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INTERORGANIZATIONAL COOPERATION TO DEVELOP INFORMATION SYSTEMS

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Abstract

Interorganizational cooperative relationships offer the potential to develop high quality, low cost information systems. Yet, such relationships are conspicuous by their absence, and important theoretical issues remain to be examined. In this paper, we analyze three cases of cooperative development of information systems, using the frameworks of cooperation theory and configuration theory. Cooperation theory highlights the role of trust in cooperation whereas configuration theory highlights the role of configurational compatibility. The within-case and cross-case analysis finds the pattern of cooperation to be paradoxical within the framework of cooperation theory, but, consistent with configuration theory, cooperation fell with increasing configurational distance. We find that the organizational changes required to overcome small configurational distances are complex and difficult to implement, raising barriers to cooperation. We examine the implications of configurational distance for the adoption and implementation of information systems innovations and suggest that configurational distance is a useful contingency variable in implementation research.

1. INTRODUCTION

Information systems development and maintenance are a significant part of many organizations' capital budgets (Keen 1991). Some are reconsidering the strategic importance of information systems and outsourcing the entire IT function as a cost-reduction strategy (Lacity and Hirschheim 1993). Cooperative development of information systems offers another strategy for low cost, high quality development. The benefits and feasibility of cooperative relationships, even among competitors, have already been demonstrated in the semi-conductor, biotechnology, automotive, and other high technology industries (Contractor and Lorange 1988; Smith, Carroll and Ashford 1995). However, cooperative relationships for the development of information systems are conspicuous by their absence.

Two theoretical perspectives underpin our research to explain this absence and understand the implications for the theory and practice of IT-based change. One perspective is grounded in cooperation theory from the organizational economics literature. This focuses on issues relating to trust, risk, efficiency and equity in the formation, conduct and continuation of cooperative relationships (Ring and Van de Ven 1992). It finds that trust is an essential antecedent to cooperation and that increasing trust leads to repeated alliances governed by a decreasing reliance on formal contracts (Gulati 1995). The other perspective draws on the configurational view of fit from the organizational theory literature and identifies a set of ideal type configurations of contextual and organizational elements that maximize fit (Doty, Glick and Huber 1993). This perspective finds that cooperation is limited to organizational configurations that are exemplars of the same ideal type. Organizational configurations that are exemplars of different ideal types are incompatible and cannot cooperate effectively (Johnston and Yetton 1996; Yetton and Johnston 1994).

In this paper, we present three case studies of cooperative development of information systems. We draw on insights from both theoretical perspectives to analyze the findings. In all three cases, the same set of organizations was invited to join a consortium

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for developing an information system. In addition, the same organization was the lead member in all three cases and the decision makers involved were also the same. The first consortium had a very high level of cooperation and was considered a success by all the participants. However, the level of participation in the two subsequent consortia was significantly lower. Within the framework of cooperation theory it is an apparent paradox that successful cooperation was followed by less, rather than more, cooperation.

An analysis of the three cases within the configurational framework resolves this paradox. This shows that even small configurational distances, such as among compatible configurations that are exemplars of the same ideal type, can create barriers to cooperation in the development of information systems. In such a case, configurational compatibility is a necessary but not sufficient condition for cooperation. In support of this, we argue that the organizational changes required to overcome even small configurational distances are complex and create significant implementation problems, thus raising managerial resistance to cooperation. We also show how changes in the external environment can overcome configurational barriers to cooperation.

We begin by presenting the analytic framework used in the analysis and describe the methodology for collecting and analysing the data. We give a brief case description of the first consortium and a within-case analysis using the framework of cooperation theory. Brief case descriptions of the second and third consortia are presented. This is followed by a cross-case analysis within the framework of configuration theory. Finally, we discuss the implications of the findings for future research and practice.

2. ANALYTIC FRAMEWORK

In cooperation theory,¹ trust is the critical antecedent enabling organizations to undertake cooperative relationships (Ring and Van de Ven 1992). Such relationships, governed by relational contracts provide a more efficient, equitable and flexible governance structure than either markets or hierarchies. Indeed, cooperative relationships may be the only viable governance structure for contracts that involve long term investments in highly specific assets and where outcomes cannot be fully specified or controlled ex ante (Ring and Van de Ven 1994). Trust, as a social mechanism governing risk, is only available to organizations in a socially and personally embedded environment (Ring and Van de Ven 1992). While initial cooperative relationships are likely to be governed by contracts that include elaborate safeguards, repeated positive interactions generate increasing levels of trust (Gulati 1995). This is reflected in repeated cooperative alliances, as well as a decreasing reliance on formal contracts to govern the relationship (Gulati 1995).

Configuration theory, in contrast to cooperation theory, takes a systems perspective. It proposes that various contextual and organizational elements, such as strategy, structure and process, cluster systematically into distinct configurations (Meyer, Tsui and Hinings 1993; Miller 1987). Configurational theorists use the ideal-type construct as a theory building device and describe ideal type configurations that represent holistic configurations of internally consistent contextual and organizational factors (Doty, Glick and Huber 1993). Ideal type configurations serve as abstract models against which to compare actual organizational configurations (Doty, Glick and Huber 1993). For instance, Mintzberg (1979) describes five ideal type configurations of contextual and organizational elements: the simple structure, the machine bureaucracy, the divisional form, the professional bureaucracy, and the adhocracy. Similarly, Miles and Snow (1978) describe four ideal type configurations of contextual, structural and strategic factors: the prospector, the analyzer, the defender, and the reactor.

A key assumption underlying configuration theory is that ideal type configurations have the highest level of fit between the contextual and organizational elements and, consequently, the highest level of effectiveness (Doty, Glick and Huber 1993). The level of fit of an actual organizational configuration is measured by its deviation from its closest ideal type configuration, along multiple dimensions, such as strategy, structure and process. The closer an organization is to an ideal type configuration, the lower its deviations along the multiple dimensions. The distance of an organizational configuration from an ideal type can be assessed by converting the deviations along multiple dimensions into an equivalent Euclidian distance (Doty, Glick and

¹Though no formal statement of cooperation theory has been presented in the literature, the works of Gulati (1995), McAllister (1995), Ring and Van de Ven (1992, 1994), and Smith, Carroll and Ashford (1995) share a common strand which we take as the statement of the theory.

Huber 1993). Thus, organizations belonging to the same ideal type configuration have a smaller distance between them than organizations belonging to different ideal types.

Johnston and Yetton and Yetton and Johnston extend configuration theory to propose that configurations that are exemplars of the same ideal type share a common organizing logic and are, therefore, compatible and able to cooperate effectively. Where two organizations with incompatible configurations interact, their different organizing logics result in conflict rather than meaningful cooperation (Yetton and Johnston 1994). In this way, information systems, having been designed around different configurations, become a key point of conflict in attempts to cooperate and, in the extreme, integrate, across incompatible configurations (Johnston and Yetton 1996). Absorption, and subsequent elimination, of one configuration by the other is one strategy for resolving the conflict endemic in such an integration. Extending this argument, we conclude that configurational compatibility is necessary for organizations to enter into cooperative relationships for developing information systems.

Here, we make a distinction between configurations belonging to different ideal types, which have a large distance between them, and between configurations that belong to the same ideal type but are still located at some distance from each other. Whereas Yetton and Johnston and Johnston and Yetton analyze cooperation between different ideal type configurations, we analyze cooperation between configurations belonging to the same ideal type. Specifically, the question we address is how small or large a distance between two organizational configurations constitutes a barrier to cooperative development of information systems.

3. METHODOLOGY

3.1 Background and Research Context

The NSW Department of Health (DOH) is responsible for the provision of health care services in the State of New South Wales, Australia. It is the largest state government portfolio with a budget of over A\$ 4.5 billion.² The actual management of the healthcare facilities and the delivery of healthcare services is delegated by the DOH to Area Health Services (AHSs). The AHSs manage the hospitals, clinics and other facilities under them. They operate as corporate entities responsible for their own planning, management and operations. The DOH, which funds the AHSs, retains direct financial control. For example, all major IT development and infrastructure decisions are subject to DOH approval. In 1990, one AHS initiated a number of consortia to undertake joint development of information systems. This paper takes a case study approach to research this cooperative development of information systems.

3.2 Case Study Research

Case study research is a particularly appropriate method for theory building in the early stages of a research field (Eisenhardt 1989). Here, we use the case approach to focus on the development of a theory with high internal and external validity, and which is testable using readily measurable constructs and falsifiable hypotheses. This approach is essentially positivist in perspective, relying on the validation of the emergent theory through a constant iteration between theory and data (Eisenhardt 1989).

3.3 Data Collection and Analysis

The primary mode of data collection consisted of twenty-two detailed semi-structured interviews with the initiator of the consortia, the developers, and the key decision makers and users in both cooperating and non-cooperating AHSs. The initial phase of interviews was conducted between April 1992 and March 1993 and a second set of interviews was conducted during March-May 1996. All interviews were recorded and transcribed. In addition, some internal records of the consortia were also examined.

²A\$ 1.00 was approximately equal to US\$ 0.78 in April 1996.

A within-case analysis was first conducted to identify the unique themes and patterns emerging from the data (Eisenhardt 1989). These findings were consistent with the framework of cooperation theory (Ring and Van de Ven 1992). However, a cross-case analysis revealed a dynamic pattern of cooperation which was paradoxical within the framework of cooperation theory. Paradoxical findings offer an opportunity to shift perspective, focus on different research questions, and introduce new theoretical frameworks based on a different set of causal mechanisms (Poole and Van de Ven 1989; Tsoukas 1989). We show that integrating configuration theory into the framework resolves the paradox by synthesis.

Grounding the explanations for the emergent relationships within two well established theoretical perspectives also contributes to establishing internal validity (Eisenhardt 1989). Claims to internal validity are further supported by the quasi-experimental nature of the study, which controls for the effect of a number of confounding variables across the cases. Specifically, the technologies, the incremental nature of the technologies, the costs, the key players, the external context, the researchers, and the time frame were the same across the three cases. These controls eliminate a number of alternative explanations and provide a high degree of internal validity not normally associated with case study research. The within-case and cross-case analyzes also ensure high internal validity for the conclusions (Eisenhardt 1989; Yin 1984).

4. CASE ANALYSIS

4.1 The DPR Consortium

The Wentworth Area Health Service (WAHS) was formed in mid-1988. It had a staff of about 2,200 and an operating budget of approximately A\$ 120 million. Graham Jenkins was appointed the Director of Finance and Budget at WAHS in late 1988. His background in financial MIS development was considered an asset. WAHS, like all other AHSs, was using HOSPAY for processing its payroll data. This system had been developed by the DOH and outsourced to an external bureau. AHSs could not access HOSPAY data for query handling or report generation and felt constrained by this inflexibility and limitation. The problem for Jenkins was that *“reports were being run from different systems . . . [and] the end user wasn’t getting valid information.”*

Jenkins’ preferred solution for the problem was *“to try and get a standardized system which worked off the payroll system.”* In late 1989, he decided to develop such a package, to download and analyze payroll data, using as a prototype a package developed by the bureau running HOSPAY. In March 1990, Jenkins invited all ten metropolitan AHSs to formally discuss the joint development of Datapower (DPR), as the package had been named. A joint development would generate enough capital to fund the development of DPR. It would also provide participants with control over the product. But most importantly, as Jenkins stated *“Our idea is: Come in with us, help us develop it, you grow with the product, we grow with the product, we all get an opportunity to be involved in it. It’s . . . ownership.”*

Five AHSs were the foundation members of the consortium. A Steering Committee, with Jenkins as Chair and one member from each participating AHS, was set up to manage the development. The bureau was contracted to develop DPR, which in turn engaged a software firm to write the code. The development and testing of the code took place at WAHS, under Jenkins’ supervision. The first version of DPR was released for testing in August 1990 and for implementation in October 1990. A second version was released in March 1991. Jenkins was also actively promoting DPR to the non-participating Areas. By July 1991, all AHSs, except one, had joined the consortium. According to Jenkins, the lone non-participant had *“set up their own quasi DPR.”* By January 1991, when version eight of DPR was released, it had grown from a simple package downloading HR data to becoming the backbone of the HR system. The participating AHSs, as well as the end-users, were extremely satisfied with the results. As the Computer Manager of AHS D³ remarked: *“[DPR] has borne reasonable fruit and very cost effective fruit. . . . it is a way of getting things done you wouldn’t otherwise get done in a very cost effective way.”*

³The AHSs other than WAHS are referred to as AHS A, B, C, and so on.

4.1.1 Analysis of the DPR Consortium

Here, we present a within-case analysis of the DPR consortium using cooperation theory as a guiding framework. In general, our analysis finds considerable support for the propositions advanced by Ring and Van de Ven (1992, 1994). The DOH's inability to meet a long standing need motivated the AHSs to explore a cooperative relationship (Ring and Van de Ven 1994). The AHSs *"wanted some sort of MIS development out of the payroll system and we just couldn't wait any longer for the DOH to come up with the ultimate solution"* (Finance Officer, AHS C). However, individual AHSs were unable to develop their own packages as *"there wasn't a push in our organisation to devote the resources to it"* (Computer Manager, AHS D). This was one of a number of major barriers to any AHS developing its own solution. Earlier attempts by one AHS to develop a market based solution had also been rejected by the other AHSs, mainly on issues of ownership, control and support. The consortium approach provided the members with various advantages including ownership, control, shared learning and support.

The particular form of cooperative relationship entered into by the DPR consortium members is a form of governance which is neither market-based nor hierarchy-based (Ring and Van de Ven 1992). It does not provide members with ownership rights, only the rights to use DPR and to obtain the support for running DPR, which is provided centrally to all members. More importantly, all participating AHSs are equal members of the User Committees which control the development of DPR. Jenkins' development philosophy for DPR was to introduce a very basic package and to build it up based on the requirements and expertise of the consortium members. Consortium members make proposals to the User Committee for enhancements to DPR, which are discussed and voted on by all the members. The support, development and maintenance of DPR are funded by the annual fees paid by all consortium members. Thus, the consortium members are engaged in a continuing cooperative relationship within which they negotiate to meet their specific requirements.

Trust in the personalities involved and their personal and social embeddedness within the NSW health system emerged as important factors enabling the development of a cooperative relationship (Ring and Van de Ven 1992). As the Finance Officer of AHS C mentioned, *"Graham Jenkins and myself have known each other for quite a long time. I have known him since he was up at . . . Hospital. I have been on quite a number of working parties with him."* Jenkins too felt that participation in the consortium would be *"partly on the reputation of the people involved"* and that he was *"reasonably well known within the health environment within NSW . . . [and] could get the acceptance at the level where acceptance was needed."* Jenkins reputation among other partners was of being *"entrepreneurial, sees an opportunity and wants to take it ... he wanted what the hospitals wanted"* (Manager Business Systems, AHS B). Consequently, *"when a person like Graham [Jenkins] says I think I can work a deal whereby we can get functionality, I agreed"* (Computer Manager, AHS D).

In this analysis, trust emerged not only as an essential antecedent to cooperation, it was also reflected in the conduct of the relationship (Smith, Carroll and Ashford 1995). Consistent with Ring and Van de Ven's (1992) proposition, we find that the contracts were negotiated and agreed on the basis of trustworthiness. Contract negotiations were highly informal and issues arising from opportunistic behavior and bounded rationality were not discussed. The assumption of trustworthiness was also reflected in the conduct of the relationship, which did not impose any monitoring mechanisms during development. Jenkins was given a free hand to develop the product, with the other participants virtually relinquishing their contractual rights to participate in product development. As the Computer Manager of AHS D commented, *"I didn't have to put virtually any time in other than attend a monthly meeting and put my piece in about direction, how it was going, where it was going."* The simplicity and informality of the governance structure is a consequence not only of the high levels of trust but also of the low levels of risk (Ring and Van de Ven 1992). The risk perceived was low, so that *"with the sort of money we spent it was easier for a couple of people to say we'll participate"* (Computer Manager, AHS D).

4.2 The Mimate and VMoney Consortia

WAHS was also collaborating with the DOH, in 1990, to develop a financial MIS package. The DOH had undertaken this development in response to demands by all the AHSs. For various reasons, this project failed and was abandoned. Jenkins decided to develop the package at WAHS based on the successful DPR consortium. This involved downloading data from the DOH's HOSFIN package and writing various processing modules. This package was named Mimate (MMT). Jenkins, with

his Finance Officer and Budget Accountant, put together a set of specifications for a very basic system and engaged the contractors writing the code for DPR to also develop MMT.

Jenkins developed an initial version of MMT and then invited other AHSs to join the MMT consortium on the same arrangement as for DPR. He believed that the other AHSs were looking for a similar package and the DPR consortium was working well and had already produced impressive results. From technical, conceptual and cost perspectives, MMT was almost identical to DPR. Furthermore, the decision makers for MMT were the same as those involved in the DPR consortium. Jenkins expected MMT to draw the same response as DPR. Development work on MMT started in February 1991. By April 1991, a prototype was ready. In June 1991, an expanded version of MMT, which included a budgeting module, was released. However, despite Jenkins' efforts, the MMT consortium attracted only three members. Later, one of these dropped out to develop a package more suited to its particular needs.

VMoney (VMN) is the third consortium-based package developed by WAHS during 1990-1991. It is a specialized package designed to handle payments to Visiting Medical Officers (VMO). These payments are governed by an agreement negotiated between the DOH and representatives from the medical officers association. The agreement involves a complex set of rules and procedures. While the rules apply to all AHSs, each AHS had interpreted them somewhat differently and developed its own process for handling VMO payments. These processes, typically based on stand-alone PC-based database or spreadsheet systems, were managed by dedicated experts. The level of satisfaction with these packages was generally low. WAHS, under Jenkins' direction, decided that VMO payments should be put on-line with the data captured in their mainframe system to allow analysis and control over VMO activities and expenditures. Again, despite Jenkins' efforts at promoting the VMN consortium, between 1990 and 1993 only three other AHSs joined. However, starting in early-1994 and without any additional effort by Jenkins, participation in the VMN consortium suddenly increased and all the AHSs had joined the consortium by the end of 1994.

4.3 Cross-Case Analysis

A cross-case analysis reveals patterns which are not evident within the individual cases. Within the framework of cooperation theory, a high level of trust and a low level of risk combine to explain the high level of cooperation in the DPR consortium. However, they do not explain the low level of cooperation in the subsequent consortia, which also experienced the same levels of trust and risk. Cooperation theory predicts that the first consortium should have received the lowest level of cooperation, with the subsequent consortia receiving higher levels of cooperation (Ring and Van de Ven 1992). However, the observed pattern was the reverse of this. In our analysis below, we first explain the low cooperation in the MMT and VMN consortia in terms of the configurational distances involved. We then address the late surge in cooperation in the VMN consortium and explain it in terms of contingencies which force organizations to undertake configurational change.

Yetton and Johnston and Johnston and Yetton find that organizational elements of a particular ideal type configuration are incompatible with a different ideal type configuration. Consequently, an information system which is compatible with a particular ideal type would be incompatible with a configuration belonging to a different ideal type. Here, the organizations participating in the three consortia are variants of the same ideal type configuration, the machine bureaucracy (Mintzberg 1979). The strong central control of the DOH had created uniformity across the AHSs by imposing a bureaucratic imperative. The standardizing influence is strongly felt in financial administration and IT infrastructure. It follows, therefore, that systems developed in one AHS should be compatible with the corresponding systems in other AHSs.

However, the incompatibility of organizational elements derives from the distance between the organizational configurations. Significant distances can exist between organizations which belong to the same constellation around an ideal type. Here, the AHSs had evolved differently and, due to local variations, the sub-unit configurations involved in the second and third cases were at some distance from each other — *“their procedures are the same . . . even then . . . each area still has its own idiosyncrasies. The Department of Health says the Chart of Accounts is this . . . we have got ten area health services and really there are ten different ways to adjust it”* (Manager, Business Systems, AHS B). The small variations meant that *“the structures were different and hence the data requirements were slightly different . . . we were looking for slightly different information and we attacked that in different ways”* (Computer Manager, AHS D).

The configurational distances created by the independent evolution of the AHSs varied across the three cases. DPR made available on-line information from the existing data source, HOSPAY, used by all the AHSs. It was an individual use innovation that provided information to individual managers to manage their own unit and did not involve interdependencies within or across task groups. In addition, it did not involve changes in any of the configurational relationships, such as among structures, processes and individual skills, that had evolved differently across the AHSs. Hence, the configurational distances involved in DPR are judged to be very low. In contrast, VMN addressed a payment process which involved interdependencies between the medical administration and finance departments. In addition, though the payments were governed by a common agreement covering all AHSs, the AHSs, and in some cases individual hospitals within an AHS, had developed their own slightly different versions of the payment process. Thus, VMN also involved changes in the configurational relationships, which varied across and within AHSs. Hence, the configurational distances involved in VMN, while small, are judged to be larger than those involved in DPR. Finally, MMT was to be a part of the AHSs' internal management processes, such as financial planning and control, which had evolved independently within each AHS. It required AHSs to clarify their internal structures and the allocation of costs to various departments. Thus, whereas VMN involved only two departments, MMT involved, potentially, the entire organization. The standardizing constraint across all AHSs was the reports required by the DOH, but beyond that the AHSs had had considerable autonomy in developing their internal management structures and processes. Consequently, the configuration of relationships among the structures, processes and individual skills involved in financial management varied considerably across the AHSs. Thus, the configurational distances involved in MMT are judged to be larger than in VMN, which in turn are perceived to be larger than those involved with the implementation of DPR.

We find that the pattern of cooperation closely follows the relative configurational distances involved. DPR, which involved very low configurational distances, experienced a very high level of cooperation. MMT and VMN, both of which involved larger distances than DPR, experienced low levels of cooperation.

"[DPR] was an excellent example of how you can cooperate because there wasn't much to haggle over, not too much to have differences of opinion . . . VMN was a little different and its acceptance in the health market has been ..different . . . MMT didn't get the acceptance . . . it was another step further away from the model we started with, which was DPR" (Computer Manager, AHS D).

We now return to the question we raised earlier, namely, how small or large a distance between two organizational configurations constitutes a barrier to cooperative development of information systems? The case studies show that, even among compatible configurations, cooperation is contingent upon configurational distance. Hence, compatibility is a necessary but not sufficient condition for information systems to be interorganizationally transferable. The bureaucratic imperative enforced by the DOH ensured that the configurational distances involved in adopting MMT and VMN were not large. However, even these configurational distances were salient enough to create barriers to cooperation.

The epistemological status of case study research rests on the clarification of the structures and generative mechanisms which are contingently capable of producing the observed phenomena (Tsoukas 1989). The cross-case analysis finds that increasing configurational distance leads to decreasing cooperation. The case evidence indicates that the generative mechanism behind this finding is that overcoming even small configurational distances requires significant managerial effort to cope with the required organizational change. The Computer Manager of AHS D explained their decision not to participate in the MMT consortium: *"Basically it was because you had to be designed the way they are in terms of their structures . . . your finances and patient services have to be set up in a particular way and ours are not. There would have been, from my perspective, reasonable change required to do that."*

If even small configurational distances can act as barriers to cooperation, how do we explain the sudden high cooperation in the VMN consortium three years after it went into operation? This occurred after on-going negotiations between the DOH and the medical officers resulted in a new agreement governing the contract between the VMOs and the AHSs. The new agreement made significant changes to the various payments made to the VMOs, requiring changes to be made to most of the existing VMO payment processes. It meant that *"we had to do something about our VMO payment system"* (Finance Director, AHS A). Non-VMN AHSs had little confidence in their ability to upgrade their existing systems to meet the requirements of the new agreement. While the development of a new payment system had long been on their agenda, this new agreement became the catalyst for an active search. In the new context, the cost of configurational change was not a barrier to change as an external

contingency had intervened to mandate all AHSs to incur that cost. The issue had shifted to which change to adopt, rather than whether or not to change.

Among the options available to non-VMN AHSs, VMN was especially attractive. VMN captured most of the data that was required to implement the new agreement and was a close fit to the baseline solution that the non-VMN AHSs had to develop. In addition to meeting the basic requirements and providing the support and other benefits that the consortium-based product offered, VMN was also a low cost option. For the few thousand dollars of entry fees for joining the consortium, the AHSs obtained immediate access to a product that *“to write from nothing would have easily cost a hundred thousand dollars . . . it was an easy decision”* (Finance Director, AHS A). However, VMN was still *“very raw . . . and didn’t have a lot of the complexities . . . [required by] the bigger Areas”* (Director Operations, AHS E). Significant modifications had to be made to VMN to accommodate the specific requirements of the new consortium members. Though the cost of procuring VMN was relatively low compared to other options, the cost of implementing the configurational changes still remained high. As the Finance Director of Area A remarked, nearly eighteen months after adoption, “[VMN] was a very difficult application to introduce because we do things differently . . . so we had to sort of change our practices . . . and we are still going through quite a bit of pain in that regard.”. That pain confirms that even small configurational differences are barriers to change.

5. IMPLICATIONS

5.1 Theory

The findings of this research, addressing issues of cooperation and configurational compatibility, are a specific case of the wider theory of IS adoption. Earlier research has identified a number of factors that act as barriers to change (Markus and Robey 1983; Robey 1984; Noble and Newman 1993). The findings of this study contribute to this stream of research in two ways. First, previous research suggests that incremental innovations are easier to implement than radical innovations, as they involve only minor changes to existing processes and structures (Dewar and Dutton 1986; Ettlie, Bridges and O’Keefe 1984). The implementation of radical innovations is associated with serious disruptions in structures, processes, operations, knowledge and morale. In contrast, the implementation of incremental innovations simply extends and augments established structures, processes and knowledge (Gallivan, Hofman and Orlikowski 1994). All three innovations considered here are incremental in nature, hence expected to require only incremental changes. However, this research finds that even incremental innovations are difficult to implement when they involve configurational change.

This finding extends the framework developed by Yetton and Johnston and Johnston and Yetton. Their framework suggests that information systems will be difficult to integrate when they are integral parts of organizations which are separated by large configurational distances. This research finds that even small configurational distances can create the same effects, and that high compatibility exists only across very small configurational distances. Thus, configurational distance may complement the incremental/radical nature of the innovation as a contingency variable predicting implementation difficulty. We conclude that the limited domain of high compatibility and the difficulty of implementing configurational change explains the virtual absence of cooperative relationships in this area.

Second, we speculate that configurational distance is a contingent variable which moderates the effect of managerial support and other implementation processes on adoption. The implementation of IS innovations, such as MMT and VMN, that involve interdependencies within and across work groups requires overcoming configurational barriers and various management interventions are needed to manage that process. In contrast, the implementation of IS innovations, such as DPR, that involve individual use only does not involve overcoming configurational barriers. Hence, the role of managerial interventions in the implementation of such innovations is weaker. The implementation of such individual use innovations is better understood using the diffusion of innovation perspective. Generalising these findings, we propose a contingent framework to underpin implementation research. In this framework, the implementation of IS innovations that involve only individual adoption can be explained within the diffusion perspective (Rogers 1962). This models end-user adoption as a function of perceived innovation characteristics (Schultz and Slevin 1975). However, when the change includes the management of configurational distances, the inclusion of both the diffusion perspective and the implementation process perspective (Swanson 1988) is required to explain adoption success and failure.

5.2 Practice

The implications for practice parallel those for theory. IS innovations involving configurational change are frequently rejected by managers. Those that are adopted are difficult to implement. These observations indicate not only the difficulties in making IT-based configurational change, but, specifically, the lack of competencies in making configurational changes. Researchers have generally focused on methodologies in system development (Wynekoop and Russo 1995), IT project management (Cleland and King 1983) and, now recently, the interpersonal skills of IS personnel (Markus and Benjamin 1996). We believe that these skills are insufficient to manage IT-enabled organizational transformation, and that competencies in managing IT-based configurational change are central to managing IT-enabled organizational transformation.

Interdependent systems, such as configurations, are resilient to change and require sustained managerial effort to effect the transition. In addition to the factors identified in implementation process research (Robey 1981, 1984; Markus 1983; Markus and Robey 1988; Noble and Newman 1993), competency in making configurational changes requires an understanding of the deep structure of the organizational configuration, the complex set of interdependencies that will have to be reconfigured, and the new individual and group skills that will be required to be developed in moving to another configuration. Managing configurational change requires, among other tactics, that the complex dynamic path to change be partitioned into manageable steps to control the risks involved in the transformation process. Gallivan, Hofman and Orlikowski and Yetton, Craig and Johnston (1995) provide some case illustrations of managing the transformation. However, further research needs to be conducted to understand the dynamics of configurational change.

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