DESIGNING TRANSACTION PLATFORMS FOR IT-BASED DYNAMIC SOURCING: THE CASE OF MOBILE PAYMENT SERVICES

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Abstract: *Developments in information and other communication technologies have led to more insourcing and outsourcing opportunities for organizations. The traditional model of isolated IT outsourcing by a single organization is being eclipsed by a new trend of sourcing through interorganizational networks and IT-based virtual organizations. Dynamic sourcing is becoming a core characteristic of virtual organizations, especially information-intensive industries, in which interdependent organizational units promote specific core competencies and cooperative advantages. Transaction platforms are examples of dynamic, flexible, sourcing-based interorganizational systems that can be used in this process. Since in the management of these organizations one is considered to be capable of systematically influencing the relevant design variables, design theory can be used to affect organizational structures. By doing so, one can aim to improve the functioning of those structures. The design of transaction platforms is important for realizing new interorganizational and even cross-industrial structures. Transaction platforms in mobile commerce have become an example of how interorganizational structures permit different organizations to leverage their core competencies in order to achieve cooperative advantages. In addition, M-commerce transaction platforms are a good area to focus on because of the various ways in which these platforms can be applied, the widespread and easy availability of mobile services, and therefore the potential of M-commerce to become a highly remunerative branche of industry in the future.*

Keywords: Dynamic Sourcing; Electronic Payment Services; Inter-organizational Systems; IT-management; Outsourcing.

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Biographical notes: Dirk Swagerman was recently appointed as a professor in controlling at the Rijksuniversiteit Groningen on a part-time basis. Before that, he was working at the Twente University. Furthermore, he is working as a management consultant mostly engaged in activities related to the organization and design of the financial function. Arjen Wassenaar is associate professor of IS management. His extensive research and consultant activities include IS management topics, such as IS strategy planning, organizing and outsourcing IS functions, management of IT-based innovations, virtual organizations and E commerce. He has widely published in journals including MIS Quarterly and the International Journal of Information Management. He has worked as a consultant and has developed IS management courses for companies and educational institutions, such as the Dutch Open University.

INTRODUCTION

In the early 1990s, isolated IT outsourcing in the business and IT domains developed from the transformation of traditional organizational structures into new, dynamic, sourcing-based, virtual organizations [42]. This paper will examine how these new virtual organizational structures are designed and will give examples from the mobile commerce to illustrate some successful designs.

Background: From Isolated IT Outsourcing to IT-based Dynamic Sourcing

Outsourcing refers to the practice of contracting outside a firm to receive some or all of the IS services needed by that firm. Although the term *outsourcing* came into common parlance in the late 1980s, the concept of contracting-out IS services was not new. Even in the early 1960s, when computers were first introduced to businesses, outsourcing was characterized by the existence of service bureaus that offered application-specific, transaction-processing services to firms. In the late 1980s, however, IS outsourcing took a new turn. Taking Kodak as an example, a large number of firms embraced a total-outsourcing approach characterized by high-value deals and long-term contracting. Under such contracts, firms relinquished to vendors their entire set of IS functions, including data center operations, networks and communication management, PC acquisitions and maintenance as well as human resources.

By the early 1990s, outsourcing had become an important topic of research. The OUT'93 conference at the University of Twente, for example, provided an overview of the latest developments in outsourcing in different countries, such as the USA (Clark and Zmud; Peak; Lacity and Hirschheim; Klepper; Turner and Kambil; Apte and Mason), Belgium (Auwers and Deschoolmeester), the UK (Willcocks), Switzerland (Griese), Spain (Valor), Finland (Saakjarvi and Saarinen; Ivari),

Germany (Heinzl), and The Netherlands (Wassenaar and Thiadens), resulting in a range of taxonomies describing the phenomena of outsourcing. Furthermore, at this conference different perspectives on outsourcing already emerged which were to dominate the literature throughout the 1990s. Three kinds of models were proposed.

First, transaction economics models focus on why managers might choose specific contractual modes of governance rather than hierarchies implemented by vertical and horizontal integration. This normative, static-oriented type explains the most important determinants of outsourcing, namely the reasons to shift from hierarchy to market, but it does not take into account the actual process of outsourcing [18].

Second, strategic and alliance-oriented models consider the roles of organizational resources and capabilities in the maintaining and leveraging of core competencies. In these models, popularized by Prahalad and Hamel [32], excellence in maintaining, growing, and leveraging the process of turning a number of competencies into products and services is what determines the success of firms in an increasingly turbulent and competitive environment. Quinn and Hilmer [35] therefore introduced the term “strategic outsourcing.” They note that while many companies see outsourcing only as a way to reduce short-term costs, a strategic outsourcing or partnership approach can yield significant additional benefits, such as lower long-term capital investments and the leverage of core competencies. They and others suggest that if firms concentrate on their own unique “core competencies” and strategically outsource those for which the firm has no strategic need in terms of special capabilities, managers can leverage their firms’ resources and skills to achieve increased competitiveness [22], [7].

Third, political and implementation-oriented models consider outsourcing as a phase-based, stakeholder-driven, decision-making process. These models focus on successful decision-making patterns [20]. In particular, the roles of stakeholders and their interests constitute a central topic of study. What are the objectives of

stakeholders (vendors, top management, IT management) in evaluating outsourcing decisions? What problems do stakeholders attempt to solve by outsourcing? Do organizations initiate outsourcing for reasons other than cost efficiency?

By the mid-1990s, the total-outsourcing approach had evolved into a more selective and dynamic sourcing environment [21]. Standardized IT infrastructures, such as EDI, the Internet, and the World Wide Web, enlarged the range and richness of information exchange among economic actors [16], [6]. These new electronic pathways could be taken as conduits enabling “dynamic sourcing of IT facilities on the tap.” The new generation of information systems has to be created ad hoc in order to meet the specific requirements of the convergence of the entities in the dynamic business network [4]. Furthermore, new, interactive IT facilities promote the operation of relatively new business transaction patterns and, therefore, of (virtual) interorganizational structures and interorganizational information systems (IISs), such as electronic shopping, electronic commerce, and electronic purchasing. Basically, existing structures for single organizations can be “deconstructed,” i.e., they are internally broken down into modules or business units, providing a more clear set of close, external links to customers, suppliers, and other business partners. The emerging concepts of virtual organizations (VOs) and dynamic networks incorporate dynamic insourcing as well as dynamic outsourcing. In order to transform their existing business transaction patterns, managers and their partners have to innovate by designing and implementing flexible IISs, and especially by embracing technical infrastructural systems, interorganizational application and knowledge systems as well as interorganizational resource providers. In other words, all processes for linking the trading partners together into new, innovative value networks.

Objective and Outline

The shift in the 1990s from isolated outsourcing of the IT function in a single organizational context toward virtual interorganizational arrangements between interdependent organizational resource units was strongly based on the sharing of interactive competencies enabled by dynamic sourcing of IT facilities. At the present stage of outsourcing and outsourcing research, it is worth asking how the concept of dynamic insourcing and outsourcing of IT facilities could be integrated into the active design of new VO forms. In this respect, Lucas [19] argues that, instead of designing a VO and adding IT afterwards, managers should actively use IT in the design of new interorganizational forms. The objective of this paper is to determine the generic design principles of the new virtual organization and provide the fundamentals for designing a transaction platform, such as a flexible IIS, which enables dynamic, sourcing-based, virtual organizations to function.

The paper is structured as follows. The above section introduced trends in outsourcing over recent years and set an area for research. In the next section, we will outline the phenomenon of the dynamic, sourcing-based, virtual organization and the role of a transaction platform as a flexible IIS, enabling dynamic sourcing. In the third section, we will study the emergence of new mobile payment services as an example of a field promoted by the developments in IT infrastructure as well as in mobile technology. We will in particular focus on the design fundamentals of the payment transaction platform. Finally, the last section will present some conclusions and final remarks.

DYNAMIC, SOURCING-BASED, VIRTUAL ORGANIZATIONS AND TRANSACTION PLATFORMS

First, our outline of a descriptive theory of dynamic, sourcing-based VOs is based on strategic, structural, and operational design variables. Management is included as

a source which systematically influences these design variables, thereby affecting the function of virtual organizational structures and, more fundamentally, the structures themselves. Next, we will introduce transaction platforms to describe a flexible kind of IIS that may be used.

Dynamic, Sourcing-Based Virtual Organizations

Study of the virtual organization phenomenon resulted in the early 1990s in literature dealing with this subject. It has become known under different labels, including intelligent enterprise [36], [14], virtual corporation or enterprise [2], and alliance [5]. The most frequently mentioned characteristics of VOs are that they are IT-based, semi-permanent, geographically dispersed, flexible (at least partially), interdependent organizational units, continuously adapting their cooperation structures, aiming to achieve cooperative advantages and improved competitive positions. Other terms existing in this literature are temporary retention of independence, reduction of uncertainty, management and alliance design, financial involvement, and horizontal versus vertical character [36], [39]. In our view, a dynamic, sourcing-based, virtual organization has the following characteristics:

- It is a flexible value network responding to rapidly changing market opportunities in a turbulent, global environment;
- It is strongly based on sharing skills (core competencies), costs, and access to markets;
- It is realized by dynamic sourcing by means of temporarily involved, interdependent, geographically dispersed, organizational resource units;
- Its units are linked together by a technical IT infrastructure, an IS application and knowledge system, a resource-providing structure consisting of a transaction governance system, a strategic management system, and a service delivery system;

- Its function is to improve the common competitive position by creating cooperative advantages based on the dynamic combination of economy of scales and economy of scope.

In this paper, we will predominantly focus on information-intensive VOs with digital products and services, such as those used in many organizations in the IT, banking, insurance, education, publishing, government, and entertainment industries. Our VO concept is based on the dynamic networking concept of Miles and Snow [26] and the concept of thinking in reverse (reversed marketing) as described by Jarvenpaa and Ives [14].

Management as Design

As Herbert Simon is known to have pointed out, the essence of manmade sciences, management included, is design. Design assumes discretion, the ability to alter a system by choice. We follow Gregor [10] in her classification of theories, distinguishing among a descriptive theory (merely describing or classifying characteristics), a correlation theory (specifying and explaining relationships among characteristics), and a formal theory (moving beyond explanation to the prediction of relationships between and among characteristics). In this first step toward a VO design theory, we will develop a descriptive theory of VOs. In the case of virtual organizations, design means turning those knobs which influence the division of (intelligent) labor and the coordinating mechanisms that affect the way in which organizations function. Mintzberg [27] states that organizational design means turning those particular knobs, the organizational structure's essential design variables which take on different values that affect this structure and its functioning. Following Mintzberg, we argue that the design of a virtual organization should be based on a theory that distinguishes a set of design variables and contingency factors as well as hypotheses about the fit between the design variables and

contingency factors. Furthermore, agreeing with Lucas [19] that managers in the era of e-business should actively use IT technology in the designing of virtual organizational forms and in their management of organizations, we consider them to be capable of systematically influencing the design variables.

Henderson [12] describes fragmentary innovative knowledge and product architectures. She defines "architectural knowledge" as the most important innovative insights and wisdom required to integrate diverse bodies of component knowledge. Thus, a product design effort of a particular design team will both produce a product and create or process knowledge. Henderson classifies innovation into four categories defined by whether or not linkages are changed and whether or not modules are changed. If both are changed, the innovation is called radical, however, if core concepts are merely reinforced, then the innovation is called incremental. Henderson argues that radical innovation, in which not only some modules are changed but also the product structure and tighter linkages are altered, may cause great difficulties for companies because of the risk that existing organizational linkages as well as knowledge channels will be destroyed. Therefore, she proposes that companies should manage their architectural knowledge as a strategic weapon.

Descriptive Theory for Dynamic, Sourcing-Based, VOs

Based on our reviews of the literature [39], [41], we distinguish several design variables on the strategic, structural and operational levels, displayed in Figure 1.

Figure 1 : Design variables of a dynamic, sourcing-based VO

These variables are explained in greater detail below.

Strategic level

The strategic management system examines ways of integrating visions, interests, and performance control in the cooperation among interdependent organizational units and their stakeholders. It comprises choices -often on a cultural basis- including those regarding methods of strategic planning, implementation, and evaluation. For example, one of the basic choices in strategy-making is among top-down, bottom-up, and middle-up-down (emergent) strategic planning and implementation [5], [29]. An example of a basic choice in evaluation method is output-based performance culture (profit, physical outcomes) versus an input-based performance culture (budget, physical resources).

The service delivery system provides an interface between a VO and the market, comprising design choices with respect to what products and services are offered (value proposition), what customer community is targeted, and what method of interaction (intermediation) is used as the basis for the interface [31]. For example, in positioning for marketing there is a choice between a low-cost strategy and a differentiation strategy.

In the transaction governance system, governance structure consists of the cooperating owners of interdependent resource units. The coordination mechanisms in this area range from market coordination, by means of hierarchical coordination, to informal mutual adjustment. A basic design choice depends on the transaction governance mechanism to be used [8].

Structural level

The resource-providing structure or configuration represents the grouping of resources in a dynamic portfolio of relationships in order to assemble the required resources (and the organizational units providing them), which (temporarily) contribute to the execution of value-chain activities. Here, design choices consist of

the grouping of resource units according to, for example, functions, products, or market segments, and the rate of external (dynamic) sourcing with the aim of concentrating on core competencies [11], [38].

The IS application and knowledge architecture form the structure of applications and knowledge systems constructed in order to build a formalized knowledge base and to support the exchange of information and knowledge among the virtual organizational units. A basic design choice could be made, for example, with regard to the rate of formalization of tacit knowledge [29].

The IT infrastructure is the technical information and communication infrastructure that supports the electronic capture, storage, transport, processing, and presentation of information by the organizational units involved. Examples of basic design choices are technical infrastructure standards for information and communication of the virtual organizational units. Skyrme [37] distinguishes four levels of IT infrastructure; the connection and communication levels are more oriented toward the technical infrastructure, while the conversation and collaboration levels deal more with the architecture of IS design variables and knowledge.

Operational level

Finally, the value network structure represents the common, functional, interdependent, value-chain activities, consisting of primary and support activities that exist in order to deliver a specific product and/or service to a target group of customers (such as citizens or companies). Christiaanse and Kumar [3] present the sequencing of value activities in the value chain as an example of a basic design choice: the beer containers are being unloaded by the stevedores in the port of New York in several steps. First, they are unloaded and subsequently they go through a customs and excise check. This sequence may seem arbitrary, but in order to gain efficiency it is considered necessary to combine electronic container sealing and

electronic custom clearance with the unloading process. An alternative would be to perform the custom inspections and sealing at sea. The alternatives have to be considered in terms of functionality rather than in terms of the physical mechanisms or the actors who carry out the activities. Moshowitz [28] also proposes an important design principle by way of a distinction between needs and satisfiers.

Interorganizational Systems

An interorganizational system (IOS) differs from an internally distributed information system in that it facilitates information exchange across organizational boundaries. It is built around IT, computers, and communications technology, thereby facilitating the creation, storage, processing, and transmission of information. In our descriptive theory, an IOS is the linking of specific values to the three structural-level design variables listed above. A system such as IOS has a considerable economic importance for throughput acceleration, stock reduction and quality assurance, since it increases the degree of coordination of business activities among trading partners.

The development of an IOS presents considerable challenges. Gregor [10] argues that the scope of the systems, the involvement of different organizations with differing goals, and the range and nature of possible relationships among involved parties makes their planning one of extreme complexity. Gregor and Menzies [9] argue that change at the industry group level in a complex environment such as that of an IOS will tend to be incremental and evolutionary. Changes at the industry level emerge as individual enterprises adapt and modify routine behaviors in response to influences in both their remote and immediate environment. In this way, these changes in structure in the immediate environment both constrain and enable various possibilities for further change. Corresponding conclusions are drawn by North [30]. The complexity of the situation, the reciprocal nature of change, and the

likely absence of an industry-group aerial view explain that the possibility of concerted action at the industry level is reduced.

In contrast, Baldwin and Clark [1] argue that the increasing complexity of a large number of products and services has forced companies to share the development and production tasks among several partners. Their view is in line with the core competence concept. Therefore, they suggest that companies have already shown that they can create complex interfaces there where individual parts are well defined. The standardization of these interfaces makes smaller companies competitive, and the complexity of the product increases the motivation to use partners in the development and production processes.

Designing Transaction Platforms

Sääksjärvi [33] applies the concept of production platform and platform strategy in the automobile industry to the "information industry," following McGrath [23], who introduced the concept of product platform strategy. McGrath noted that a product platform is not a product but a collection of common elements rooted in a common underlying technology, which is implemented across a range of products. Meyer and Lopez [25] similarly define a product platform as the core technologies that are common to all members of a product family. They use the term "product design" to signify subsystems and their interfaces used as the common base or core from which different, closely related products can be derived. This platform concept is rooted in engineering design and product development, which are related to so-called technology push products. Push products are products that are not originally designed in response to the traditional specification of customer needs, but are first of all developed through technological innovation and subsequently adapted to real market needs.

We define a transaction platform as an IOS architecture offering a common core from which a variety of services can be generated, facilitating information exchange in a value network in order to tie together different, interdependent organizational units of a virtual organization. To provide the required resources, the common core consists of IS application and IT infrastructural and knowledge components together with their portfolio of relationships.

MOBILE PAYMENT SERVICES

The previous sections provide the context for studying the emergence of new mobile payment services that have been made possible by the developments in the IT infrastructure and mobile technology. We pay particular attention to the design fundamentals of the payment transaction platform. This transaction platform can be considered from a viewpoint of dynamic sourcing-based VO-theory as a flexible IOS [41]. In our case mobile payment services - an application of M-commerce - are enabled by the above mentioned flexible IOS. M-Commerce could be viewed as a subset of e-commerce. The name M-commerce is based on the mobile nature of the wireless environment that supports mobile electronic business transactions.

Developments in IT infrastructure, improvements in securing (mobile) data, and new user interface developments, such as WAP and I-mode, have all led different companies to explore the possibilities of new sourcing strategies in M-commerce, especially in mobile payment services. In order to leverage their competencies in billing and customer access, mobile service providers are seeking new electronic payment services based on their mobile network and the smart card in the mobile phone. They study, for example, the possibility of adding an electronic wallet to mobile phones. Mobile phone manufacturers have already formed a joint venture to offer secured payment services via mobile phone. Other companies, such as

financial institutions, are also exploring the opportunities of mobile payment services.

Using a Value Chain to Discover New Sourcing Strategies in M-Commerce

At present, mobile payment is not a very large business yet, but new user interface developments may be an important factor in the creation of a new market for M-commerce payment services [42]. Below, we will show some examples of successful current and future transaction platforms whose emergence has been enabled by the mobile and information technology. First, we will look more closely into the M-commerce value chain.

A feasibility study conducted by KPN Mobile, a Dutch mobile operator, identified the following M-commerce value chain:

- Access to the mobile network is the main link between the end user and the M-commerce service offered by the mobile operator (the owner of the physical infrastructure), while the mobile service provider and mobile virtual network operator are merely users of the infrastructure;
- Content-packaging by presenting goods and services of different merchants in a portal: in the mobile world, a portal function is needed due to poor navigation facilities and the lack of a full keyboard;
- Delivery of goods or services by the merchant offering content (such as information about train timetables or stock prices), electronic services (such as mobile banking and trading in stocks), or physical goods and services (such as the ordering of books and paying for car-parking);
- Security services that guarantee the integrity of financial transactions;
- Financial settlement based on a previously adopted payment method;
- Delivery of the goods and services agreed upon in the contract.

If the IT infrastructure is excellent, each of these elements of the chain can be handled by different resource providers. The next section analyzes the information (exchange) requirements in this value chain.

The Design Fundamentals of a Transaction Platform

The IOS in our descriptive theory of a VO implements the structural-level design variables that we called resource-providing structure, the IS application and knowledge architecture as well as the IT infrastructure. In Figure 2, we visualize the relationship between the information and communication requirements (which are information functions derived from the value network structure) as well as a possible implementation in the form of alternative IS application and knowledge procedures.

The morphological design map depicts alternative IS procedures and gives insight into the variety available for the execution of the information functions and thus into the flexibility of the transaction platform. Using the morphological map, a detailed flowchart can be designed to summarize how the information flows from the merchant to the consumer and how the two are linked together, resulting in a financial settlement by payment providers.

Figure 2: Morphological design map of transaction platforms

In the next figure USSD is referred to, which stands for ´Unstructured Supplementary Service Data´.

Figure 3: Resource providers involved in the M-commerce payment service

The flowchart depicted in Figure 2 is schematized in Figure 3 and represents the resource providers involved and their roles (consisting of one or more functions).

Emergent M-Commerce Payment Services

This section explores a number of recent developments that indicate the emergence of M-commerce payment services. As mentioned before, different mobile (service) operators as well as other companies have recently begun to explore the technical, economic, and commercial feasibility of the mobile phone (and the smart card inside it) and the Personal Digital Assistant (PDA) as a means of offering new electronic payment services.

One mobile payment system about to be tested in Europe is the mobile procurement of train tickets for the Dutch rail operator Noordnet. Other contributors to this pilot are CMG (a software house), Rabobank (a Dutch bank) and Vrije Universiteit (a Dutch university). During the pilot, passengers of Noordnet trains will be able to buy train tickets with their mobile phones, and train conductors can check the validity of the tickets with special-purpose mobile devices.

In April 2000, Nokia, Ericsson and Motorola formed a joint venture to offer secured payment services via mobile phone. Since then this joint venture, dubbed Mobile E-business Technologies (MeT), has been joined by Siemens, Sony, and Matsushita (Panasonic). According to an initial market survey, the three founding companies expected a turnover of between 13-28 billion dollars. This figure, as Forrester noted, was three times the then existing turnover via the Internet, but there are two reasons why it seemed a reasonable expectation. First, by 2004, there will be approximately one billion mobile phone subscribers worldwide, many more than the number of owners of credit cards, today's most frequently used method of conducting transactions. Second, since pure M-commerce is not the only possibility with regard to M-commerce payment services, various transaction combinations are possible,

such as ordering via Internet and paying by mobile phone, making payments from one mobile device to another, or procuring goods from traditional merchants at the point of sale using both a mobile device and a point-of-sale device.

To illustrate the measures taken to secure mobile payments, we refer to the example of Secure Mobile Payment Services (SEMOPS). SEMOPS is based on the credit push concept. The purpose of SEMPOS is to develop an ad hoc and comprehensible mobile payment service, combined with high-tech mobile technology. The inverse transaction flow is the main characteristic of the service. This means that all users (customers and merchants) are in direct contact with their own trusted partners, i.e. banks and MNOs. Sensitive information is only provided to the customer's trusted partner, while the payment guarantee is provided by the merchant's trusted partner – its bank. Because this model is based on social-trust, it provides a very high security solution, which at the same time is highly flexible. Within this system, there is no publicly available traceable information, and the customers are allowed to control and retain their anonymity if they wish [15].

The mobile payment services are not just possibilities for the future; they are services already provided by Fundamo, a South African joint venture by Sanlam, the South African financial services institution and two technology-oriented investment funds. Fundamo (www.fundamo.com) aims to provide a secure, effective, completely mobile payment system that is interoperable between banks and mobile operators. The first Fundamo pilot project began in November 2000 and succeeded to the delight and by the praise of the pilot users. In the meantime, Fundamo kept striving to make the system interoperable with as many other payment systems as possible, and it has succeeded in creating a truly versatile offering.

Fundamo has shown that services, such as ticket reservation, prepaid tokens, and consolidated billing, are easily integrated as "intelligent payments." The Fundamo

system transforms phones into powerful payment instruments, capable of transferring money between Fundamo-enabled bank accounts. Fundamo subscribers can make instantaneous, authorized payments from their phones to other Fundamo users, to point-of-sale devices at stores, or on the Internet. This means, for example, that one can buy groceries, pay for theatre tickets on the Internet, and pay the babysitter, from anywhere at any time, always secured by the PIN number that is entered before each transaction is performed. Fundamo provides a comprehensive payment platform that can be deployed by any bank.

In addition, Fundamo makes its business and technology models freely available to third-party developers who want to integrate their offerings. Because Fundamo adheres to open standards, its product architecture can be quickly and easily assimilated into banking systems and used with any third-party applications. Fundamo's payment platform supports the majority of existing mobile phones (both WAP-enabled and non-WAP-enabled), can be used across mobile networks, and uses a single interface to operate in conjunction with a number of payment devices.

Finally, Fundamo provides a comprehensive certification system for prospective partners that guarantees that the basic principles of compatibility and interoperability can be ensured in any implementation of a payment solution. Transactions are carried out via a push payment model; the money is pushed by a payee into the account of the recipient, in contrast with credit card transactions, in which money is withdrawn from an account to accomplish a transaction. It should be clear that the Fundamo payment system is an excellent example of a flexible, interorganizational transaction platform.

CONCLUSIONS AND FINAL REMARKS

The recent literature suggests that interactive IT capabilities are “deconstructing” traditional, single organizational structures and reconstituting new, interorganizational, virtual arrangements of interdependent organizational units. These new structures strongly require dynamic sourcing. Dynamic sourcing is becoming a core characteristic of a virtual organization of interdependent organizational units that aim to promote specific core competencies and cooperative advantages, especially in information-intensive industries.

The phenomenon of dynamic, sourcing-based, virtual organizations demands a descriptive theory of virtual organizations as the starting point of an interorganizational design theory in the network economy. We have therefore distinguished seven design variables for virtual organizations. Three structural-level variables -IT infrastructure, IS application and knowledge systems, and a resource-providing structure, all implemented in a transaction platform- have been discussed in greater depth.

Designing transaction platforms is an important challenge on the way to realizing new interorganizational and even cross-industrial structures. Transaction platforms for several kinds of companies in which M-commerce is used serve as good examples of interorganizational structures by which different companies leverage their core competencies to achieve cooperative advantages. On the basis of a wide variety of possible applications of M-commerce transaction platforms and the widespread and easy availability of mobile services, we predict that M-commerce has the potential to generate great revenue in the future.

Three final remarks are in order. First, well-designed transaction platforms are successful only if they can be implemented in many different and flexible ways.

This is an issue of organizational dynamics that can be approached by the application of innovation theory. Here, it might be interesting and worthwhile to incorporate here the rather isolated perspectives into a more integrated interorganizational development theory.

Second, the case we chose, an electronic payment service, focused heavily on the application structure. The education and publishing industries, in contrast, are more strongly based on design, which focuses on a knowledge structure.

Finally, the focus of this paper is on providing the fundamentals for designing a flexible IOS. Future research should focus on designing a detailed methodology or recipe for establishing an IOS in practice. The design of an IOS, however, constrains the other distinct design variables, namely the strategic management system, the governance system, the service delivery system, and the value network structure. The identification and classification of these constraints in different industries is an interesting problem for further empirical research.

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REFERENCES AND NOTES

1. Baldwin, C., and Clark, K. (1997). "Managing in the age of modularity", *Harvard Business Review*, September-October, 84-93.
2. Campbell, A. (1997). *Creating the Virtual Organisation and Managing the Distributed Workforce*. United Kingdom: University of Paisley.
3. Christiaanse, E., and Kumar, K. (2000). "ICT Enabled Co-ordination of Dynamic supply Webs", *International Journal of Physical Distribution and Logistics Management*, 30, 3/4, 3-23
4. Coursaris, C., Hassanein, K. (2002), "Understanding m-commerce", Quarterly Journal of Electronic *Commerce*, 3, 3, p247
5. Douma, M.U. (1997). *Strategic Alliances Fit or Failure*. Enschede: University of Twente.
6. Evans, P., and Wurster, T.S. (1997). "Strategy and new economics of information" *Harvard Business Review*, September-October, 71-82.
7. Feeney, D.F., and Willcocks, L.P. (1998). "Core IS capabilities for exploiting information technology", *Sloan Management Review*, 39 (3), Spring, 13-25.
8. Gebauer, J. (1996). "Virtual Organizations from an Economic Perspective." In: Coelho et al. (Eds.), *Proceedings of the 4th European Conference on Information Systems*, pp. 91-103. Lisbon, Portugal, Part A, July 2-4.
9. Gregor, S., and Menzies, D. (2000). "The role of the ´Honest Broker´ in the development of interorganisational systems: A case study in the beef industry." In: *Proceedings [of the] 13th Electronic Commerce Conference*, pp. 618-631. Bled, Slovenia.
10. Gregor, S. (2001). *Theory formulation in e-commerce: Puzzles and opportunities*. Internal Paper, Rockhampton: Central University of Queensland.
11. Häkansson, H. (1987). *Industrial Technology Development, a Network Approach*. London.

12. Henderson, R. (1991). “Architectural innovation as a source of competitive advantage”, *Design Management Journa,l 2*, Summer 1991, 43-47.
13. Hoogeweegen, M.R. (1997). *Modular network design: Assessing the impact of EDI*. Rotterdam: Erasmus University Rotterdam.
14. Jarvenpaa, S.L., and Ives, B. (1993). “The global network organisation of the future: Information management opportunities and challenges”, *Journal of Management Information Systems*, 10 (4), 25-57.
15. Karnouskos, S., Vilmos, A., Hoepner P., Ramfos, A., and Venetakis, N., “Secure Mobile Payment - Architecture and Business Model of SEMOPS”, EURESCOM summit 2003, Evolution of Broadband Service, Satisfying user and market needs, 29 Sept - 1 Oct, 2003, Heidelberg, Germany
16. Keen, P.G.M. (1990). *Shaping the Future*. Boston: Harvard Business Press.
17. Klein Twennaar, R. (1999). *MobielBetalen@KPNMobile.nl*. Enschede: University of Twente.
18. Klepper, R., and Hartog, C. (1992). “Some determinants of MIS outsourcing behaviour.” In: *Handbook BIK*. Alphen a/d Rijn: Samson.
19. Lucas, H.C.(1996). *The T-form Organisation*. San Francisco: Jossey-Bass Publishers.
20. Lacity, M.C., and Hirschheim, R. (1995). *Beyond the Information Systems Outsourcing Bandwagon.* New York: Wiley, Chichester.
21. Lacity, M.C., Willcocks, L.P., and Feeny, D.F. (1996). “The value of selective IT sourcing”, *Sloan Management Review*, 37 (3), 13-25.
22. McFarlan, F.W., and Nolan, R.L. (1995). “How to manage an IT outsourcing alliance”, *Sloan Management Review*, Winter, 9-23.
23. McGrath, M.E. (1995). *Product Strategy for High-Technology Companies*. Richard D. Irwin.
24. Malone, T.W., Yates, J., and Benjamin, R.I. (1997). “Electronic markets and electronic hierarchies”, *Communication of ACM*, 30 (6), 484-497.

25. Meyer, M.H., and Lopez, L. (1995). “Technology strategy in a software products company”, *Journal of Product Innovation Management*, 12 (4), 294-306.
26. Miles, R.E., and Snow, C.C. (1992). *Organisational Strategy, Structure and Process*. McGraw Hill.
27. Mintzberg, H. (1979). *Structuring of Organisations*. Englewood Cliffs, NJ: Prentice Hall.
28. Moshowitz, A. (1997). “Virtual Organisation”, *Communication of ACM*, 40 (9), 30-37.
29. Nonaka, I., and Takeuchi, H. (1995). *The Knowledge-creating Company*. New York/Oxford: Oxford University Press
30. North, D.C. (1990). *Institutional Change and Economic Performance*. Cambridge/New York: Cambridge University Press.
31. Porter, M.E. (1980). *Competitive Strategy: Techniques for Analysing Industries and Competitors*. New York: The Free Press.
32. Prahalad, C. K., and Hamel, G (1990). “The core competence of the corporation”, *Harvard Business Review*, May-June, 79-91.
33. Sääksjärvi, M. (1998). “Product platform and IT infrastructure in strategic management of IT.” In: *Europe's Economic Future, Volume V*, edited by: S. Urban; Gabler, Spring.
34. Quinn, J.B. (1990) .*The Intelligent Enterprise*. New York: The Free Press.
35. Quinn, J.B., and Hilmer, F.G. (1994). “Strategic outsourcing”, *Sloan Management Review*, 35 (4), 73-87.
36. Sieber, P., and Griese, J. (Eds.) (1999). “*Organizational Virtualness*”, Proceedings of the VoNet-Workshop. Bern, Switzerland.
37. Skyrme, D.J. (1998). “*The realities of virtuality”, In: Organizational Virtualness*”, Proceedings of the VoNet-Workshop, edited by: P. Sieber and J. Griese, 25-34.
38. Venkatraman, N., and Henderson, J.C. (1998). “Real strategies for virtual organising”, *Sloan Management Review*, Fall, 33-48.

39. Wassenaar, D.A. (1999). “Understanding and designing virtual organisational forms”, *VoNet Newsletter*, 3 (1).

40. Wassenaar, D.A. (2000). “E-governmental value chain models E-government from a business (modeling) perspective.” In: *Proceedings [of the] 11th International Workshop on Database and Expert Systems Applications*, 289-298, Greenwich, London, UK.

41. Wassenaar, D.A., and Gregor, S. (2001). “*E-business formulating and forming: New wine in old bottles? Towards an emergent management concept of interorganisational systems (IOS)”*. Proceedings of the 9th ECIS Conference, Vol. 2, June 27-29, Bled Slovenia 2001, 1242-1253.

42. Wassenaar, D.A., and Swagerman, D.M. (2002). “Transaction platforms as flexible interorganisational systems enabling dynamic sourcing based virtual organizations”. In: *Information systems outscourcing: Enduring themes, emergent patterns and future directions*, edited by: R. Hirschheim, A. Heizl, and J. Dibbern. Springer-Verlag.

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Figure 1 : Design variables of a dynamic, sourcing-based VO

Level	Design variable
Strategic	Strategy Management System
	Service Delivery System
	Transaction Governance System
Structural	Resource Providing Structure
	IS Application and Knowledge Architecture
	IT Infrastructure
Operational	Value Network Structure

Figure 2 : Morphological design map of transaction platforms

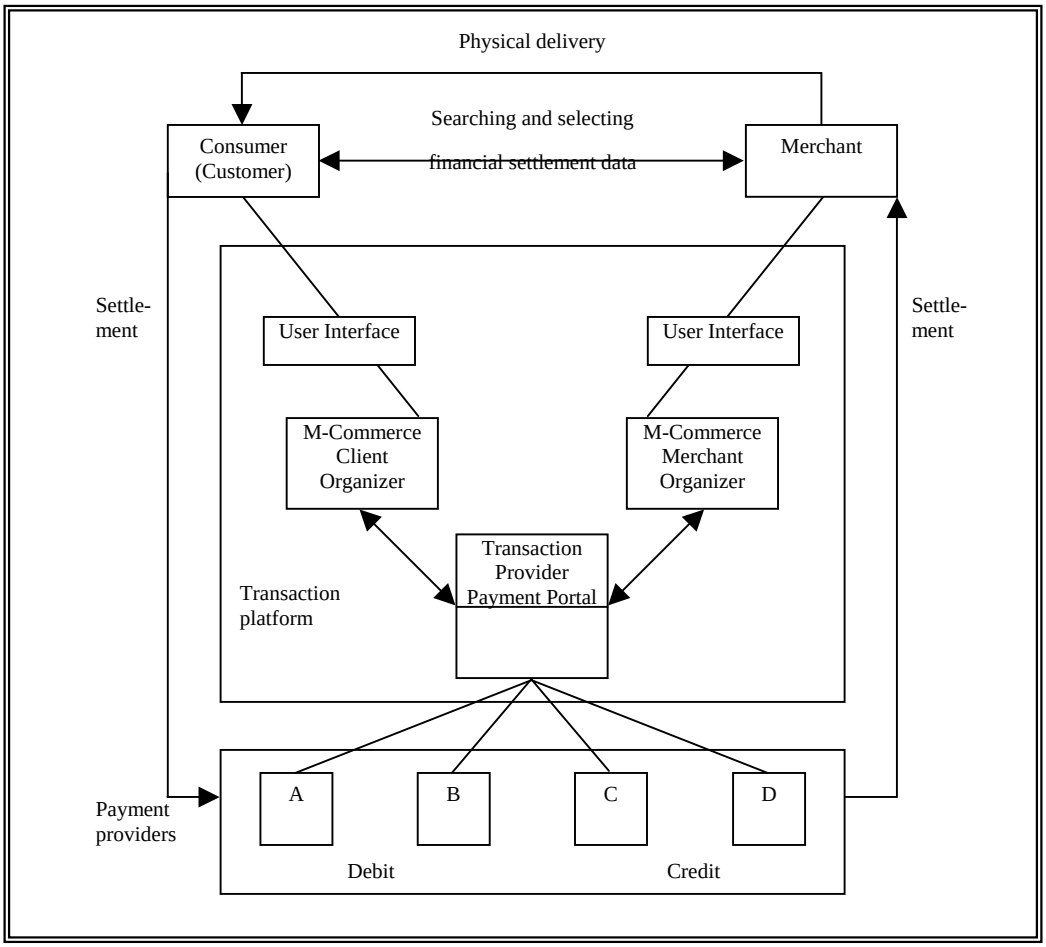

Figure 3 : Resource providers involved in the M-commerce payment service

IS Procedures and Information Functions	Alternative IS application Procedures					
Information Capture Media	Voice	SMS	USSD	WAP	Internet	Mail
Information Transport	Via Consumer		Via Merchant		Via Consumer & Merchant	
Information Security	Calling Line Identification (CLI) + (PIN Code)	SMS + PIN Code	SMS + Secret Key (SK) + SIM Toolkit (STK)	SMS + Public Key (PK) + SIM Toolkit (STK)	Token	WAP + Password
Information Relating /Joining	Already Related		By Calling Line Identification (CLI)	By IP Number		By Transaction Number
Selecting Payment Method	No Choice	Selection by Merchant	Selection by Consumer	Selection by Consumer & Merchant	Selection Based On Amount	All Methods
Supporting User/ Consumer	No		Storing Financial Payment Data			
Supporting Merchant	No		Storing Financial Payment Data			
Payment	Internal Debit		External Debit	Internal Credit		External Credit
Transaction Confirmation	No		To Merchant	To Consumer		To Consumer & Merchant