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Explaining Organizational Virtuality: Insights from the Knowledge-Based View

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ABSTRACT

Despite a sizable body of literature on virtual organization, little attention has been paid to defining organizational virtuality and identifying organizational factors that influence degree of virtuality of virtual organizations. Based on the virtual organization literature and the knowledge-based view, we develop a working definition of organizational virtuality by conducting a review on the existing definitions of virtual organization, and identify knowledge-related organizational factors that influence organizational virtuality. More specifically, we propose that 1) an organization's need for knowledge exchange and ability to engage in knowledge exchange jointly determine the level of organizational virtuality that exists in the firm; 2) The higher the need for and ability to engage in knowledge exchange, the higher the level of organizational virtuality of the firm. The contribution the study makes to the academia and the practitioners are also discussed.

Keywords

Knowledge based view, virtual organization, organizational virtuality.

INTRODUCTION

As society enters the twenty-first century, there is a growing realization that the ways in which people live, work, communicate with each other, and organize their professional and personal activities are being subjected to an all-pervasive influence of information and communication technologies (ICTs) (Orlikowski and Barley, 2001). Within firms, one of the ways in which this influence finds expression is through creation and adoption of newer organizational forms such as the virtual organization. A virtual organization (VO) entails employees being sent to work outside of the physical central office (Kurland and Egan, 1999, Neufeld and Fang, 2004, Neufeld and Fang 2005, Staples et al., 1999), creating virtual teams to work across geographical and temporal boundaries (Townsend et al., 1998, Lipnack and Stamps, 1996, Lipnack and Stamps, 1997) and establishing tightly-coupled linkages with other firms based on ICTs, in order to outsource a large portion of production process outside of traditional firm boundary (Kraut et al., 1999, Boudreau, 1998, Hoogeweegen et al., 1999).

Organizing business activities in a virtual manner had its origins in the last decade (Davidow and Malone, 1992) and has been increasingly proliferating since that time (Kurland and Egan, 1999). The Gartner Group estimates that between 2000 and 2010, a typical employee will notice the following shifts in the nature of his/her work: (i) time spent working alone will fall from 40% to 30%; (ii) time spent on working with others (who are based in the same location and thus also in the same time zone) will fall from 15% to 5%; (iii) time spent on working with others (who are based in a different location but in the same time zone) will rise from 15% to 25%; and (iv) time spent in working with others (who are based in a different location and a different time zone) will rise from 30% to 40% (Solomon, 2001). This suggests that over the next few years there will be an increasing expansion of both spatial and temporal variations associated with teamwork. Similar studies suggest that this change will occur not just in North America but across the world (Russell, 1996, Edwards and Field-Hendrey, 1996).

With proliferation of VOs, it has become fashionable to focus on this phenomenon as part of management research (DeSanctis and Monge, 1999). Yet, to date there has been little consensus with respect to the definition of "virtual" as well as what factors contribute to formation of virtual organizations (Kraut et al., 1999). Extant research on VOs has been concerned mainly with understanding the managerial challenges and consequences arising *after* such organizations are formed. Issues that have been examined in prior literature include: (i) management dynamics of VOs, such as communication processes (DeSanctis and Monge, 1999), metamanagement (Mowshowitz, 1994, Mowshowitz, 1997, Hoogeweegen et al., 1999), personal relationship on use of virtual networks (Kraut et al., 1999), risk mitigation (Grabowski and Roberts, 1999), network

structure (Ahuja and Carley, 1999) and trustworthiness within VO (Kasper-Fuehrer and Ashkanasy, 2001); and (ii) consequences of VO, such as process improvement (Kock, 2000), flexible and reconfigurable structures (DeSanctis and Monge, 1999) and organizational performance (Davidow and Malone, 1992). There has been little research so far on assessing the circumstances and conditions that lead to creation of VO (i.e., its antecedents and facilitators). Given this backdrop, the research questions that motivate this paper are as follows:

1. What is organizational virtuality?
2. What factors contribute to formation of virtual organizations?

The remainder of the paper is organized as follows. First, we summarize the definitions of virtual organization based on the existing literature review. Based on the summary, we define organizational virtuality. We then explore one possible reason for which different degree of organizational virtuality exist among virtual organizations from the perspective of knowledge-based view.

ORGANIZATIONAL VIRTUALITY

The study of organizational form is a central issue of concern in organization science. Organizational form is composed of structural features or patterns that are shared across a large number of organizations (McKelvey, 1982). Researchers have been concerned with studying a variety of forms. Economists have traditionally focused on two alternative forms, markets versus hierarchies (Williamson, 1975). Sociologists have studied bureaucracy, a form (WEBER, 1922/1968) portrayed in contrast to the guild form. Recently, organizational scholars have observed that an alternative to markets and hierarchies seems to be emerging, that of the network (Powell, 1990, Miles and Snow, 1986, Nohria and Eccles, 1992). Over the last decade, there has been a growing interest in a number of other “postbureaucratic” forms, one of which is the VO (Nohria and Berkley, 1994, Bleecker, 1994, Davidow and Malone, 1992). Yet, there seems to be little agreement amongst researchers on what influences virtuality (Kraut et al., 1999).

Virtual Organization

In order to have a better understanding of what characterize a virtual organization, we review prior literature on virtual organizations and summarize a variety of definitions in Table 1. For the purpose of this paper, we adopt DeSanctis and Monge’s (1999) definition of virtual organizations being “a collection of geographically/temporally dispersed, functionally and/or culturally diverse entities that work together using information technology”. An essential characteristic embedded in this definition of organizational virtuality is the suggestion of using information technology to connect dispersed entities that work together. From Table 1, we notice that prior literature is unanimous with respect to the central role played by information technology in virtual organizations. It is agreed that information technology must be in place before a virtual organization, no matter how geographically dispersed and/or functionally diversified, can come into existence. Thus, Davidow and Malone (1992) stress that virtual organizations “require taking a sophisticated information network that gathers data on markets and customer needs, combining it with the newest design methods and computer-integrated production processes, and then operating this system with an integrated network that includes not only highly skilled employees of the company but also suppliers, distributors, retailers and even consumers” (p6). Underlying this sophisticated information network is the application of information technologies, which integrates the entities within and across organizations. The entities that make up a virtual organization can be individual workers (Clancy, 1994, Barner, 1996), teams and departments (Lipnack and Stamps, 1997, Grenier and Metes, 1995) (i.e., within organization), as well as organizations with external ties (i.e., inter-organizational) (Coyle and Schnarr, 1995). Virtual organizations can arise in either intra-firm or inter-firm contexts (DeSanctis and Monge, 1999, Kasper-Fuehrer and Ashkanasy, 2001). Similarly, duration of existence of a VO can also vary: from satisfying a short-term or temporary goal to a long-term or enduring goal.

Organizational Virtuality

Although the idea of VO has prevailing in both academic and practitioner discourse, few pure virtual forms exist today (Dutton, 1999, Kraut et al., 1999). Instead, aspects of virtuality occur in many business organizations (DeSanctis and Monge, 1999). For example, many firms build some form of the VO based on the external relationships forged with other firms through outsourcing contracts, strategic alliances and inter-organizational linkages (Mowshowitz, 1994, Nohria and Berkley, 1994). More and more firms have deployed telecommuting programs that enable their employees to operate from outside of the physical boundaries of the office (Neufeld and Fang, 2004, Davenport and Pearlson, 1998). Even within the firm, work teams are often geographically distributed (Ancona and Caldwell, 1992). These trends suggest that firms are engaging in and acquiring higher virtuality than before (DeSanctis and Monge, 1999). Even firms that do not seem to be virtual in the conventional definition of their organizational form do usually conduct certain activities virtually. Thus, for most firms being virtual is a matter of degree (Kraut et al., 1999).

| Study | Definition |
|-------------------------------------|--|
| (DeSanctis & Monge 1999) | A collection of geographically distributed, functionally and/or culturally diverse entities that are linked by electronic forms of communication and rely on lateral, dynamic relationships for coordination |
| (Ahuja & Carley 1999) | A geographically distributed organization whose members are bound by a long-term common interest or goal, and who communicate and coordinate their work through information technology |
| (Grabowski & Roberts 1999) | Comprised of multiple, distributed members, temporarily linked together for competitive advantage, that share common value chains and business processes supported by distributed information technology |
| (Staples et al. 1999) | Consists of individuals working toward a common goal, but without centralized buildings, physical plant, or other characteristics of a traditional organization |
| (Kraut et al. 1999) | Defined in terms of the number and importance of cross-boundary transactions. Production processes transcend the boundaries of a single firm Production processes are flexible Parties are geographically dispersed Coordination is heavily dependent on information technologies |
| (Mowshowitz 1994b; Mowshowitz 1997) | A virtually organized company dynamically links its business goals with the procedures needed to achieve them |
| (O'Leary et al. 1997) | Defined as one where complementary resources existing in a number of cooperating companies are left in place, but are integrated to support a particular product effort for as long as it is viable to do so... Resources are selectively allocated to the virtual company if they are underutilized or if they can be profitably utilized there more than in the home company |
| (Hoogeweegen et al. 1999) | Combine core competences of multiple organizations in temporary alignment in response to specific customer preferences |
| (Markus et al. 2000) | New networked organizational forms in which work is conducted by temporary teams that cross organizational lines |
| (Kasper-Fuehrer & Ashkanasy 2001) | Inter-organizational virtual organization: a temporary network organization, consisting of independent enterprises that come together swiftly to exploit and apparent market opportunity. |
| Markus et al 2000 | New networked organizational forms in which work is conducted by temporary teams that cross organizational lines |
| Boudreau et al 1998 | A VO operates as a federated collection of enterprises tied together through contractual and other means. Organizations that is dependent on a federation of alliances and partnerships with other organizations; relative spatial and temporal independence; flexibility |
| Kurland and Egan 1999 | Virtual organizations are composed of telecommuters, substitution of telecommunications for physical travel to the organization |

Table 1. Definitions of Virtual Organization

What are the key characteristics that differentiate between different levels of virtuality? Following the definition and characteristics of virtual organizations, we define organizational virtuality as being “*the capability of an organization to connect geographically dispersed entities to continuously work together by taking recourse to information system (IS) resources*”. In our view, even though geographical dispersion, functional diversity and extensive use of information technology comprise the dominant features of most virtual organizations, we cannot define virtuality using these characteristics in a separate manner. Organizations that have employees based across several countries are more geographically dispersed, but they may not be necessarily more virtual compared to those that have employees dispersed within one city. Organizations that have more cultural/functional heterogeneity are more diversified, but not necessarily more

virtual, than those with less heterogeneity. Similarly, organizations that have more use of information technology (IT) are more computerized, but not necessarily more virtual, than those with less information technology. In effect, virtual becomes a state where “individual members of an organization featuring global cross-functional computer-mediated jobs maybe considered holographically equivalent to the organization as a whole” (Noharia and Berkley 1994).

Thus, virtuality is about the ability of an organization and its constituent units to work collaboratively under situations where dispersion, diversity and digitalization are essential features. Adopting an integrative view of these three characteristics and the crucial role of IT, we argue that virtuality is the ability of a firm to connect a collection of entities, however dispersed and/or diverse they are, to engage in continuous collaboration through leveraging IS resources. As such, firms can be inter-organizationally virtual when one firm connects some of its own business processes conducted in-house with business processes that are conducted outside the firm’s boundaries by its business partners (Kraut et al., 1999). Similarly, a firm is intra-organizationally virtual when its employees are based outside the physical boundaries of the firm and connect with some of the central resources within the firm through use of IS, or when a number of virtual teams within the firm but based in multiple locations electronically connect together for teamwork, thus in either case bridging geographical distance. Having acknowledged that organizational virtuality can, therefore, be thought of as extending along a continuum, it now becomes important to identify the set of factors that potentially influence it. In other words, we now investigate what leads to differing levels of virtuality within the firm. In order to do so, we focus knowledge-based view of the firm.

THE KNOWLEDGE-BASED VIEW OF THE FIRM

The knowledge-based view (KBV) posits that a firm’s knowledge is not only valuable, rare, inimitable and non-substitutable but also strategically *the* most significant resource available to it (Grant, 1996). Therefore, it is knowledge that forms the basis of a firm’s sustained competitive advantage. Even though the KBV initially developed as an extension or special case of the more popular resource-based view (RBV) of the firm (Barney, 1991), more recently several researchers (e.g., Cook and Brown, 1999; Spender, 1996; Orlikowski, 2002) have suggested that rather than the objective knowledge *per se*, it is the idiosyncratic process of “knowing”, characterizing ongoing, dynamic social interaction amongst organizational actors, that actually enables the firm to achieve sustained competitive advantage using knowledge. In this expanded view, organizational knowledge is not static but emergent and becomes useful only when it is applied in a context. Thus, “...knowing is constituted and reconstituted every day in practice... [so much so that] capabilities of the organization are not fixed or given properties... Rather, they are constituted every day in the ongoing and situated practices of the organization’s members” (Orlikowski, 2002: 269-270). To examine organizational virtuality, we adopt this view of organizational knowledge as “knowing in practice”.

Based on four analytically distinct but inter-related streams of discourse in the social sciences, Kakahara and Sorensen (2002) find that organizational knowledge can be viewed from the following perspectives: (i) knowledge as object, (ii) knowledge as interpretation, (iii) knowledge as process, and (iv) knowledge as relationship. As knowledge evolves from being a “...given and stable, as always ready-to-hand” (Orlikowski, 2002: 269) objective resource to an emergent entity, reflecting knowing in practice and rooted in organizational interpretation and discourse, it becomes increasingly important to shift the earlier-held understanding of knowledge. Knowledge transforms from being self-contained within the individual to a dynamic exchange occurring amongst two or more organizational actors engaged in a conversation of enduring mutual interest and significance. In the latter case, two attributes of the knowledge that aid this process are: (i) the *need* for knowledge exchange, and (ii) the *ability* to engage in knowledge exchange, amongst interested organizational members. We suggest that both these attributes affect the level of organizational virtuality resulting in the virtual firm. While it is theoretically possible for either attribute to assume an infinite range of values varying from zero (or not at all) to one (or complete), for the purpose of this discussion we categorize either attribute as taking up a value that is either “low” or “high”. Therefore, organizational virtuality becomes a function of these two attributes, represented in Figure 1.

Need for Knowledge Exchange

The first attribute or characteristic influencing organizational virtuality is the need for knowledge exchange that arises amongst a firm’s dispersed organizational units and their constituent members. Any knowledge generated and used within an organizational unit can be categorized as being (i) only useful to that unit and only at that point in time, (ii) only useful to that unit but at multiple points in time, or (iii) useful to not only that unit but other organizational units as well, either at a single point in time or for multiple points in time. In case (ii) and/or (iii) prevail over (i), we can say that the firm has a comparatively higher need for knowledge exchange amongst its constituent organizational units and/or their members. For instance, the need for knowledge exchange is certainly higher for (ii) over (i) because knowledge is required at multiple points in time. Given that knowledge is emergent and contextually variant, it will need to be shared and exchanged amongst

organizational members over and over again because the context has changed with time (e.g., some of the organizational members have left the unit) and so the earlier knowledge has lost its partial significance and, therefore, must be renewed. Similarly, between (i) and (iii) as also between (ii) and (iii) the need for knowledge exchange is highest in case (iii) because the knowledge is needed to be shared, enacted and transformed across multiple units and over multiple points in time, before it becomes useful.

| | | | |
|------------------------------------|-------------|--|---|
| Need for Knowledge Exchange | <i>High</i> | <i>Scenario 3</i> <i>Low level of organizational virtuality</i> | <i>Scenario 4</i> <i>High level of organizational virtuality</i> |
| | <i>Low</i> | <i>Scenario 1</i> <i>Non-existent organizational virtuality</i> | <i>Scenario 2</i> <i>Moderate organizational virtuality, but exists in isolated pockets only</i> |
| | | <i>Low</i> | <i>High</i> |
| | | Ability to Engage in Knowledge Exchange | |

Figure 1. Organizational Virtuality as an Outcome of the Firm’s Need for Knowledge Exchange and Ability to Engaging in Knowledge Exchange

Ability to Engage in Knowledge Exchange

The second attribute or characteristic that affects organizational virtuality is the ability of the firm to engage in knowledge exchange. Simply possessing a need to exchange knowledge is not enough. What is equally important is an ability to exchange the knowledge, amongst the interested organizational constituents (units and/or actors) and at the point in time when the need has been expressed. The ability to engage in knowledge exchange is a function of two parameters: (i) the ability to articulate the knowledge, and (ii) the ability to create a shared environment for knowledge exchange using appropriate technology.

The first parameter is the ability to articulate the knowledge and bring it to a form such that it is amenable to transmission from one organizational member to another. This relates to distinguishing between the two commonly accepted categories of knowledge – tacit versus explicit (Polanyi, 1962). In developing a typology of tacit knowledge, Castillo suggests that such knowledge can take the following forms: (i) nonepistle tacit knowledge, or knowledge that is based on “gut feelings” and is not or cannot be written in any form or verbalized, (ii) sociocultural tacit knowledge, or knowledge that do not belong to anyone in particular but rather arise in wider social/cultural systems, which learn and make use of this knowledge, (iii) semantic tacit knowledge, or knowledge that is necessarily abstract, symbolic and can be shared only between individuals who belong to a common professional milieu, and (iv) sagacious tacit knowledge, or knowledge that is perceived only by the sages (i.e. experts) and escapes the notice of novices. From this classification, it is clear that much of tacit knowledge is abstruse, extremely difficult to verbalize, and loses its significance when removed from the context. Only a limited proportion of the total tacit knowledge resident within an individual can be made explicit before it is shared with others. In effect, much of the tacit knowledge can be shared only if it is exchanged between individuals on a real-time basis, with the vehicle for sharing sensitive to the context and the dynamic nature of the sharing process.

This is where the second parameter, viz. the ability to create a shared environment for knowledge exchange using appropriate technology becomes crucial. Organizational virtuality enables firms to take recourse to technology and create the requisite infrastructure that provides firms with the ability to exchange technology. Using various expressions of organizational virtuality (such as computer supported collaborative work, videoconferencing, email, intranet, etc.), it thus becomes possible for firms to create virtual communities of practice that can engage in effective knowledge exchange amongst organizational members and/or unit.

To summarize, Figure 1 depicts the following four situations:

- (i) Scenario 1 - both the need for knowledge exchange and ability to engage in knowledge exchange are low;
- (ii) Scenario 2 - the need for knowledge exchange is low but ability to engage in knowledge exchange is high;

- (iii) Scenario 3 - the need for knowledge exchange is high but ability to engage in knowledge exchange is low; and
- (iv) Scenario 4 - both the need for knowledge exchange and ability to engage in knowledge exchange are high.

We suggest that a high level of organizational virtuality will be noticed only in Scenario 4 because this is when the conditions within the firm are optimal for both creation of and sustenance of a virtual network. In all the other scenarios, organizational virtuality will either not be required or if it is set up, will provide sub-optimal benefits to the firm. For example, under Scenario 1 there is simply no requirement to create organizational virtuality. Despite that, if it is created through use of available technology, it will not be used because the firm does not have an ability to exchange knowledge. In effect, the virtual network will fritter away and degenerate over time. Again, under Scenario 2 even though the firm has an ability to engage in knowledge exchange, the need for knowledge exchange is low. Under the circumstances, if a virtual network is created simply because of a fascination with available technology, it will be only partially used. Finally, under Scenario 3 even though the firm has a high need for knowledge exchange, it has only a limited ability to engage in knowledge exchange. Once again, under the circumstances the firm will demonstrate rather low levels of organizational virtuality and fall back upon other traditional methods of knowledge exchange such as face-to-face meetings, and with only limited success. Therefore, we suggest:

Proposition 1: Need for knowledge exchange and ability to engage in knowledge exchange jointly determine the level of organizational virtuality that exists in a firm.

Proposition 2: The level of organizational virtuality will be highest when both need for knowledge exchange and ability to engage in knowledge exchange are high. Alternatively, the level of organizational virtuality will be: (i) non-existent when both need for knowledge exchange and ability to engage in knowledge exchange are low, (ii) low when need for knowledge exchange is high but ability to engage in knowledge exchange is low, and (iii) moderate, but exist in isolated pockets only, when the need for knowledge exchange is low but ability to engage in knowledge exchange is high.

DISCUSSION AND LIMITATIONS

This study summarizes the extant literature on virtual organizations, proposes a definition of organizational virtuality, and theorizes the reasons for which different levels of virtuality exist in the firm from the knowledge-based view. It makes the following contribution to the literature. First, our study is among the first to define the notion of organizational virtuality. Although research has suggested that organizations' being virtual is a matter of degree (Kraut et al 1999), the literature has not intensively explored what factors contribute to the variation of virtuality. Our study objects to measure virtuality in terms the three major characteristics of virtual organizations (i.e., dispersion, diversity and digitalization) and suggest a unified view of virtuality that stresses the capability of continuous operating without face-to-face interactions. This view offers a point of departure for a new venue of research, including determinants and consequence of virtuality and the effects of the three characteristics of virtual organizations on virtuality.

Second, this study is of relevance to researchers who study change of organizational forms, particularly those focusing on the determinants. Organizational change and its enablers have been topics of abiding interest (Huber and Glick, 1993). Developing and adopting an increasing virtual form of organizing is changing the way businesses are run. As such, it is important to study this phenomenon. Previous research only focuses on the influencing factors of virtual organizing on the firm performance. Little research has been conducted to explain why virtual organization comes into being at the first place. Thus, developing an understanding of factors that determine organizational virtuality will enrich the body of research on organizational change. Based on the working definition of organizational virtuality, this paper contributes to the body of knowledge by adopting the knowledge-based view, suggesting that two factors jointly influence virtuality: need to exchange and ability to exchange.

Third, our study offers opportunities to study the relationship between technology and organizational forms (Fulk and DeSanctis, 1995, Orlikowski, 1996). Virtual organization, as an emerging organizational form enabled by information technology, is of great interest and relevance for IS researchers who study the role of IT in firms (Dewett and Jones, 2001). The knowledge-based view in this study makes the first attempt in linking the knowledge aspect of the firm with organizational virtuality, and thus contribute to the IS literature by linking knowledge management and virtual organizations.

However, the study suffers from a few limitations. First, discussion on the relationship between the two attributes of knowledge and organizational virtuality is still preliminary. A more in depth explaining of how needs to exchange and ability to exchange individually and jointly affect virtuality is needed. Second, the study focuses on defining virtuality and exploring

knowledge-related determinants of virtuality for firms. Its generalizability to other virtual forms of organizing, such as virtual communities, is subject to further research. Third, the extent to which the three major characteristics of virtual organization (i.e., dispersion, diversity and digitalization) affect virtuality remains an opportunity for further research.

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