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A Contingency Theory of Virtual Work Effectiveness: Task, Technology and Communication Fit

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ABSTRACT

We are witnessing rapid growth of inter and intra-organizational virtual processes in many different forms, which include telecommuting, mobile work, e-businesses, and virtual corporation. Despite the prevalence of virtual processes and their importance in creating a business value, our understanding on their effective design is limited. Among many variables, task characteristics, communication quality, and IT support have been frequently mentioned as key components for successfully running a virtual process. The paper theoretically discusses implications of these variables on the effectiveness of virtual work from the fit theory perspective. The main emphasis of this paper is to discuss the role of alignment (or fit) among task characteristics, communication quality, and IT support variables on the effectiveness of distributed virtual work settings.

INTRODUCTION

Organizations are witnessing rapid growth of virtual processes. Design of virtual processes fits to the frame of administrative innovation, which produces a business value through changes in the organizational structure or process. As an organizational initiative that responds to internal or external stresses or opportunities, virtual work design is intended to achieve various strategic and non-strategic goals including cost reduction, better customer support, productivity increase, and enhanced worker retention and satisfaction. Different types of virtual work are discussed in existing literature including telecommuting, multiplex or telecenters, mobile work, satellite office, and virtual corporations (Lindstrom et al, 1997). Despite increasing prevalence and importance of the concept, our understanding on designing effective virtual work environment is limited. There are many organizational, individual, and technological design features that should play a significant role in deciding the effectiveness of virtual work. Among them, task characteristics, communication quality, and IT support have been frequently mentioned as key components. The paper visits these variables and discusses their implications on the effectiveness (i.e., quality, quantity, timeliness, and satisfaction) of virtual work from the fit theory perspective. The main emphasis of this paper is to discuss the role of alignment (or fit) among task characteristics, communication quality, and IT support variables on the effectiveness of distributed work settings.

FIT AS A CONTINGENCY THEORY

In discussing implications of task characteristics, communication quality, and IT support on the effectiveness of virtual processes, Venkatraman's (1989) and Van de Ven and Drazin's (1985) work on fit concept renders a solid theoretical foundation. Venkatraman (1989) defined fit from six different perspectives: *fit as matching, fit as moderation* (interaction), *fit as mediation* (intervention), *fit as gestalts* (internal congruence), *fit as covariation* (internal consistency), and *fit as profile deviation* (adherence to a specified profile).

Fit as a matching is a "theoretically defined match between two related variables (Venkatraman, 1989)" without necessarily looking into its implications on the performance aspect. For instance, we can think of fit between ideal specs of an information system and those available in existing information system. The matching is conceptually related to Van de Ven and Drazin (1985)'s selection, in which fit is viewed as the result of natural choice. In this paradigm, context causes design. As an example, the fit of a strategy at organizational level is the result of managerial choice (or selection) to achieve congruence to organizational context. Venkatraman (1989) suggested that deviation scores and residual analysis are analytic approaches available for this type of fit.

Fit as moderation is similar to *fit as interaction* from Van de Ven and Drazin (1985), in which fit is considered as the interaction effect of context and structure (or design) on performance. From the contingency viewpoint, fit represents conformance to a linear relationship of context and design. Here the impact of a predictor variable (or design variable) on a dependent variable (or performance variable) is moderated by (or dependent on) the third variable (or context variable) that we can call as a moderator (Venkatraman, 1989). Naturally, the main interest here is more on the relationship of measured performance on the interaction (or fit) of the moderator and the predictor. An example given is the interaction effect of strategy as a predictor variable and managerial characteristics as a moderator on the organizational performance (Zigurs and Buckand, 1998).

Fit as mediation represents fit from the perspective of intervention of a variable between an antecedent variable (i.e., strategy) and a consequent variable (i.e., performance). In this scenario, the intervening variable has an indirect (or intervening) effect on the antecedent variable and also a direct effect on the consequent variable. The intervening effect is considered as one dimension of fit. For example, we can think of the intervening effect of national economy between strategy as a design variable and organizational performance as a consequent variable. Fit as moderation and fit as mediation are typically applied to the situation with a single independent variable, a single moderator or mediator, and a single dependent variable (Zigurs and Buckand, 1998).

Fit as Gestalts looks into the fit concept from the systems approach, in which fit cannot be represented by the functional relationship of a few chosen variables, but should be understood from dynamics of attribute (or gestalts) clusters. It accordingly supports multivariate view that understanding of fit need to take interpretive stance rather than to find their functional relationship. This perspective corresponds to Van de Ven and Drazin's (1985) "holistic patterns of interdependencies from the systems theory perspective." Here, fit is achieved when there is an internal congruence of many contingencies, structures, and performance criteria.

Fit as covariation represents internal consistency among related variables or constituencies. It is conceptually similar to *fit as Gestalts*, but Venkatraman (1989) used an analogy to differentiate them. According to him, *fit as Gestalts* can be regarded as products of cluster analysis where grouping of observations is made on a set of attributes. On the other hand, covariation is the result of factor analysis in which

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grouping of attributes is made from a set of observations. Covariation, therefore, is to show the logical linkage or alignment among the considered independent variables. Venkatraman (1989) suggested that first-order or second-order factors from both exploratory and confirmatory (more preferred) factor analysis could be utilized to identify the unobservable state of linkage or alignment.

Fit as profile deviation assumes the existence of profile specification for variables associated to a criterion variable. Fit represents the degree of adherence to the specified profile and the level of fit affects performance. For instance, as a contingency theory, the *organization assessment* indicates that there are adequate organizational (or unit) structures (systematized, discretionary, and developmental) for different task uncertainties (i.e., difficulty and variability) (Van de Ven and Drazin, 1985). The unit structures offer profiles against which a pattern analysis can be conducted. Deviation from the profile implies a weakness of context and design fit. This is different from Gestalt or matching perspective because the announced profile is anchored to effectiveness (Venkatraman, 1989). Testing fit from this perspective demands identification of distinct environments (i.e., tasks), determination of ideal resource allocation for each environment, and testing the effects of context/design alignment (Venkatraman and Prescott, 1990).

TASK, COMMUNICATION, AND TECHNOLOGY FIT

Research Model

This paper discusses: (1) the effect of task characteristics, communication quality, and IT support variables on the effectiveness of virtual work, and (2) the effect of fit among three variables on the effectiveness of virtual work. Distributive work demands that team members and business employees rely on telecom technologies for the communication, coordination, and collaboration in conducting business tasks. The effectiveness of such virtual processes would be inevitably affected by the design of task characteristics, by the degree of technology support, and by the management of communication (Shin et al., 2000). Meanwhile, an argument can also be made that the effectiveness of virtual processes is better understood from the perspective of relationships among the variables (Goodhue and Thomson, 1995). Such a contingency view is compelling in the sense that excessiveness may be worse than adequateness. For instance, increased provision of the latest and the greatest ITs may not necessarily associated with increased performance of teleworkers when their tasks do not justify the IT deployment. This lack of alignment may end up with over-spending on ITs and wasted resources (i.e., support, training, and IT setup), without advancing intended performance. The same line of reasoning applies to the relationship between IT support and communication quality, and that between task characteristics and communication quality. Accordingly, the degree of fit among the factors may be more important precursor in attaining the effectiveness in virtual works. Figure 1, therefore, becomes a high-level research model, which can become the basis of elaborated reasoning for the triangular relationship.

Research Propositions

Task characteristics may affect the effectiveness of virtual work. Task characteristics can be defined from many different dimensions. Job level, task interdependence, job discretion, skill variety, job pressure, feedback from the job, closeness of supervision, and tasks significance are discussed (Kling, 1978; Turner and Karasek, 1984). Other task features including complexity, multiplicity, and uncertainty (Campbell, 1988), portability (Venkatesh and Vitalari, 1992), autonomy and responsibility (Kwon and Zmud, 1987) may render differing implications on the effectiveness of a virtual process.

Existing literature reveals inconsistency in the role of task characteristics. For example, clustering of responsibilities, and assignment of structured and repetitive tasks may make virtual work more productive in certain situations (Dubrin, 1991). In other circumstances, enlarged jobs with high degrees of control, autonomy, and responsibility might show better performance and satisfaction (Olson, 1988; Venkatesh and Vitalari, 1992). The associative relationship between task attributes and virtual work effectiveness may be more context-dependent and generalizing it from positivistic viewpoint may be difficult. Such contingency factors include organizational rewarding structure, measurement benchmark of effectiveness (i.e., productivity, satisfaction), motivations of virtual work (i.e., strategy versus labor cost control), and the level of electronic linkage (i.e., multi-channel communication, automated work-flow, accessibility to intranet) (Shin, et al., 2000). Meanwhile, professionals whose tasks are well defined, who are able to work independently, and who are knowledge workers may find enlarged jobs more productive and satisfying (Devey and Risman, 1993). From the literature survey, it is derived that:

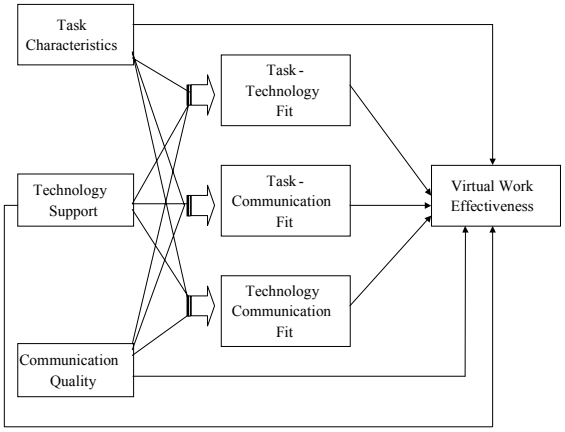
Proposition 1: Tasks that are well defined and independent, regardless of their complexity and routineness, are better positioned for increased effectiveness in virtual work.

The potential role of IT in facilitating effectiveness of virtual work has been repeatedly pointed out. In fact, IT is such a broad concept that its general application to the reasoning process may risk over-simplification of technology role. For instance, ITs may be classified into several groups depending on their utility. These include personal productivity tools (i.e., office software), communication enabling ITs (i.e., network infrastructure and messaging tools), and other ITs (i.e., publishing tools and infrastructure). The tools may carry different implications and weights on virtual work effectiveness. Communication enabling ITs may be especially crucial as the degradation of internal communication and coordination resulting from the distributive work is a major apprehension factor in adopting virtual processes (Shin et al., 2000). Here, we use IT in its broader context that indicates the collection of tools utilized for conducting assigned tasks in virtual settings.

Keller (1994) suggested that the fit between technology and information processing might predict project performance. Task and technology fit is defined as "the degree to which a technology assists an individual in performing his or her portfolio of tasks (Goodhue and Thompson, 1995)." Technology is a static element and therefore its role on a virtual process may be better understood from the *fit as mediation* perspective, in which effectiveness of virtual work in conducting certain tasks is mediated (or facilitated) by the degree and manner of IT support. From the discussion, it is proposed that:

Proposition 2: Task-technology fit is a positive indicator for the virtual work effectiveness and the impact of the fit on a virtual process is realized by intervening role of IT support in conducting a task.

Figure 1: A research model



Meanwhile, task-technology fit may be understood from the degree of *matching* between task characteristics and corresponding requirements for IT support. Task characteristics such as variability and analyzability may be highly correlated to the choice and use of IT (Ghani, 1992). Non-routine and complex tasks may demand information processing and communication through advanced form of ITs at virtual environment. On the other hand, repetitive and predictable tasks may not need the same degree of IT support as non-routine and complex tasks do. If we look at the task-technology relationship from the selection viewpoint (Van de Ven and Drazin, 1985) in which details of technology support are designed based on task features, following proposition becomes viable:

Proposition 3: The selection of ITs affects the effectiveness of virtual work and optimal deployment of ITs is achieved when they are adequately matched to the profile of task characteristics.

Crucial role of communication quality in increasing workers' satisfaction and task productivity has been repeatedly studied (Mohr and Sohi, 1995; O'Reilly and Roberts, 1977). Research on the facilitating role of IT for effective communication in virtual work is especially important. Enhanced quality of internal processes could curtail side effects of virtual work such as social isolation, role conflict and ambiguity, and difficulties in coordination and supervision (Shin et al, 2000). Also, IT support in the form of enhanced electronic linkage (Lucas and Baroudi, 1994) may have implications on the mode of communication and its quality. Randolph and Finch (1977) empirically showed that there was a significant association between the certainty (e.g., routine vs. non-routine) of an IT and the direction (e.g., vertical vs. horizontal) and frequency of task-related communication. Therefore, it is proposed that:

Proposition 4: Communication quality is a positive indicator for virtual work effectiveness.

Proposition 5: The impact of communication-technology fit on a virtual process is realized by mediating role of ITs in facilitating effective communication.

From a different angle, classical media richness theory (Daft and Lengel, 1984) posits that each communication medium (i.e., email, voice mail, audio and video conferencing, fax, and World Wide Web) has a different information-carrying capacity because of the difference in the feedback capability, types of language used, and the number of cues being used. These media become a powerful tool that enables distributed work, but they are vastly different in their information carrying capability (Daft and Lengel, 1984). They also differ in supporting accessibility to information and data, transportability of work (i.e., workflow management), and collaboration support. Effectiveness of communication is achieved when a person effectively matches the complexity of a communication task with an appropriate medium. When an insufficiently rich medium is chosen for a communication task, performance may suffer. By applying the media richness theory, it is proposed that:

Proposition 6: Communication-technology fit is a positive indicator for virtual work effectiveness and it is achieved by matching (or selecting) appropriate ITs to support required communication characteristics (i.e., uncertainty and complexity).

On the other hand, studies indicate that the effectiveness of technology use results more from how it is used than what is used (Markus, 1994; Schmitz and Fulk, 1991). Effective adoption of a medium, even considered as lean, may render virtual team an information-rich tool that enhances work productivity (Higa et al, 2000). Accordingly, the social structuration of technology use and its effective *utilization* (Goodhue and Thompson, 1995) could be a prevalent force that decides the effectiveness of IT in supporting virtual work. It has also been suggested that technologies that are commonly available and can be used spontaneously have a high effect on organizational processes (Mokhtarian and Sato, 1994). Overall, this emergent and non-deterministic paradigm is in line with the theoretical view of fit as Gestalts. The discussion leads to following proposition:

Proposition 7: The degree of communication-technology fit and its impact on virtual processes are significantly affected by ITs' perceived information richness from users.

CONCLUSION

The manuscript discussed implications of task characteristics, communication quality, technology support, and alignments among three variables on virtual work effectiveness. The discussion is based on the assumption that distributed work settings are significantly different from traditional and centralized work settings in various aspects including the management of communication, coordination, task, and workers. The fit concept rendered a theoretical foundation in discussing the role of selected variables and their contingency relationships on virtual work performance. Future research can extend this work by refining the propositions and by undertaking relevant empirical tests.

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