

**Electronic Integration and Business Network Redesign:
A Roles-Linkage Perspective**

by

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1.0 Introduction:

The business environment of the 1990s is characterized by heightened competition, turbulence and transformation in firm and market relationships. Environments are changing rapidly due to innovations in products and services, market structures and technology, as well as shifting firm, industry and national boundaries (Antonelli, 1988; Drucker 1988; Johnston and Lawrence 1988; Powell, 1990; Scott Morton 1991). Information technology (IT) is seen as one force reshaping competition (McFarlan 1984; Porter and Millar 1985; Clemons and Row 1988; Venkatraman 1991).

Technologies affecting the structure of inter-firm relationships - electronic data interchange (EDI) and interorganizational systems (IOS) - refer primarily to IT platforms enabling information exchange between firms and trading partners, and to shared information systems applications providing greater systems functionality between firms (Cash and Konsynski 1985; Bakos 1991).

Electronic integration refers to strategic choices made by firms to exploit EDI and IOS platforms to transform business processes and relationships, the business network or the firm's business scope. The business network is defined as the structure of interdependent relationships between the activities of a given firm and those of other firms in its competitive environment which influence each others' strategies. In contrast to applying information technology to merely automate existing firm processes, electronic integration strategies impact beyond the firm's boundaries at the level of the business network.

Strategies for electronic integration can be used to redesign economic production and exchange relationships, the firm's organization of work, as well as to reshape firm boundaries (Clemons and Weber 1990; Malone, Yates and Benjamin 1987; Piore and Sabel 1984; Venkatraman and Kambil 1991). These transformations are widely acknowledged to be leading to a new form of industrial organization variously called the "network organization," the "flexible corporation" or the "virtual firm" (Drucker 1988; Miles and Snow 1986; Powell 1990; Eccles and Crane, 1988; Rockart and Short 1991). Firms

implementing these structures may also organize to work with a variety of external organizations through alliances, strategic partnerships and other modes of relational governance (Henderson 1990) to quickly bring products to market and to take advantage of changing markets by collectively leveraging each others' strengths (Johnston and Lawrence 1988; Ring and Van de Ven 1992; Bowman and Singh 1993).

For managers, turbulence and transformation in business environments gives rise to new strategic management challenges. As traditional buffers between the firm and its environment are reduced - examples include time, inventory, people and geography - managers must carefully position the firm to undertake specific activities within an increasingly complex business network to ensure continued growth and success of the firm. They must also select and build suitable governance mechanisms both to coordinate and to integrate the activities of the firm with those of its customers, suppliers and other organizations in the environment. A central management challenge for the 1990s, therefore, can be seen as the effective design and management of interdependence in business networks (McCann and Ferry 1979; Victor and Blackburn 1987; Rockart and Short 1989).

However, despite the increasing importance of the business network as a unit of strategic analysis, there are few conceptual frameworks or planning tools guiding analysis or defining planning agendas at this level. In addition, current theories, frameworks and tools are incomplete in helping decision makers manage the complexity of these emerging interdependent, networked environments. Shifting the level of analysis from the firm-level to the business network level thus adds new complexity to research on the effects of electronic integration and to the development of strategic planning tools for use by managers. This complexity arises from the multitude of strategies, organizational capabilities, and other factors defining a typical network that contribute to turbulence and uncertainties in a given firm's environment.

This paper develops a preliminary theory of the effects of electronic integration (EI) at the level of the business network. Building from a critical review of prior research on IT-enabled, electronic integration, we develop a model of network roles and linkages between roles, and suggest the roles - linkage model provides a useful, conceptual schema with which to study

electronic integration. We elaborate our model in a case drawn from the tax return preparation industry. Based on our analysis, we suggest guidelines for both theory development and case-based research into the effect of electronic integration on business networks. We conclude by discussing key advantages and disadvantages of our preliminary model, and suggest research extensions of the approach to facilitate further studies of networked organizations.

2.0 Electronic Integration and Business Networks: A Critical Review

Research on electronic integration at the business network level recognizes the pattern of interdependence among multiple economic actors and how roles and positions in the network are altered through information technology-based strategies. Selecting this level of analysis seeks to bring the "environment back in to the analysis" (Marsden 1982) and to understand the broader impacts of EI strategies on market structures, competition and the actions of firms in relation to their environment. Dill (1958) defines the organization's *task environment* as those activities and institutions that have an immediate influence on a firm's operations. The task environment includes customers, suppliers, competitors, shareholders and government agencies. In addition, the wider *contextual environment* of social, political, technological and demographic factors influences the longer term activities of the firm. The nature of both task and contextual environments critically influences the selection of strategies undertaken by the firm (Miller and Friesen 1980; Porter 1980).

Given the emergence of networked organizations and markets with multiple coalitions deploying competing IT-based strategies, the business network promises to be an attractive level of analysis. However, to date there are few systematic studies at this level. Prior studies generally examine the impact of information technology on the competitive dynamics of a focal firm or, in a few cases, a firm dyad (Venkatraman and Zaheer 1990; Nidumolu 1989). Analysis at this level considers IT's impact on the focal firm through one or another of its core business processes (e.g., order management; product development; distribution and logistics; sales and marketing). Alternatively, the pattern of business relationships between a given focal (producer) firm and customer is examined. Generally, there has been minimal consideration for how an electronic integration strategy could

alter the strategies of other firms in the environment or, more generally, the structure of the business network (Clemons 1992; Short and Venkatraman 1992). Alternatively, the research focuses on the organizational and technical issues related to the implementation of an EDI or IOS-based strategy (Copeland and Mckenney 1988).

Figure 1 provides illustrative examples of prior research organized into a classificatory framework which varies by level of analysis and reference frame for the research. The level of analysis dimension identifies the basic unit of analysis adopted for investigating the IT-based integration strategy. These include the *focal firm*, the *dyad* and *business network*. The reference frame identifies how the work was theoretically, empirically or otherwise approached. The four reference frames are *theories*, *conceptual frameworks*, *case research*, and *variance studies*.

Figure 1:
Selected Research on Electronic Integration: A Classificatory Framework

Reference Frame Level of Analysis	Conceptual Frameworks	Case Research	Variance Research
Focal Actor (Firm)	Parsons 1983 McFarlan 1984 Benjamin et. al 1984 Holland, Lockett & Blackman 1992	Vitale 1983 McFarlan 1986 Konsynski & Vitale 1988 Earl & Vitale 1988	Venkatraman & Zaheer 1989 Banker et al 1988
Dyad	Porter & Millar 1985 Malone et. al 1986 Barrett & Konsynski 1982 Cash & Konsynski 1985	Clemons & Row 1988 Clemons & Weber 1990 Hart & Estrin 1991 Short & Venkatraman 1992	Nidumolu 1989
Network	Clemons & Kimbrough 1988 Antonelli 1990 Malone et al 1987	Venkatraman ...& Kambil 1991 Antonelli 1988	
Underlying Theoretical Perspectives	IO Economics -- SCP Paradigm (Scherer, 1980) Information Processing (Galbraith, 1977) Coordination Science (Malone, 1989) Interdependent Value-Chains (Porter, 1985) Transaction Costs theory(Williamson, 1975) Game-theory (Bakos, 1987) Social Network theory (Cook et al, 1987); Resource Dependence (Pfeffer & Salancik, 1979) Political Economy (Benson, 1975; Piore & Sabel, 1984)		

Based on analysis of work included in this figure and related studies, we observe:

- *Theory development and conceptual frameworks identifying IT-based, IOS and electronic integration strategies and their effects on business networks are still in their infancy.*

We observe that while different theoretical perspectives can be adapted to the study of electronic integration - e.g. industrial organization (IO) economics (Tirole 1988; Williamson 1985), information processing and behavioral theories of the firm (Galbraith 1974; Mintzberg 1979) - these theories generally view firms and industries in discrete terms. This sheds little light on the structure of business networks and their relationship to blurring industry boundaries and inter-industry and inter-firm alliances. At the network level, resource dependence, political economy and organizational network perspectives (Benson 1975; Pfeffer and Salancik 1978; DiMaggio and Powell 1983; Piore and Sabel 1984) are possible frames for analyzing emerging network structures and processes. However, the lack of a dominant theoretical paradigm serving to integrate this work has produced a lack of consensus on key constructs and, similarly, a lack of consistent language to characterize network level phenomena. Moreover, unfortunately these general theories to date have yielded relatively few operationalizable and testable hypotheses. This adds to difficulties in establishing a cumulative body of theoretical and empirical knowledge. While conceptual frameworks are valuable in the initial stages of theory development, we note a *weak link* between existing frameworks and relevant theoretical perspectives or empirical data at the business network level.

- *There is little empirical research on electronic integration at the business network level. Indeed, suitable approaches and analytic methods for studying electronic integration remain unresolved.*

Two different frames for empirical research were identified: case-based and variance research. Case research uses single or multiple case studies to investigate emerging phenomena. Case studies are generally focused on understanding 'leading-edge' companies and are especially useful for studying novel phenomena. Following Bonoma (1985) and Yin (1981), we distinguish between cases prepared for pedagogical purposes and cases for research purposes. The latter represent inductive approaches to understanding novel phenomena and constitute a basis for refuting or constructing conceptual frameworks and theories. We note to date there are relatively few instances of such research at the level of the business network. (See Figure 1).

Variance research refers to empirical studies of electronic integration through multivariate analysis of survey, experimental, archival and other quantitative data. Generally variance research is based on a set of theoretical arguments and propositions used to generate hypotheses. Hypotheses are then tested through the collection of data and the application of statistical methods to establish the degree of support for the hypotheses. Multivariate techniques can also be used to infer structures in data. For example, network and cluster analysis techniques can be used to identify patterns of inter-firm relationships and to characterize the structure of networks (Luke et al 1989). However, research to date is sparse and has not generally adopted these methods for inferring patterns or testing hypotheses. This is partially explained by the increased complexity of undertaking research at the network level. Data collection is more expensive than at the level of the focal firm or dyad, and difficulties arise with respect to access and conduct of research across multiple organizations. In addition, methods for theory testing in these settings are unresolved.

Given the importance of understanding EI-based strategies and the business network as a unit of analysis, it will be necessary to develop efficient approaches to inquiry and theory development. This requires consensus on key constructs and their representation, as well as the refinement of methods to manage the complexities of case development and/or variance studies. Careful selection of constructs and representation schemes is especially crucial to the development of a multi-level theory (Rousseau 1985). In the next two sections of this paper we develop the roles-linkage model as a representation schema to support research and theory development at the network level. We then report results on applying this model in the tax return preparation marketplace.

3.0 Representing Business Networks: The Roles-Linkage Model

We argue that a roles-linkage model is a useful conceptual schema for representation and analysis of business networks. The model represents the business network in terms of two abstract constructs: *roles* and *linkages*.

Roles

Roles are distinct value added activities undertaken by firms in the network. Using the notion of technological separability as a basis for business segmentation (Gort 1962), *roles can be defined as technologically separable, value added activities in a given business network*. Technology is defined as inclusive of specialized types of applied knowledge and equipment (Perrow 1986; Nelson and Winter 1982).

In any business network we can identify firms that provide value by undertaking distinct value adding activities or roles. For example, traditional insurance firms add value by combining money management with risk pooling and claims management services. Each of these activities requires different technologies, both in terms of knowledge and skills as well as equipment. Hence we can consider the traditional insurance firm as combining these roles into one organization through vertical or horizontal integration. Alternatively, firms may create value in a business network by undertaking a single core role or by coordinating many different roles using various modes of governance.

Sociologists and organization theorists have used role abstraction for classification of individuals or organizations into common groups to simplify data collection and analysis (Banton 1965; Nadel 1957; Barley 1990). Occupational roles typically classify individuals on the basis of non-relational attributes such as activities that require different skills, knowledge or task behaviors. In defining our concept of *business network role*, we expand the common role concept beyond individuals to organizations in an economic system. Like occupational roles, firms undertake a variety of different functions or value added activities in a given business network. These can be delineated based on the skills and applied knowledge required for the tasks undertaken to accomplish the activity.

Linkage

Linkage refers to different ways of managing economic interdependence across value adding roles in the network. Adapting work by Williamson (1975) on economic governance and Galbraith's (1974) work on information processing organizations, we specify six different classification

types for linkages in a business network.¹ These are: simple market exchange, standard linkage, specialized linkage, customized linkages (alliance and hierarchy), and mandate. These forms of linkage reflect different models of coordinating and influencing economic relationships between network roles.

Simple Market Exchange

A simple market exchange refers to mechanisms typically used to manage infrequent transactions characterized by low levels of relation specific investments between a buyer and a seller. Typically the buyer and seller negotiate the price and exchange a standard or well-specified good of relatively low value. The potential for opportunism is attenuated by the existence of alternative suppliers for similar or equivalent goods. Thus the market mode of governance is used to manage the exchange relation. In repeated transactions by actors across roles the terms of the exchange relation is typically redefined for each transaction between the parties.

Standard Linkage

A standard linkage refers to mechanisms typically used to manage frequent and routine transactions of relatively low value by actors across roles. Relationship specific investments are relatively low, but the relationship is more routine than a simple market exchange and the terms of the agreement are generally not differentiated for each transaction between parties. The two parties therefore commit a low level of investment for administering repeated transactions. The existence of alternative suppliers and legal recourse attenuates opportunism. A standard linkage is exemplified by the use of standard contracts such as the agreements that govern repeated credit card transactions. Again a market mode of governance is typically used to govern these transactions.

Specialized Linkage

¹ This classification framework builds on work completed by Kambil in his doctoral dissertation (MIT Sloan School, December 1992), and prior work by Venkatraman and Kambil, 1991. We relax the assumption of governance by purely economic forces in a forthcoming article (Short and Kambil, forthcoming).

A *specialized linkage* refers to mechanisms used to manage complex, infrequent transactions that require a significant *a priori* relationship providing specific investments or the acquisition of specialized information for valuation. Unique and specialized resources are committed to the transaction by at least one of the parties, as in the case of a transaction between a real estate holding company and a developer. To attenuate exchange risks, complex contingent contracts or specialized third party arbitration and intermediation structures are specified and implemented between the parties. In addition, complex coordination mechanisms may be deployed between parties to the exchange. These structures are unlikely to be modified frequently during the course of an exchange relation.

Customized Linkage: Alliance or Hierarchy

Customized linkages are used to manage frequent complex and long-term transactions that require relation specific investments and adaptive behavior by parties across roles. This requires frequent modification of the exchange relation in terms of the structures and processes implemented to coordinate and influence the relation. Prior work by Williamson (1979, 1985) has identified two principal modes exist for governing these types of exchange relations: we denote these as alliances and hierarchies.

In an *alliance* or partnership both parties have committed specialized assets to the relationship and share risks. Typically, authority is decentralized between the two parties for resource allocation and dispute arbitration. To coordinate activities, the parties may implement complex bilateral coordination mechanisms such as joint strategic and operational planning (Henderson 1990). These structures and processes are modified during the course of the exchange to respond to changing governance requirements.

In a *hierarchy*, authority is centralized to coordinate and influence activities across roles, this authority based on the ownership of the assets of production or the ownership of information assets. Complex and/or specialized routines and mechanisms are deployed in order to coordinate and influence activities between roles. Hence these types of linkage are appropriate for complex transactions that extend over long periods of time and are characterized by significant uncertainty.

While ownership provides the general means for control, not all vertically- or horizontally-integrated firms manage actors in different roles through a hierarchy. Indeed actors in different roles within the same firm may be allowed significant autonomy over the design of their transactions. Hence hierarchy is not synonymous with vertical or horizontal integration.

Mandate

Mandates provide another form of managing interdependence. In mandated linkages, there need not be a direct exchange of economic goods between parties. Instead, actors in one role can influence resource allocation by those in other roles through legal or professional authority, and the ability to make rules over the behavior of those in other roles. For example, physicians have traditionally had a strong mandate over the ability of pharmacists to sell prescription medicines. Mandates may be denoted as strong or weak.

Using the above definition of roles and linkages, a business network can thus be represented as a matrix or grid that specifies the *roles-linkage model*. The grid axes correspond to network roles, and the values within each cell of the matrix represent the type of linkage between roles. Completing the matrix provides a graphical representation of the dominant or critical modes of relationships between roles in the network. While alternative schemes for representing networks are possible, the roles-linkage model isolates and represents the business network in terms of a few key constructs, excluding unnecessary detail. This reduces the complexity of analysis in contrast to traditional network analysis which typically examines all direct and indirect ties between firms in a given network, without simplification through abstraction.

Figure 2 presents an idealized roles linkage matrix for a business network with five generic (simplified) roles: product producer, service producer, service integrator, network provider (electronic network), and buyer.

Figure 2: Idealized Roles Linkage Model for Simplified Product Service Exchange

ROLES	Product Produced	Service Producer	Service Integrator	Network Provider	Buyer
Product Producer					
Service Producer	Linkage Type				
Service Integrator	Linkage Type	Linkage Type			
Network Provider	Linkage Type	Linkage Type	Linkage Type		
Buyer	Linkage Type	Linkage Type	Linkage Type	Linkage Type	

4.0 Applying the Roles-Linkage Model: The Tax Return Preparation Marketplace

We now apply the roles-linkage model to analyze the tax return and tax filing marketplace. This is used to develop a preliminary theory into the effects of electronic integration at the level of the business network. A discussion section follows which generalizes observations from the case example to other business network settings.

4.1 Approach to Data Gathering and Roles-Linkage Operationalization

Data was collected through interviews with over 40 government and industry executives, complemented by extensive searches of archival material obtained from both the Internal Revenue Service and tax return preparation firms (example: H&R Block). Role-linkage classifications were inferred from interview data, and review of government and company documents,

including business and IT-strategy planning documents, that analyzed specific information intensive businesses. We compared our own classifications of roles and linkages with those of a panel of government and industry executives who were asked to identify basic functional and value added activities in their respective industry networks and to construct network roles as they saw them. To simplify our analysis, roles were not specified to the finest level of granularity at this stage of work. Instead, key roles were defined by a common aggregation of functions requiring a distinctive combination of technology and knowledge. Furthermore, our definition of the tax preparation marketplace is bounded by a collection of roles that is not exhaustive but is based on identifying the primary strategies of existing firms and the various products and services that they provide in the marketplace.

Linkages were classified based on descriptions of inter-role relationships in the trade press and interviews with the same government and industry executives. The following criteria were used for classification:

- the extent of relation-specific investments between actors across roles
- the nature of contracts across actors
- the distribution of authority for resource allocation and regulation of the exchange

The classification rules are summarized in the decision tree below:

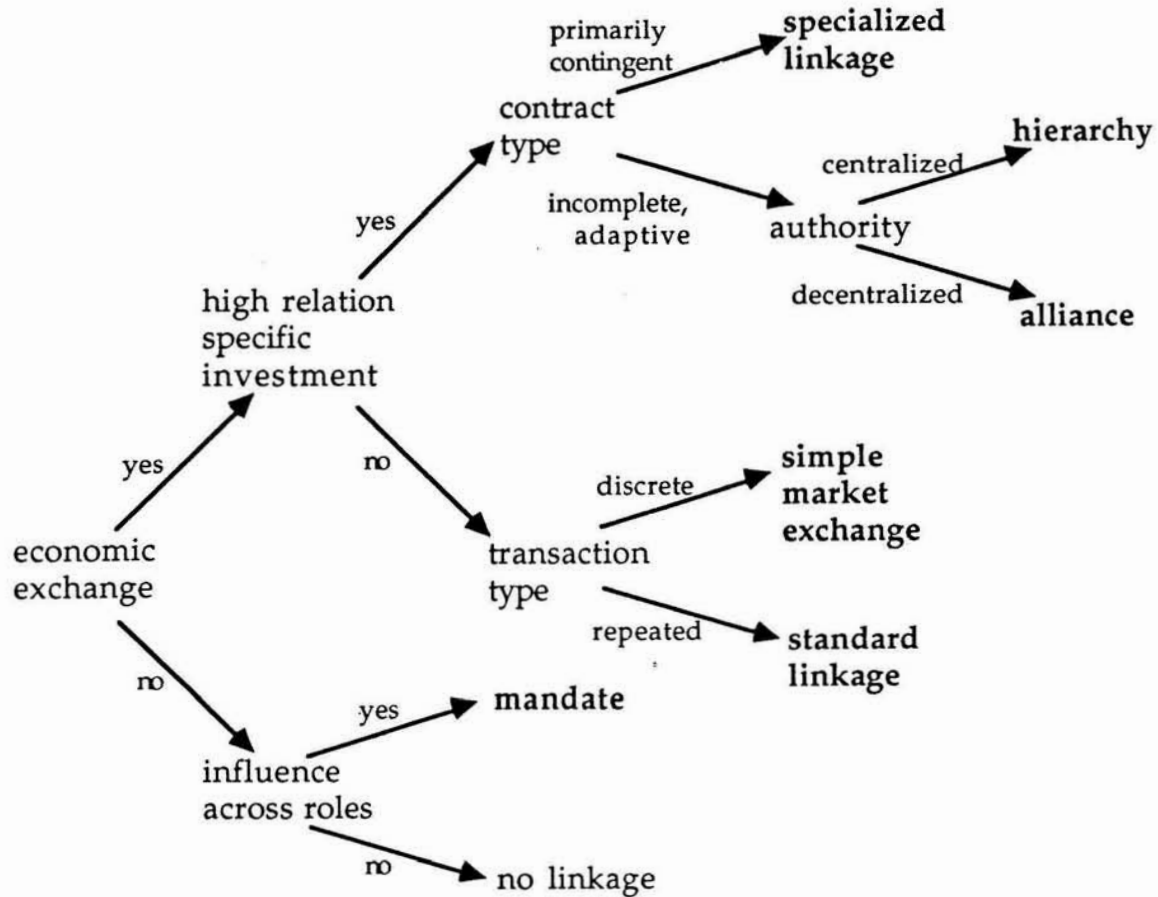


Figure 3: Specifying Linkage Types

4.2 The Tax Return Preparation Marketplace

In 1990 the Internal Revenue Service (IRS) made electronic tax return filing available nationwide. In simple terms, electronic filing allowed *return preparers* or *return filers* authorized by the IRS to electronically transmit an individual's return to the IRS using a pre-authorized electronic transmission protocol.² The filer can obtain confirmation of receipt and arrange for direct deposit of any refund.

² The evolution of the IRS electronic filing initiative is discussed in greater detail in N. Venkatraman and A. Kambil, "The Check's Not in the Mail Strategies for Electronic Integration", *Sloan Management Review* 32 (Winter 1991), pp. 33-43.

The IRS initiative, which we view as a technological discontinuity in the marketplace, can affect the over 100 million individual taxpayers who file Form 1040 and related schedules annually with the IRS. Taxpayers generally prepare their own returns, or use a professional tax return preparer such as H&R Block, TaxMan, or an independent tax accountant. Before the electronic filing initiative, returns were mailed in, processed by the IRS, and a refund (if due) was mailed back to the taxpayer. About 75 million taxpayers receive an average refund check of \$900 in a given tax year.

Over 40 million taxpayers use professional tax return preparation services. The marketplace -- highly fragmented at the local level -- can be broken down into four tiers:

- Nationwide, "commodity services" tax preparation firms. H&R Block leads this segment with over one third of the market.
- Nationwide, professional accounting firms providing a wide range of accounting, investment, and tax advice services to their clients (examples: Arthur Andersen, Coopers & Lybrand, Price-Waterhouse, etc.).
- Boutique investment services firms, offering custom services for high-income clients.
- Individual and/or small CPA services firms, generally specializing in tax advice and tax return preparation services.

Prior to electronic filing, the tax preparation marketplace can be represented as a business network consisting of linkages among six roles: taxpayer, return preparer, mail carrier, banking services, the Internal Revenue Service and retailer. Typically, individuals, who are both taxpayers and consumers, file returns with the IRS. They may use a tax return preparation service to prepare the return and a mail carriage service such as the US Post Office or a value-added service such as Federal Express to mail the return to the IRS. Once processed, a refund check (if due) was mailed. The taxpayer as a consumer of services could deposit the money for later use, or cash the check and use the money to purchase goods from a retailer. The banker role combines check processing with savings.

Figure 4: The Tax Preparation Market Prior to Electronic Filing

	taxpayer /consumer s	return preparer	mail carrier	IRS	banker	retailer
taxpayer /consumer						
return preparer	M,SC					
mail carrier	M,SC					
IRS	MD	MD				
banker	M,SC					
retailer	M	SpC				

Key: M = market; SC= standard contract, SpC = specialized contract, A=alliance, H=hierarchy, MD = mandate

We define the typical linkages between roles in Figure 4 above. For example, the linkage between the IRS, the tax return preparer and the taxpayer is defined as a mandate. The IRS specifies the rules by which taxpayers and tax preparers prepare and submit returns. The linkages between the taxpayer and other roles are defined as market exchanges or standard contracts. Where taxpayers have many alternatives, they may select service providers based on quality of service and market prices. Alternatively, the exchange may be governed by a standard (undifferentiated) contract such as for mail service. The only specialized linkage (SpC) is between return preparers and retailers. Some retail firms permitted tax return preparers to operate on their premises during the tax filing season. For example Sears and H&R Block use such a cooperative agreement to encourage taxpayers and consumers to visit stores in an otherwise slow season for retail sales.³

The IRS's electronic filing initiative and the subsequent evolution of electronic fund transfers between different roles in this marketplace has led to major transformations in the business network. The evolving tax return

³Interview with Mr. Thomas Block. An example is the relationship between Sears and H&R Block.

services business network is illustrated in the roles linkage matrix presented in Figure 5. We analyze this evolution in terms of: expansion of the network; coordination across roles to introduce new products and services; shifting the locus of value added in the network; and evolution to more specialized linkages.

Figure 5: Emerging Tax Return Services Business Network

	tax paye r	ret. prep	mail	IRS	bank	reta iler	e- filer	Net prov ider	soft ware	Infor mati onb	cons. credi t	tax plan	Stk Brok er
tax pay or													
retur n prep	M,S C,Sp C												
mail	M												
IRS	MD	MD											
bank	M,S C												
reta iler	M	A											
e- filer	M	H, A, SpC		MD	SC	H, A							
Net prov ider		A, SpC		MD	SC	SC	SC, A						
soft war e	M	H, A, SpC		MD		SC	SC, A						
Infor mati on Brok er	SC	H, SpC											
cons. credi t	SC, SpC	A, SpC			H,A	H.A							
tax plan	SpC	H			A, H	A							
Stk Brok er	M	SpC, A			A, SpC								

KEY: M = market; SC= standard contract, SpC = specialized contract, A=alliance, H= hierarchy, MD = mandate

4.3 Expansion of the Business Network

Electronic integration has created new, strategically relevant roles in the business network: electronic filer, communications network provider, software vendor, information broker, consumer credit provider, tax planner, and investment broker. The electronic filer receives the tax return from the taxpayer in paper or electronic form, and transmits it electronically to the IRS. The electronic network provider provides the value-added network (VAN) supporting data transmission between the IRS and electronic filer. Software vendors provide tax preparation and/or communications software supporting these transactions. These roles can be seen as the *minimum role set* required to implement the simplest form of electronic filing in the business network, becoming important as a direct consequence of the IRS's electronic filing initiative. Other roles combine with this *minimum set* to provide financial, information and related value added services. These are: the consumer credit role which provides loans to taxpayers; the tax planner role which provides financial and tax liability advice; and the investment broker role which sells securities and bonds to the taxpayer. Finally, the information broker role sells information to other parties in the network⁴. These new roles provide new sources of value in the network.

4.4 Coordination Across Roles to Implement New Products and Services

New and existing roles may be combined to provide new products and services, reshaping the business network and competition across markets. For example, H&R Block's Rapid Refund program - which promises taxpayers a faster refund than if they filed on paper - combines three roles - electronic filer, communications network provider, and software provider, to introduce a new product in the market. On a smaller scale, individual taxpayers or small-business return preparation firms may use a specialized electronic filer business such as Instatax or Nelco Inc. (Bartolik, 1990), which provide electronic filing through specialized contract or partnership with different return preparers, software vendors and communication network providers (for example, GE Information Services and CompuServe both provide value added network services for tax filing). Indeed, these organizations are

⁴Note that while many of these roles exist in other business networks (example: investment brokers in financial services), these roles did not exist previously in the tax return preparation market.

beginning to offer tax preparation and electronic filing online to their individual subscribers (Meadows, 1990, Ojala, 1989).

Another new product in the business network is the instant refund, or refund anticipation loan. Here the tax preparer and credit provider link to implement electronic filing in combination with a loan against the anticipated IRS refund. When the electronic return is transmitted, it is checked by the IRS to verify accuracy. This verification enables the credit provider to issue a loan or "instant credit" against the security of the anticipated IRS refund. The repayment of the loan may also be secured as the electronic return can mandate the IRS to deposit the refund directly into the credit provider's account. For example, Dollar Dry Dock Bank of New York offers a three to five day no interest refund advance in combination with electronic filing service to customers for a fee of \$45. It offers non-bank customers a new bank account for using this service, thereby increasing the number of bank clients. For an extra fee, the bank also provides a tax preparation service (Dollar Dry Dock Bank, 1989). The instant refund is one extension of the bank's traditional core business.

More generally, electronic integration enables firms to extend their influence across markets by leveraging information assets acquired in one market to differentiate products and services in another. For example, the tax preparer, planner, and investment broker roles can be linked - tax information provided by a taxpayer to a return preparer allows the tax planner to create customized investment portfolios designed to reduce future tax liabilities. By linking these roles, an investment broker can then sell these securities to the taxpayer. American Express's IDS unit, for example, coordinates across these three roles within the American Express organization to provide various services to clients.

Another example of coordinated, across market competition is illustrated by retailers who provide consumer credit through instant refund products linked to store cards. Specifically, retailers in partnership with a return preparer and the store credit card operation may provide discounts on tax preparation and filing, or store discounts if the refund is directed to the store credit card. Such initiatives transform and create incentives for tax payers to purchase products from a specific retailer. These emerging linkages may lead

also to more complex business ties between retail organizations and tax preparers, transforming the relationship from a specialized contract to a partnership.

5.0 Preliminary Results and Insights from a Roles-Linkage Perspective

Our case study and classification scheme gives rise to the following insights about the effect of electronic integration on business networks. We discuss these observations in terms of transformation in network roles, network linkages, and emerging network structures.

5.1 Transforming Network Roles through Electronic Integration

Electronic integration creates technological discontinuities in information processing activities underlying roles, and transforms skill requirements and routines for performing role tasks. Changes in skills and organizational competencies can change the population of individuals and organizations occupying specific roles.

Stinchcombe (1990) identifies a worker's skills as the set of routines and the principles of decision to select from among routines, or, the ability to construct new routines for different tasks. Highly skilled workers know more routines and selection principles, and may also construct new routines. Less skilled workers know fewer routines and principles. Extending Stinchcombe's definition of skills, highly competent organizations can be seen as those with the knowledge and capability to select from and execute a large number of strategies. Observations from our case study suggests that electronic integration has different effects on roles requiring different levels of individual or organizational information processing skills.

For example, in the tax preparation case information technology was applied to automate information processing intensive routines requiring low levels of skill in tax preparing. Here, automation devalued role providers whose primary contribution had been low skilled information processing work.

For roles requiring medium levels of information processing skills (tasks with high variety and high analyzability) , information technology was applied to match routines to tasks and to coordinate organizational capabilities. In this instance, electronic integration served to augment the performance and value of role providers. For example, decision support systems and databases have been introduced into investment services firms providing advice to clients on what investments to make. Here IT helps financial advisers design custom investment plans for individual clients.

For information processing roles characterized by low task analyzability and high task variety , the effect of electronic integration is to support the construction of new routines to formalize tasks and to coordinate the application of organizational expertise to tasks. In the case of specialized tax planning for higher income clients, for example, firms such as Coopers & Lybrand have invested in expert systems (ExperTax) to formalize tax planning and investment routines and to structure investment advice along a common set of business rules used to define the expert system. This formalization of routines, in large measure supported by information technology, may also be seen to influence individual discretion over job definition and role task activity (Zuboff, 1984).

5.2 Transforming Network Linkages through Electronic Integration

Our case points to two general forms of transformation in business network linkages: a move to distributed, asynchronous links; and investments in technologies supporting specialized, role critical links. We note also the potential for linkages to shift back and forth from contract-based links to mandated links given some network circumstances.

First, as the cost of information technology falls it can be used to intermediate coordination among network participants in different organizations and roles. For example, tax preparers send electronic returns to specialized electronic submission points (electronic filers). Filers maintain distributed, asynchronous coordination between the IRS and other network participants.

Second, specialized investments in IT to support linkages across network roles shifts the relationship between participants and roles toward more differentiated and/or frequent links. For example, in the tax preparation network, network linkages are being shifted from discrete and undifferentiated links towards more unique and frequent longer term linkages across organizations or individuals in different roles. For example, H&R Block implemented a Compuserve service to address tax related questions from customers, enabling the company to increase customer contact and ultimately augmenting the visibility of their services⁵.

Third, we observe the potential in this marketplace for electronic integration to change the principal-agency relations across roles by altering the mechanisms for the selection, monitoring and control of participants in different roles. Specifically, the specification of skill-based, tax planning and investment services and the prospects for periodic review of the effects of these services on customer financial planning enabled by electronic integration can shift the nature of control in principal agency relationships (Eisenhardt 1985). Given increasing interconnection among customers (taxpayers), service providers, and retailers, for example, individual taxpayers may themselves develop routines for access to and use of tax services among different players in the market. This, in turn, will change the mandate or authority of principals in a specific role over agents (customers) in other roles. We observe, however, that the form of these links may shift repeatedly as network circumstances change (firms may alter product/service strategies, taxpayers may choose to integrate, or not integrate, their use of services, etc.).

5.3 Electronic Integration and Emergent Business Network Strategies

We have noted earlier the impact of the IRS initiative in creating a technological discontinuity in the marketplace that altered the available set of firm strategies for competitive advantage. Adapting Ansoff's (1965) definition of strategy in terms of a firm's product-market posture, we identify firm

⁵Subscribers of Compuserve can get immediately-useful tax tips, tax advice, tax news, and a list of important income tax dates by typing "Go HRB" on the network. This linkage encourages Compuserve users to use Block's tax preparation services, and enables the tax preparer segment of the company to maintain an ongoing linkage with its customers.

strategy in terms of the roles occupied in the business network and linkages between roles. A variety of strategy options were identified in the IRS case.

Consistent with prior studies of electronic integration (Porter and Millar 1985; Rockart and Scott Morton 1984) we observed that firms undertook electronic integration strategies for product and service differentiation through technology and information leverage. Technology leverage strategies enable differentiation by exploiting the performance/cost improvements in information storage, communications, processing and input/output (Venkatraman and Kambil 1991). Information leverage strategies enable differentiation through using new information made accessible by information technology applications to alter business processes, products and services. Differentiation strategies are fundamental to creating disequilibrium in markets and enabling firms to achieve higher than normal profits (Porter 1980; Tirole 1988).

For example, technology leverage enabled certain tax return preparers to differentiate their product from other preparers by offering Rapid Refund as a value added product. A second option was to coordinate across different roles and product-markets to exploit product complementarities and externalities. Tax planning and tax return preparation roles, for example, provide complementary products. Information leverage strategies enable and drive the combination of both roles.

Coordination across roles was also used to exploit weak consumption externalities across markets. For example, American Express's IDS unit leverages information assets gained from tax preparation into the sale of tax free securities. This strategy exploited consumption externalities across two weakly coupled markets (tax return preparation, selling securities) through internal coordination leveraging electronic integration. Another example is the weak tie between tax refunds and their use by taxpayers for consuming goods. Retail firms can benefit from this weak interdependence and positive externality by offering instant credit on a store credit card against anticipated refunds on tax returns. This way retailers convert a weak interdependence between activities into a strong interdependence. We note that the exploitation of weak interdependencies across markets and roles is a key new source of competitive advantage from electronic integration. As firms must

incur extra costs for such coordination it establishes barriers to entry⁶ for new firms and also increases the scale and capital requirements of existing firms in the inter-related markets.

Finally, we observe that firms will seek to develop strategies which effectively combine information leverage with technology leverage as a means for electronic integration. For example, we note a shift in this marketplace from technology leverage (e.g., the Rapid Refund product) to strategies combining technology and information leverage (e.g., the coupling of rapid refunds with product sales by retailers, etc.). In contrast to technology leverage strategies which may be quickly matched by competitors (Benjamin et. al., 1988), information leverage strategies increase in value as more useful information is acquired and utilized as an asset by the firm.

5.4 Electronic Integration and Business Network Transformation

The net effect of firm-level strategies attempting to shift roles and redefine linkages in the business network is to shift network boundaries. As a consequence, new information processing based roles become strategically relevant, creating new sources of value. New linkages can be seen to emerge to integrate these new roles into the network.

The expansion of roles and linkages is exemplified by changes observed in the tax preparation marketplace. We have earlier noted the emergence of new roles and suggested factors which influence role creation and role differentiation. A factor not discussed in detail here, but suggested by observations from our case and extant work in network analysis, is the relationship between network expansion and *network complexity*. We note the increasing complexity of the pattern of inter-role linkages in the tax preparation network, with firms diversifying and/or acquiring equity positions in these new roles, and developing linkage strategies across roles

⁶Prior examples on the role information technology as creating industry barriers focused on economies of scope or scale in information processing (see Porter and Millar (1985) and Clemons and Row (1987)).

(see discussions of American Express's IDS unit and strategies for technology and information linkage above). While we have not attempted to systematically address the issue of network complexity in our analysis here, we suggest it as an important dimension to consider for those interested in mapping network expansion and/or contraction, and the dynamics of firm structure and strategies in business networks.

6. The Roles-Linkage Perspective: Evaluation and Research Extensions

6.1 Evaluation

The case study and our observations in applying the roles-linkage perspective illustrate its potential as an abstraction tool for studying business network transformation. Our findings identify how electronic integration alters roles, linkages, business strategies and the structure of business networks.

Our analysis suggests ways in which electronic integration makes available new information and information processing resources in the business network. Firms reorganize networks to utilize and take advantage of these resources. Specifically, technology and information were used to construct new routines or automate existing routines, thereby altering the skill requirements and population of role providers. Routinization served to reduce costs or improve the quality of service or product. New information resources, the routinization of roles, as well as coordination capabilities enabled new ways of managing interdependence between roles. Hence the pattern of linkages between roles moves toward more complex, information intensive mechanisms.

Electronic integration also provided firms with new strategy options for differentiating products and services through information and technology leverage. Firms can also engage in new modes of competition through coordination and exploiting complementarities across different product-market segments and roles. The exploitation of consumption externalities across previously discrete markets also serves to create barriers to entry. Exercising these strategies leads to transformation of the business network - increasing its size and complexity as defined by the number of strategically relevant roles and pattern of linkages across roles. Some roles become less

important as new information processing based roles become a strategic asset in the business network.

Our initial motivation for developing a roles-linkage abstraction was to focus and simplify network analysis. However, we note that research at the level of the business network still remains complex. Our study of the tax preparation network required defining thirteen roles, with consideration for over thirty-five linkages. Moreover, field data collection was a challenge. While standardized interview protocols could be followed in most cases, the large number of business entities and linkages involved required significant field time. Thus while the roles-linkage model provides a basis for simplifying traditional network analysis, many challenges remain toward building empirical knowledge. Below we discuss briefly the utility of the roles-linkage perspective and suggest guidelines for research extension.

6.2 Theory and Method

Our work highlights a number of theoretical and methodological issues in the study of emerging complex organizations and the role of information technology in shaping the strategies and structures of these organizations. There are two problem levels for theory development on how electronic integration and other discontinuities affect complex business networks. The first relates to the model of inquiry in use to study the phenomena. Given the novelty of electronic integration as a means of transforming business networks, and the lack generally of a dominant research paradigm guiding theory development, systematic research cases and cross case analyses (Eisenhardt 1989; Yin 1981) are especially promising as a basis for constructing preliminary theories and/or conceptual frameworks of electronic integration. Specific propositions derived from empirical cases can then be tested across multiple settings using variance techniques to build a cumulative body of knowledge. Our IRS case identifies a number of preliminary effects of electronic integration at the network level to this end. Role linkage models of other settings can now be utilized to see if these patterns hold in different contexts.

The second problem level relates to the implementation of the case study method and the roles linkage abstraction for network representation. The

critical issues are: knowledge elicitation techniques to develop role-linkage models, computational tools to manage network complexity and create views on the data, and metrics/statistics for network characterization and analysis.

In this study we used interviews and archival data to build preliminary role-linkage models. Management process techniques are required to elicit senior executive knowledge of the business network and to efficiently specify strategically relevant roles and linkages. While our initial techniques centered around both open ended and semi-structured interviews, we propose and are now developing individual and group techniques to formalize role construction. Similarly, we are building and validating survey instruments to identify different linkage types in networks. In essence we seek to develop instruments which enable researchers, industry experts, and other informants to quickly specify network structures using consistent, cross-validated methods.

Finally, given the complexity of the many roles and linkages needed to develop a network model, we are also constructing a computer-based tool for collecting, storing and displaying network-level data. A key design goal is to enable researchers and managers to visualize network structures and to contrast the role and linkage-based strategies of different organizations. As part of this effort, we are building on prior social network analysis techniques and developing appropriate metrics and statistics useful for characterizing network level data, and for making strategy comparisons. It appears that given the cost of collecting data and the lack of timely information from industry databases and business reporting systems, it is best to start by building cognitive models of strategy representation in networks. However attractive this option, though, much work is needed to develop appropriate methods to integrate the views of multiple network data informants and to test the reliability and validity of cognitive models of strategy.

7. Conclusions

Managers in the increasingly turbulent business environments of the 1990s will be required to manage interdependencies between firms that cut across traditional industry boundaries. Indeed, as electronic integration reduces buffers between the firm and its environment, managers must design new

organizations that redefine their firm's roles and relationships with other actors in the business network. As complex new organizations are developed, the business network is an increasingly important level for the study of how electronic integration shapes organization structures and strategies. However, many methodological issues remain in making network analysis tractable from a research and management perspective. The roles-linkage model provides a useful heuristic for constructing models and analysis at this level. It focuses research and management attention on the way firms create value in networks through information technology based roles, and helps to identify firm-level strategies for linkage across roles.

Increased understanding of these more complex forms of network roles and relationships should prove useful to policy makers setting strategies for investment and product and service positioning in emerging business networks. Firms successful in managing this increasing complexity will gain relative advantages over those firms who cannot.

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References

- 1) M. Aiken and J. Hage. Organizational Interdependence and Intra-Organizational Structure. *American Sociological Review*, 33, December (1968), 912-930
- (2) H. E. Ansoff. *Corporate Strategy*, New York: McGraw Hill, 1965.
- (3) C. Antonelli. The Emergence of the Network Firm. In C. Antonelli,(eds.), *New Information Technology and Industrial Change: The Italian Case*. Dordrecht: Kluwer Academic Publishers, 1988
- (4) J. Y. Bakos. Information Links and Electronic Marketplaces: The Role of Interorganizational Information Systems in Vertical Markets. *Journal of Management Information Systems*, 8, 2 (1991), 31-52
- (5) J. Y. Bakos, Inter-Organizational Information Systems: Strategic Implications for Competition and Cooperation. Ph.D Thesis, MIT Sloan School of Management, 1987
- (6) R. D. Banker and R. J. Kauffman. *Strategic Contributions of Information Technology: An Empirical Study of ATM Networks*. Minneapolis, Minnesota, ICIS, 1988
- (7) M. Banton. *Roles: An Introduction to the Study of Social Relations*, New York: Basic Books Inc, 1965.
- (8) S. Barley. The Alignment of Technology and Structure Through Roles and Networks. *Administrative Science Quarterly*, 35, March (1990), 61-103
- (9) S. Barrett and B. Konsynski. Inter-Organizational Information Sharing Systems. *MIS Quarterly*, Special Issue, Fall (1982),
- (10) P. Bartolik. Turbotax Makes Electronic Filing a Viable Option. *Computerworld*. March 26, 1990, 1990, 55
- (11) R. B. Benjamin, D. W. DeLong and M. S. Scott Morton. The Realities of Electronic Data Interchange: How Much Competitive Advantage? Management in the 1990s Working Paper. #88-042. MIT Sloan School of Management, January, 1988
- (12) J. K. Benson. The Interorganizational Network as a Political Economy. *Administrative Science Quarterly*, 20, June (1975), 229-248
- (13) T. V. Bonoma. Case Research in Marketing: Opportunities, Problems, and a Process. *Journal of Marketing Research*, 22, (1985), 199-208

- (14) J. I. Cash and B. R. Konsynski. IS Redraws Competitive Boundaries. *Harvard Business Review*, 63, 2 (1985), 134-142
- (15) J. Child. Information Technology, Organization, and the Response to Strategic Challenges. *California Management Review*, Fall (1987),
- (16) E. K. Clemons. Information Technology and the Changing Boundary of the Firm: Implications for Industrial Restructuring. Working Paper. 92-09-02. Department of Decision Sciences, The Wharton School, University of Pennsylvania, Philadelphia, Pa., 1992
- (17) E. K. Clemons. *MAC -- Philadelphia National Bank's Strategic Venture in Shared ATM Networks*. Hawaii, 1989
- (18) E. K. Clemons and M. Row. *Structural Differences Among Firms: A Potential Source of Competitive Advantage in the Application of Information Technology*. Pittsburgh, PA, 1987
- (19) E. K. Clemons and M. C. Row. Information Technology at Rosenbluth Travel: Competitive Advantage in a Rapidly Growing Global Service Company. *Journal of Management Information Systems*, 8, 2 (1991), 53-79
- (20) E. K. Clemons and B. Weber. London's Big Bang: A Case Study of Information Technology, Competitive Impact, and Organizational Change. *Journal of Management Information Systems*, 6, Spring (1990), 41-60
- (21) D. G. Copeland and J. M. Mckenney. Airline Reservation Systems: Lessons from History. *MIS Quarterly*, 12, 3 (1988), 353-370
- (22) W. R. Dill. Environment as an Influence on Managerial Autonomy. *Administrative Science Quarterly*, 2, (1958), 409-443
- (23) P. DiMaggio and W. Powell. The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review*, 48, (1983), 147-160
- (24) Dollar Dry Dock Bank. ELECTRONIC TAX FILING AND NO-INTEREST 3 TO 5 DAY IRS REFUND ADVANCES. Public Relations Newswire. Dollar Dry Dock Bank, January 26, 1989
- (25) P. F. Drucker. The Coming of the New Organization. *Harvard Business Review*, January-February (1988), 45-53
- (26) M. J. Earl and M. Vitale. BhS plc: The Supplier Link. Teaching Case. 9-188-094. Harvard Business School, 1988

- (27) R. Eccles and H. White. Price and Authority in Inter-Profit Center Transactions. *American Journal of Sociology*, 94 Supplement, 07 (1988), pp. S17-S51
- (28) K. M. Eisenhardt. Building Theories from Case Study Research. *Academy of Management Review*, 14, 4 (1989), 532-550
- (29) K. M. Eisenhardt. Control: Organizational and Economic Approaches. *Management Science*, 31, 2 (1985), 134-149
- (30) J. R. Galbraith. Organization Design: An Information Processing Perspective. *Interfaces*, 4, 5 (1974), 28-36
- (31) M. Gort. *Diversification and Integration in American Industry*, Princeton: Princeton University Press, 1962.
- (32) P. Hart and D. Estrin. Inter-Organization Networks, Computer Integration, and Shifts in Interdependence: The Case of the Semiconductor Industry. *ACM Transactions on Information Systems*, 4, 4 (1991), 370-398
- (33) HBS. American Hospital Supply Corporation (A): The ASAP System. Case Study. 9-186-005. Harvard Business School, 1985
- (34) HBS. Baxter Healthcare Corporation: ASAP Express. Case Study. 9-188-080. Harvard Business School, 1988
- (35) J. C. Henderson. Plugging into Strategic Partnerships: The Critical IS Connection. *Sloan Management Review*, 31, 3 (1990), 7-18
- (36) C. Holland, G. Lockett and I. Blackman. Planning for Electronic Data Interchange. *Strategic Management Journal*, Vol. 13, 7 (1992), 539-550
- (37) M. Hopper. Rattling SABRE -- New Ways to Compete on Information. *Harvard Business Review*, May-June (1990), 118-125.
- (38) R. Johnston and P. R. Lawrence. Beyond Vertical Integration- the Rise of the Value-Adding Partnership. *Harvard Business Review*, July-August (1988), 94-101
- (39) P. Keen. *Shaping the Future : Business Design Through Information Technology*, Boston, Mass: Harvard Business School Press, 1991.
- (40) B. Konsynski and M. Vitale. Baxter Healthcare Corporation (A):ASAP Express. Case Study. 9-188-080. Harvard Business School, 9/1989
- (41) B. Larson. Small Independent Firm Faces Competition by Relying on Personalized Customer Service. *Capital District Business Review*. Vol 14, No 40, January 18, 1988, pg 20

- (42) T. W. Malone, J. Yates and R. I. Benjamin. Electronic Markets and Electronic Hierarchies. *Communications of the ACM*, 30, June (1987), 484-497
- (43) P. Marsden. *Social Structure and Network Analysis*, Beverly Hills: Sage Publications, 1982.
- (44) J. E. McCann and D. L. Ferry. An Approach for Assessing and Managing Inter-Unit Interdependence. *Academy of Management Review*, October, 1979, 4 (1979), pp. 113-119
- (45) W. F. McFarlan. Information Technology Changes the Way You Compete. *Harvard Business Review*, May-June (1984), p98
- (46) W. F. McFarlan and D. Stoddard. Otisline. Teaching Case. 9-186-304. Harvard Business School, 1986
- (47) L. L. Meadows. Faster Refunds with Electronic Filing: Computerizing Your Relationship with the IRS. *PC*. Vol. 9, No. 4, February 27, 1990, 1990, Pg. 388
- (48) R. E. Miles and C. C. Snow. Organizations: New Concepts for New Forms. *California Management Review*, 28, Spring (1986), 62-73
- (49) D. Miller and P. Friesen. Archetypes of Organizational Transition. *Administrative Science Quarterly*, 25, June (1980), 268-298
- (50) H. Mintzberg. *The Structuring of Organizations*, Englewood Cliffs, NJ: Prentice-Hall, 1979.
- (51) S. F. Nadel. *The Theory of Social Structure*, London: Cohen and West, 1957.
- (52) R. R. Nelson and S. G. Winter. *An Evolutionary Theory of Economic Change*, Cambridge, MA: Belknap Press, 1982.
- (53) S. Nidumolu. *The Impact of Interorganizational Systems on the Form and Climate of Seller-Buyer Relationships: A Structural Equations Model*. Boston, MA, 1989
- (54) M. Ojala. Online Solutions to Taxing Problems. *Link-Up*. 6, 6, November, 1989, 12
- (55) G. L. Parsons. Information Technology: A New Competitive Weapon. *Sloan Management Review*, (1983), 3-14
- (56) C. Perrow. *Complex Organizations*, 3rd, New York: Random House, 1986.

- (57) J. Pfeffer and G. Salancik. *The External Control of Organizations: A Resource Dependence Perspective*, New York: Harper & Row, 1978.
- (58) M. J. Piore and C. F. Sabel. *The Second Industrial Divide*, New York: Basic Books, 1984.
- (59) M. E. Porter. *Competitive Advantage: Creating and Sustaining Superior Performance*, New York: Free Press, 1985.
- (60) M. E. Porter. *Competitive Strategy: Techniques for Analyzing Industries and Competitors*, New York: Free Press, 1980.
- (61) M. E. Porter and V. E. Millar. How Information Technology Gives You Competitive Advantage. *Harvard Business Review*, July-August (1985), 149-160
- (62) W. W. Powell. Hybrid Organizational Arrangement: New Form or Transitional Development? *California Management Review*, 29, Fall, 1987 (1987), 67-87
- (63) P. S. Ring and A. Van de Ven. Structuring Cooperative Relationships Between Organizations. *Strategic Management Journal*, 13, (1992), 483-498
- (64) J. F. Rockart and M. S. Scott Morton. Implications of Changes in Information Technology for Corporate Strategy. *Interfaces*, 14, 10 (1984), 84-95
- (65) J. F. Rockart and J. E. Short. IT in the 1990s: Managing Organizational Interdependence. *Sloan Management Review*, 30, 2 (1989), 7-17
- (66) D. M. Rousseau. Issues of Level in Organizational Research: Multi-level and Cross-level Perspectives. In *Research In Organizational Behaviour*. Greenwich, CT: JAI Press Inc, 1985
- (67) M. S. Scott Morton. Introduction. In M. S. S. Morton,(eds.), *The Corporation of the 1990s: Information Technology and Organizational Transformation*. New York: Oxford University Press, 1991
- (68) J. E. Short and N. Venkatraman. Beyond Business Process Redesign: Redefining Baxter's Business Network. *Sloan Management Review*, 34, Fall (1992), 7-21
- (69) A. Stinchcombe. *Information and Organizations*, Berkeley: University of California Press, 1990.
- (70) J. Tirole. *The Theory of Industrial Organization*, Cambridge, MA: MIT Press, 1988.

- (71) N. Venkatraman. IT-Induced Business Reconfiguration. In M. S. S. Morton,(eds.), *The Corporation of the 1990s: Information Technology and Organizational Transformation*. New York: Oxford Press, 1991
- (72) N. Venkatraman and A. Kambil. The Check's Not in the Mail: Strategies for Electronic Integration. *Sloan Management Review*, 32, Winter 1991 (1991), 33-44
- (73) N. Venkatraman and A. Zaheer. Electronic Integration and Strategic Advantage: A Quasi-Experimental Study in the Insurance Industry. *Information Systems Research*, 1, 4 (1990), 377-393
- (74) B. Victor and R. S. Blackburn. Interdependence: An Alternative Conceptualization. *Academy of Management Review*, 12, July, 1987 (1987), pp. 486-498
- (75) M. Vitale. Frontier Airlines, Inc. Teaching Case. 9-184-041. Harvard Business School, 1983
- (76) O. E. Williamson. *The Economic Institutions of Capitalism: Firms, Markets and Relational Contracting*, New York: Free Press, 1985.
- (77) O. E. Williamson. Transaction-Cost Economics: The Governance of Contractual Relations. *Journal of Law and Economics*, 22, (1979), 233-261
- (78) R. K. Yin. The Case Study Crisis: Some Answers. *Administrative Science Quarterly*, 26, March (1981), 58-61
- (79) S. Zuboff. *In the Age of the Smart Machine: The Future of Work and Power*, New York: Basic Books, 1988. .