Management, 23, 3, 421-454.
7. Chen, G. (2005), Newcomer adaptation in teams: Multilevel antecedents and outcomes, *Academy of Management Journal*, 48, 1,101-116.
8. Daft, R. (1998) *Organization Theory and Design* West Publishing, New York.
9. Dess, G.G., and Rasheed, A.M.A. (1995), The new corporate architecture, *Academy of Management Executive*, Academy of Management, 9, 7-20.
10. Dessein, W., and Santos, T. (2003) *Adaptive Organizations*, University of Chicago.
11. Gibson, C., and Vermeulen, F. (2003) A Healthy Divide: Subgroups as a Stimulus for Team Learning Behavior, *Administrative Science Quarterly*, 48, 202-239.
12. Goh, S., and Richards, G. (1997), Benchmarking the learning capability of organizations, *European Management Journal*, 15, 5, 575-583.
13. Hansen, M.T. (1999) The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits., *Administrative Science Quarterly*, 44, 82-111.
14. Hedlund, G. (1994) A model of knowledge management and the N-Form corporation, *Strategic Management Journal*, 15, 73-90.
15. Itoh, H. (1994) Co-ordination, Specialization, and Incentives in Product Development Organizations, in: *Co-ordination, Specialization, and Incentives in Product Development Organizations*, M. Aoki and R. Dore (eds.), Oxford University Press, Oxford, 265-284.
16. Kirsch, L.J., and Beath, C.M. (1996) The Enactments and Consequences of Token, Shared, and Compliant Participation in Information Systems Development, *Accounting, Management and Information Technologies*, 6, 4, 221-254.
17. Larson. E and Gobeli, H. (1989) Significance of project management structure on development success, *IEEE Trans. Of Eng. Management*, 44, 188-195.
18. Li, E.Y., Jiang, J., and Klein, G. (2003) The Impact of Organizational Coordination and Climate on Marketing Executives' Satisfaction with Information Systems Services, *Journal of the Association for Information Systems*, 4, 99-117.
19. March, J.G., and Simon, H.A. (1958) *Organization* Wiley, New York.
20. Marengo, L. (1993) Knowledge distribution and coordination in organizations: On some social aspects of the exploitation vs. exploration trade-off., *Revue Internationale de Systemique*, 7, 553-571.
21. Mintzberg, H. (1979) *The structuring of organizations*. Prentice Hall, Englewood Cliffs.
22. Nesan, L.J. (2004) Efficacy-information for implementing learning in construction, *Learning Organization*, 11, 1, 45-66.
23. Nidumolu, S. (1995) The Effect of Coordination and Uncertainty on Software Project Performance: Residual Performance Risk as an Intervening Variable, *Information Systems Research*, INFORMS: Institute for Operations Research, 6, 191-219.
24. Nidumolu, S.R. (1996) A comparison of the structural contingency and risk-based perspectives on coordination in software-development projects *Journal of Management Information Systems*, 13, 77-113.
25. Pomberger. G, Bischofberger. W, Kolb. D, Pree. W, Schlemm. H (1991) Prototyping-Oriented Software Development—Concepts and Tools, *Structured Programming*, 12, 43-60.
26. Sarin, S., and McDermott, C. (2003) The Effect of Team Leader Characteristics on Learning, Knowledge Application, and Performance of Cross-Functional New Product Development Teams, *Decision Sciences*, Blackwell Publishing Limited, 34, 4,707-739.
27. Uhlenbruck, K., Meyer, K.E., and Hitt, M.A. (2003) Organizational Transformation in Transition Economies: Resource based and Organizational Learning Perspectives, in: *Journal of Management Studies*, Blackwell Publishing Limited, 40, 2, 257.
28. Van De Ven, A.H., and Delbecq, A.L. (1976) Determinants of Coordination Modes within Organizations, in: *American Sociological Review*, American Sociological Association, 41, 322-338.
29. Wang. E, Chen. H, Jiang. J and G. Klein. (2005) Interaction quality between IS professionals and users: Impacting conflict and project performance, *Journal of Information Science*, 31, 4, 2005, 273-282.