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Business network-based value creation in electronic commerce

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ABSTRACT: Information technologies (IT) have affected economic activities within and beyond the boundaries of the firm, changing the face of e-commerce. This article explores the circumstances under which value is created in business networks made possible by IT. Business networks combine the capabilities of multiple firms to produce and deliver products and services that none of them could more economically produce on its own and for which there is demand in the market. We call this *business network-based value creation.* We apply economic theory to explain the conditions under which business networks will exist and are able to sustain their value-producing activities. Informedness has the potential to increase the complexity of consumer demand. Addressing this demand requires flexible production and delivery of products and services, and can be achieved by value-adding business networks supported by IT, standardized technology, and business process solutions. We also examine the benefits associated with business network-based value creation and fair value-sharing to support the sustainability of business networks. We develop a set of propositions and draw upon multiple case examples from the travel and hospitality industry to validate our theoretical perspectives on business network-based value creation. The results demonstrate that this industry is going through a digital transformation that makes it possible for many firms to engage in highly effective and innovative network-based value creation.

KEY WORDS AND PHRASES: Business networks, case studies, e-commerce, economic theory, network stability, network sustainability, theory development, travel and hospitality industry, value creation, value sharing.

Innovations based on information technologies (IT) and the data they generate have changed the coordination of economic activities within and between firms. By shifting the boundaries of firms and creating opportunities for them to jointly produce value within a business network, such innovations have the potential to reshape industry structure. One illustration is Li & Fung, the largest trading export company based in Hong Kong [28, 52]. The uniqueness of its business lies in its ability to break up the value chain into independent modules and find the best source for each part of the modular production that it conducts. In 2008, Li & Fung had $16.7 billion in revenue, yet it did not own a single factory. Instead, it has been working with 10,000-plus suppliers and 35,000 staff in 40 counties to organize flexible supply networks to achieve true global business network co-production. For example, it sources raw wool from Korea, ships it to Taiwan for weaving, then to Bangladesh for cutting, and on to Thailand for dyeing. Thereafter, the materials are sent to Mexico for assembly, timed to coincide with the arrival there of zippers from Japan. Magretta noted that Li & Fung is "not asking which country can do the best job overall. Instead, [the company is] pulling apart the value chain and optimizing each step—and . . . doing it globally" [49, p. 106].

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Li & Fung's prowess in producing value for its customers is based on its capabilities to mobilize and orchestrate its business network. This form of *business network-based value creation* is the focus of the present article, which explores the theories that explain what enables business network-based value creation and the conditions under which value is created within business networks and sustained over time. Business network-based value creation occurs when IT offers an opportunity for participating firms to produce value-creating products and to provide service transactions for customers through the selective use of process resources that exist across the boundaries of multiple firms rather than within their own. The central argument is that informed customers are increasingly demanding products and services tailored to their specific needs. This results in increasingly complex customer demand, which concomitantly requires greater flexibility on the part of providers in the areas of product development and service delivery. Business networks are uniquely suited to be effective in this new kind of marketspace because IT and standardized solutions have made interfirm transaction costs so much lower. Traditional outsourcing driven by the need of producers to reduce costs is now being replaced with flexible and dynamically reconfigurable business networks. As information availability and customer engagement increase in importance to firms, the capabilities of coalitions of firms in networks have become a critical source of value and competitive advantage—something expected to evolve into a *strategic necessity* in the future.

We address three research questions that will permit us to contribute a new perspective on business network-based value creation. First, why do business networks exist? This question emphasizes the shift from individual firms as the key historical locus for value creation to the transformed process of value creation in business networks when IT is present. Second, to what extent do the heightened levels of information availability and access made possible by IT investments and new technological innovations improve the effectiveness of business network-based value creation? And how is joint production among business partners changed? Third, what characteristics of business networks permit them to continuously deliver value to customers over time, enhancing their strategic stability? And what capabilities do they need to effectively appropriate that value?

Based on theories from economics, information systems (IS), and marketing, we develop three sets of propositions that represent a theoretical perspective on business network-based value creation to address the three research questions. The first set of propositions focuses on the conditions for business network *formation*. We know from prior research that IT affects the boundaries of the firm and the location of service process activities. It also has impacts beyond the firm's boundaries at the level of the business network [16, 51]. Today, business value is being realized through the actions of multiple firms in flexible networks rather than solely through the actions of a single firm, thanks to IT-driven reductions in transaction, integration, and switching costs.

The second set of propositions deals with the significance of informed *demand* that influences network-based value creation. The new levels of information available both to firms and to consumers provide opportunities for the development of next-generation business intelligence in e-commerce

to create value [48]. Generating value from information shared in network-based production, in concert with high levels of customer involvement, is an important new development in e-commerce business processes. Although value creation through networks is largely a result of reduced transaction costs, value creation based on consumer informedness may be a response to reduced search costs. Clemons [10] defines *consumer informedness* as a profound, almost unconscious awareness on the consumer's part of what is available and at what price, and with a precise understanding of the exact set of attributes of a product or service. This article argues that network firms are equipped with improved information capabilities that enable them to implement advanced multifirm strategies that deliver unique complementary network value to their customers beyond what individual firms can do. The third set of propositions examines the forces that affect the *stability* of this form of network-based value creation. They explain how value should be distributed among firms in a network—when viewed as a coalition driven by value creation—and how value can be sustained over time, so that it supports the stability of network participation.

We employ a multiple case study method, using a variety of cases selected from the travel and hospitality industry, which has undergone a digital transformation in the past fifteen years. The research validates propositions that extend prior theory to explain the formation, demand, and stability of business networks. It makes two original contributions to the competitive strategy, economics and IS literature. First, we develop a theoretical perspective and apply economic theory to explain why informedness is critical for the existence of today's business networks, and examine the conditions under which business networks will be stable and sustainable over time. Second, we provide empirical support for the proposed theoretical perspective on business network-based value creation in a setting of interest to research and business practice: the travel and hospitality industry. More broadly, this study of how business networks improve upon and create new capabilities within and beyond firm boundaries contributes to research on IT value [46].

Business Networks and the Role of Information Technology

We use the term *business network* to refer to a collection of interfirm relationships, including alliances, long-term buyer-supplier relationships, and informal collaborations. Firms increasingly enter business networks because of the greater process modularity and interdependencies made possible by investments in IT. Two types of IT are relevant here: transformational technologies related to the firms in the network and communication technologies related to the linkages in the network. The interfirm relationships and interorganizational information systems (IOS) that support them create the basis for networks, a mixed mode between markets and hierarchies [57, 62]. This form of industrial organization is an important current means of accessing valuable resources and information, although the network forms in different industry verticals and countries may vary based on the degree of coordination.

The *network form of organization* has been discussed in the economics, sociology, and strategy literature over the last two decades. Kambil and Short defined a business network as a "structure of interdependent relationships between the activities of a given firm and those of other firms in its competitive environment which influence each other's strategies" [41, p. 60]. In the IS literature, there has long been a tradition of examining the impact of IOS on the development of business networks [4, 12]. Prior research argued that IOS lowers transaction costs among business partners and changes process boundaries [16, 51]. IOS gives firms greater ability to couple to and decouple from other network nodes [38, 64]. IOS also makes it easier to use modular design to decompose the production of services, resulting in less vertical integration and more diversification [36]. This further results in more outsourcing and increased customization, in spite of countervailing forces. Some other viewpoints on this matter include Clemons, Reddi, and Row's [16] "move to the middle" assessment of relational risk, and Kauffman and Mohtadi's [44] interpretation of the impact of stochastic shocks in supply chain management.

Recent IS research provides some evidence on the adoption of IOS in business networks and the related firm-level and industry-level impacts. For example, in a study of systems adoption in the mortgage finance industry, Wigand, Steinfield, and Markus [67] examined the impact on industry structure of IT-enabled interorganizational coordination standards. They argued that IOS adoption created a level playing field for small companies and helped large companies become more agile, changing the industry's structure in the process. Another study looked at how benefits are created through the assimilation of business process standards [3]. The authors demonstrated that the accrued benefits are different for firms that dominate their industry sectors or marketplaces. In addition, prior research also demonstrated that firms develop IT infrastructure integration capabilities and leverage them to create stronger supply chain integration process capabilities. This allows them to achieve performance improvements [59]. Such outcomes are achieved by unbundling information flows from physical flows and sharing information among business partners to create information-based approaches for various business activities.

Theory

We develop three sets of propositions pertaining to business network-based value creation with respect to network formation, network demand, and network stability (*see Table 1*).

Business Network Formation: IT and Standards Support

The theory of the firm, or, more precisely, the analysis of why firms exist and the literature on transaction costs economics, began with Coase [17]. He defined *transaction costs* as the cost of using either the price mechanism of the market (the "invisible hand") or the costs of explicit nonmarket transactions.

Table 1. Business Network-Based Value-Creation Propositions and Supporting Theories.

Conditions	Proposition	Theoretical assertion	Theoretical support
Network formation	Business network existence (P1a)	Business networks will occur when IT offers opportunities for participants to produce value-creating product and service transactions for customers that the network can do more cheaply through the use of process resources across the boundaries of multiple firms.	Transaction costs [16, 51]
	Process standards support (P1b)	Firms that adopt business process standards will have a higher likelihood of participating in business networks, since their costs for participation and switching will be lower, thus enabling greater capacity for value creation in production that is undertaken with other network firms.	Network externalities [42, 43]; business process standards [61]
Network demand	Firm informedness and consumer informedness (P2a)	Business network-based value creation will be highly valued when informedness increases the complexity of consumer demand and permits suppliers to be flexible with service production and delivery.	Informedness [10, 45]
	Demand-driven complementary network value (P2b)	Business networks involving firms, their business partners, and consumers will be observed where firms provide complementary network value to economically meet consumer demand for value-creating products and services.	Complementary products [61]; value co-creation [58]
Network stability	Sustainable network value (P3a)	A business network will be stable when participating firms are able to create value that is sustainable over time through product and service transactions that result in profits they cannot achieve without similar network organization.	Resource dependency theory [56]
	Monitoring and fair value sharing (P3b)	A stable business network will monitor participation to support fair value sharing to align the incentives of individual firms in a business network so that the firms will be able to jointly maximize the network's value.	Agency theory [22, 39]; coordination theory [50]

He acknowledged that transactions often happen within one firm and across several firms. He argued that transactions tend to occur within the firm when the cost of doing so is lower than that of using the market. Nevertheless, his traditional view of production mainly focused on mass production involving a sequence of stages. Beyond Coase's contributions, Williamson [68] added agency and opportunism considerations, and the explicit risks associated with deliberate contract violations.

The impact of IT on process boundaries is determined by the degree to which the costs of internal coordination, external coordination, and production change. Based on transaction cost economics, Malone, Yates, and Benjamin [51] suggested that IT reduces the cost of coordination relative to production, thereby leading to an overall shift to more use of markets rather than integrated firm hierarchies to coordinate economic activities. In addition to lowering the transaction costs associated with external coordination, Clemons, Gu, and Lang [15] argued, IT also reduces transaction risks and opportunism risks. With these changes comes increased outsourcing with a set of specialized suppliers. Hitt [36] provided empirical evidence on the changes in organization form that IT brings and demonstrated that IT causes a decrease in vertical integration, an increase in diversification, and a subsequent reduction in the size of the firm.

Prior theoretical and empirical work suggests that firms leverage IT to support the use of interorganizational resources and information across the boundaries of multiple firms. Firms also use IT to reengineer key business processes and relationships in order to implement business network-based value creation as a basis for co-creating value-adding products and services with their customers. When a set of firms support the co-production of products and services, they will do so only so long as the combination of their production capabilities bears sufficient value in their marketplace to achieve a profitable return. This leads to the first proposition with respect to the formation of business networks:

> ***Proposition 1a (Business Network Existence):*** *Business networks will occur when IT offers opportunities for participants to produce value-creating product and service transactions for customers that the network can do more cheaply than an individual firm can, through the use of process resources across the boundaries of multiple firms.*

A network is more likely to form if the network costs are lower. Adopting business process standards lowers the cost to firms of participating in electronic exchanges and other interorganizational activities. It facilitates infrastructure, information, and process integration within one firm and across multiple firms. Standards are often developed in markets in which there are increasing returns in the number of firms that adopt the same technologies and products. The success of a standard largely depends on the installed base of firms to create sufficient network externalities [42]. Dominant firms are usually in the position of exerting substantial market power to either sponsor the development of standards or create bandwagon adoption of standards, although they may lock out competing technologies [25, 43]. Small firms, however, are also able

to benefit from industry's adoption of standards. In a study of the adoption of XML technology in the mortgage industry, the authors demonstrated that the lower adoption costs allow smaller firms to enter the competition, resulting in changes in industry structure [67].

Two types of standards for business processes can be distinguished: open standards and proprietary standards. *Proprietary business process standards* are commonly controlled by one firm or a small number of firms, and may not be available to all players in the marketplace. *Open business process standards,* in contrast, typically are developed with the goal of fostering more widespread adoption and creating social value. Firms can leverage them for free or for a reasonable and nondiscriminatory price. There is a sharp contrast between the objectives of these two types of standards efforts, as Shapiro and Varian [61] have noted with respect to technology standards more generally: one seeks to "share the pie," while the other seeks to "grow the pie." Standards engender participation by adopters, who may play an especially active role in their enhancement and development when they are open. The resulting standards, irrespective of whether they are proprietary or open, provide the basis for richer interoperability between firms and enable network participants to appropriate greater value at lower costs.

No firm wants to create new schemas each time it has to electronically connect with a new trading partner. By using business process software standards that are embedded in their systems, firms will be able to work with multiple trading partners in the same industry or across industries. In addition, adopting process standards will reduce their operating costs, as well as the one-time fixed costs of integration, allowing their own IT assets to connect with the otherwise incompatible technologies of other firms in a business network. Further, adoption of process standards also can mitigate a firm's risk of lock-in and reduce its switching costs, making it easier to leave one network and join another. The drawback, however, is that adopting process standards of some kind may cause lock-in for customers that come to depend on a firm for its products and services. This is because a customer attached to a seller that has captured all of its information will have a mobility barrier, making it more difficult to leave the relationship [29]. Therefore:

> ***Proposition 1b (Process Standards Support):*** *Firms that adopt business process standards will have a higher likelihood of participating in business networks, since their costs for participation and switching will be lower, thus enabling greater capacity for value creation in production undertaken with other network firms.*

Business Network Demand: Informedness and Complementary Network Value

Through the deployment of IT, consumers are increasingly informed of the products and services available on the market. Improved informedness has an important effect: It increases the complexity of consumer demand, since people know more about the details of what they want to buy and the available

product offerings of a firm in the market. This change in demand requires more flexible product and service production and delivery. The result, in our view, is a unique and historic increase in the capability of firms to add value through network organizations.

It is necessary to distinguish between firm informedness and consumer informedness. *Firm informedness* covers three levels of awareness. At the *customer level*, an informed firm knows about customer purchases, demographics, and preferences, and can capture, store, analyze, and interpret this information to understand what customers want to buy and how much they are willing to pay. This enables firms to tailor their product and service offerings to the specific needs of individual customers and to benefit from the increased level of willingness-to-pay. At the *firm level*, an informed firm knows about the resources and competencies of other firms too, and may wish to engage them in business network-based value creation, through alliances and strategic partnerships. This knowledge allows the firm to make an evaluation of the centrality of the value it can deliver when products and services are produced and delivered with the involvement of multiple firms. It can also assess the value-adding capabilities of its business network partners. This can be achieved through sharing strategic, tactical, and operational information with its business partners and enhancing its boundary-spanning capabilities. At the *network level*, an informed firm may know its own position in the overall network structure and the positions of the firms it collaborates with. This knowledge is important because a firm's *network position* may determine its access to information and resources, and how it can most successfully work with its partners to achieve the most profitable network outcomes.

Consumer informedness refers to the degree to which consumers know what products or services are available in the market and their precise attributes and prices [10]. It plays an important role in determining willingness-to-pay. A consumer's lack of information may result in higher uncertainty, lowered willingness-to-pay, and subsequently reduced firm profit. On the contrary, in the presence of more information, consumers will experience a sense of "delight" and not just the usual utility. Consumers will not only choose the cheapest product—*trading down*; instead, they will consider choosing the product with the best fit—*trading out* [10, 11]. Recently Kauffman et al. [45] provided an empirical test of the trading-down and trading-out hypotheses using a series of field experiments in the public transportation industry. They found that more-informed consumers exhibit greater trading-down and trading-out behavior, and have lower switching inertia compared to less-informed consumers. Therefore:

> ***Proposition 2a (Firm Informedness and Consumer Informedness):*** *Business network-based value creation will be highly valued when informedness increases the complexity of consumer demand and permits suppliers to be flexible with service production and delivery.*

Traditionally, the market has been viewed as a *locus of exchange*, and firms decided what products and services to produce for customers. Customers were segmented for ease of exchange and were separated from the value-creation

process. The situation changes when connected, informed, and active customers contribute to firm production. A customer no longer only buys products and services. Instead, firms may view customers in terms of the problems they try to solve for them. Gulati and Kletter [33] have suggested that customers are at the core of the relational capital of network organizations. Fung, Fung, and Wind have further noted that "customers are the new axis of the flat world" and the "route through this flat world begins with a customer need and ends with a customer solution" [28, p. 129].

Value co-creation, in the marketing literature, refers to the idea that value is not created solely by the firm and then delivered to consumers—instead, consumers participate in a production process that bears value [58]. In a business network context, the extent to which customers become involved in the joint creation of value may vary depending on what products and services are being produced. Some products and services are complex, unstructured, and highly customized to meet a particular customer's unique needs (e.g., IT consulting, technical engineering, software design). Business network-based value creation is more likely to occur in this situation than in less complex and customized, more structured services. For example, knowledge-intensive service production and delivery activities require firms to develop customized service solutions. Their business partners may serve as natural co-producers of solutions by bringing complementary value into the network. From an economic perspective, they will be more likely to do so if they receive benefits that are higher than the costs of the effort involved in business network-based value creation.

Three capabilities are characteristic of the complementary value that firms develop across a business network. First, the participating firms in a business network will develop the capability to support one another to understand their customers' requirements, fulfill their needs, and anticipate future demand by effectively using network resources. Second, firms will create ways to support value production by involving customers in value co-creation, irrespective of which of the network firms is involved. Third, firms will take advantage of improved firm informedness as a complementary asset for effective value creation. Developing the capability to share information effectively within the network can change the joint production capability of the business partners. Thus:

> ***Proposition 2b (Demand-Driven Complementary Network Value):*** *Business networks involving firms, their business partners, and consumers will be observed where firms provide complementary network value to economically meet consumer demand for value-creating products and services.*

Business Network Stability: Sustainable Value Creation and Fair Value Sharing

The creation of value in business networks develops over time. In providing products and services to customers, the number of firms involved and the sequence of their actions in joint production may change over time. Fung,

Fung, and Wind noted that customer needs "might change, but a flexible organization with a flexible supply network can reconfigure itself to meet the changes of its customers" [28, p. 117]. Although the reconfiguration will not literally happen "on the fly," since the focal supplier will need to have contracts and quality assurance agreements in place with its subsuppliers, it will be necessary to have a fully constituted network of firms ready to do business when they are called upon. When customers find value in the products and services they receive, they will express a higher level of willingness-to-pay and offer the network repeat business. When this is the case, the ingredients for the sustainability of the network will come together, assuming that it can offer products and services profitably and allocate benefits fairly.

Sustainable value creation over time is important for the stability of a business network for four reasons. First, firms involved in business network-based value creation may join or leave a network flexibly over time, depending on their resources, product, and service production requirements, and their relevance to the demand the business network serves. Since firm costs and the details of product and service transactions change over time, it is natural that participating firms will evaluate whether they can achieve a value margin and make their participation value bearing. This reflects the fact that firms may operate at different points in the value chain. Thus, they may only add value for a short or medium-term business activity, depending on the product or service. Over time, network membership can be adjusted to better match consumer demand, but this may be counterproductive for sustaining longer-term relationships.

Second, value creation does not require all network firms to deliver products and services for every transaction the network makes. Business networks may have *core participants* that are stable and always contribute to production and *peripheral participants* that come and go as needed, and may not be called upon so often. A firm can benefit from long-lasting relationships, resulting in improved knowledge, competencies, understanding, and trust [32]. The "dark side" is that firms may be locked into a small circle of relationships and may not recognize the opportunities that arise with new market trends and fresh partnerships.

Third, as suggested by *resource dependency theory*, a firm may enter into an interorganizational relationship to fill a resource need that increases its ability to deliver services efficiently and decreases competition in an industry [56, 57]. This need is more than a one-time phenomenon. Resource dependencies frequently occur over time: What was needed last period is also valuable in order to have access in this period. In addition, firms are not forced to be part of a business network. Instead they will enter new interorganizational relationships or continue to participate in the business network if the all-in strategic and operational benefits exceed the costs.

Fourth, profitability and growth also are important drivers for firms to participate in business network-based value creation. Consumer willingness-to-pay for value-creating products and services will need to cover the participation costs for product or service delivery, and still provide a margin of value that can be split among firms in the business network. Financial economics suggests that a business network will need to have *immediate value* from its

co-production activities, and also will have to generate *present value of growth opportunities*, if the financial costs of coordination are to be acceptable from more than just a very short-term perspective. Firms may need incentives and subsidies to invest to support initial investments to start the value flows [60]. Thus:

> ***Proposition 3a (Sustainable Network Value):*** *A business network will be stable when participating firms are able to create value that is sustainable over time through product and service transactions that result in profits they cannot achieve without similar network organization.*

In network-based production, customer demand typically exhibits variations and volatility over time, and thus not all requests for products or services will require identical resources or the same business network for value creation. In addition, the participation of partner firms and their operating environments will have their own uncertainties to some degree. This uncertainty will tend to increase the difficulties of specifying in advance the value contribution of individual network firms and the outcomes they help the network to achieve. Thus it is challenging to identify how value is shared among network participants when an individual firm's contribution cannot be identified. Furthermore, it is difficult to design reward structures effectively in advance because adjustments and iteration are usually necessary. Instead, firms need to respond on the fly to requests for specific kinds of products and services, and it is often necessary to share transaction value (in the form of payments or promises about future compensation) in the absence of a clearly understood compensation mechanism. Otherwise, unfair value sharing may result, which will lead to network instability. The likely result is that firms may no longer wish to continue to participate in the network and will exercise their other outside options to participate in other business networks. A business network's stability and success will depend, to some degree, on how the business value it creates is distributed among participating firms.

A successful network will have the appropriate incentives in place that encourage and permit business network partners to jointly maximize value. The business network will need to be organized in a manner that serves to align the goals of the focal firm in a transaction with those of other participating firms. This is similar to the *principal-agent problem* as described by Jensen and Meckling [39]. To align the goals of network firms, the outcomes toward which the focal firm wishes the participating firms to work must be tied closely to the related incentives. The capacity of network participants to understand how to effectively allocate value will be affected by the degree of outcome uncertainty present in the environment and whether it is possible to measure the participants' individual contributions to the overall value produced [22]. The more difficult it is to measure the outcome, the more difficult it will be to determine what the compensation should be for any individual participant. The capability of different firms to effectively appropriate value in interfirm activities also has been affected by technological progress [2], the interaction between network members and technology [13], and how the technological assets of their business networks are invested in and owned [34].

For these reasons, it is necessary to have effective monitoring mechanisms in place. If there is no appropriate mechanism in place, the partner firms may engage in self-interested behavior that will result in other firms being unwilling to continue to participate. Still other firms that are attractive partners for the network may decline to participate based on "hearsay" problems with value sharing. This is similar to an agency problem where the interests of the participating firms are not congruent with the interests of the focal firm. To solve the agency problem in a business network context, the focal firm, or *principal*, can implement monitoring to limit the ability of the participating firms, or *agents*, to engage in self-interested behavior. Similarly, the firm can use monitoring to obtain more information about participating firms' behavior and decisions. This will increase the efficiency of the business network by reducing the risk that the participating firms will engage in self-interested behavior, leading to beneficial outcomes.

Unlike direct personal supervision of managers in a single firm, network-based monitoring and fair value sharing may require the presence of a network orchestrator or coordinator to ensure the success of the process. Joint production of products and services requires effective coordination of specialized activities, transactions, and processes among various network participants. Coordination theory suggests that firms need to identify and study common dependencies and the related coordination mechanisms to manage dependencies among activities and resources within a firm as well as across firm boundaries in a business network [50]. Thus the following is asserted:

> ***Proposition 3b (Monitoring and Fair Value Sharing):*** *A stable business network will monitor participation to support fair value sharing to align the incentives of individual firms in a business network so that the firms will be able to jointly maximize the network's value.*

Evidence from Travel and Hospitality Industry

The discussion in this section begins with an explanation of methodology, including research setting, case selection, and data collection. It then moves on to treat multiple cases that validate the theory on network formation, network demand, and network stability.

Research Method

We implemented a multiple case study approach to explore the theory, following Benbasat, Goldstein, and Mead [7], and Eisenhardt [23]. We selected the travel and hospitality industry, comprising airlines, hotels, travel agencies, and related intermediaries, as the empirical setting for the study for a number of reasons. First, this industry has achieved a level of sophistication in terms of advanced IT use and intensive market competition in the last two decades. Moreover, it has been widely discussed in the IS literature, beginning with the early introduction of computerized reservation systems (CRSs) in the airlines and of IT in travel agencies, as in the case of Rosenbluth Travel, as described

by Clemons and Row [14, 18]. This extended to the transformation through disintermediation and reintermediation of the business travel sector and to the information transparency enabled by on-line travel agencies, such as Orbitz, Expedia, Hotwire, and Priceline [31]. In fact, the travel and hospitality industry continues to undergo fundamental changes wrought by IT. As a result, today the travel distribution industry is not only newly contestable but represents a *newly vulnerable market*—newly easy to enter, difficult to defend, and attractive to attack [5, 15 , 31].

To bring the market competition to the next level, market players in this industry chose to team up through alliances, frequent flyer programs, and code-sharing agreements to produce value-added services that reflected increasing innovativeness and value for customers. Another reason for selecting this industry, pointed out by Eisenhardt [23], is that singling out one industry helps to control for extraneous variation that would make it more difficult to understand the relevant causes and their possible effects.

We identified multiple cases from this industry to provide empirical evidence for the theoretical perspective, as a means to extend prior theory, and to explain the formation, demand, and stability of business networks. Multiple cases enable broader exploration of the research questions under study. They also permit elaboration on the basic theory that is being examined. Moreover, theory building from multiple cases typically yields more robust, generalizable, and testable theory than do single-case study research designs [23]. The selection of the cases to be reported on was based on the desirability of replication and extensions to the theory, by offering either confirmatory or disconfirmatory evidence. To this end, we made sure that each part of the theory expressed in the propositions was demonstrated by evidence from some of the cases. We collected case information from a variety of sources, including company press releases and industry news, corporate white papers, consulting reports and firm brochures, and other items in the industry press.

Evidence for Business Network Formation

We next present evidence to support the foregoing network-formation propositions. We will first use a case to illustrates the forces that support the existence of business networks for value creation in the marketplace. We will then discuss the role of business process standards in the travel and hospitality industry as a means to show the benefits they offer for business network-based value creation.

Case 1a: Delta Air Lines Developed a Code-Sharing System with Its Alliance Partners

To offer a global route network and seamless travel, the airlines have built IT-supported alliances. As of 2010, three major airline alliance networks—the Star Alliance (www.staralliance.com), the SkyTeam Alliance (www.skyteam.com), and the OneWorld Alliance (www.oneworld.com)—account for more than 80 percent of the world airline industry (*see Table 2*). In 2009, Continental

Table 2. International Airline Alliances.

Characteristic	Star Alliance	SkyTeam	OneWorld Alliance
Launch	May 14, 1997	June 22, 2000	February 1, 1999
Headquarters	Frankfurt, Germany	Amsterdam, Netherlands	Vancouver, Canada
Full members	26	9	11
Country	175	169	142
Destinations	1,077	905	727
Passengers	603.5 million	462.0 million	328.2 million
Fleet size	3,993	2,971	2,280

Sources: www.oneworld.com, www.skyteam.com, www.staralliance.com.

joined the Star Alliance. When asked about its motivation, Continental's chief executive officer, Larry Kellner, said: "In a network business, there is significant value gained from linking with larger networks to provide truly national coverage and expanded global reach, and exploring new ways to reduce costs and improve efficiencies" [63].

Airlines have the potential to improve their revenues and provide value-added travel services through careful selection of their code-sharing partners through these alliance networks. *Code-sharing* is an agreement that allows a marketing airline to place its marketing code on an operating airline's flights and sell these fights to its customers. As a business process, code-sharing relies upon the use of business process resources and integrating technologies across the boundaries of multiple firms, not just one, as the proposition suggests. Code-share flight selection is a complex process and often involves different requirements and restrictions from the alliance contract, federal regulations, and an airline's labor unions. Delta Air Lines successfully developed a "code-share flight profitability system" [54]. This system helps to automate the code-share flight selection process to maximize total system revenue for Delta Air Lines, while satisfying the rules set by the alliances, the government, and the airline unions. Delta expects the new system to increase its operating revenue by up to $50 million per year while reducing its planning cycle from days to several hours. With code-sharing programs, for every customer request, a subgroup of airlines within a particular alliance agreement works together to deliver travel services that satisfy customers' specific requirements, rather than with just one airline. As a result, customers benefit through expanded networks that coordinate flight schedules, merge frequent flyer programs, reduce fares, and shorten travel times as a result of optimized transfers.

Case 1b: The OpenTravel Alliance Facilitates Electronic Exchange Among Travel Companies

Customer demand for one-stop shopping has given rise to higher expectations for service delivery by travel companies in the last few years. The new requirements are for various service providers of all kinds to flexibly work

together to deliver seamless travel services. As a result, there is an increasing call for travel companies to adopt business process standards so they will be in a better position to join travel service provider networks and satisfy the market demand for quickly establishing transaction-making relationships with new partners.

The OpenTravel Alliance (www.opentravel.org) is an exemplar in this respect. It was founded in 1999 to facilitate business-to-business electronic exchange of transaction and booking information among all sectors of the travel industry on the basis of XML message standards. This industry effort is focused on improving operational processes and reducing costs in travel and hospitality. The member firms of the alliance include airlines, car rental firms, hotels, cruise lines, railroads, leisure suppliers, tour operators, travel agencies, and other services and technology companies and distributors (e.g., Accor, American Airlines, Amtrak, Expedia, Hertz, Marriott, Orbitz, Royal Caribbean Cruise Lines, and US Airways).

A member of the OpenTravel alliance noted the fast adoption of the open framework and commented that "growing numbers of travel companies are migrating from proprietary XML interfaces to the alliance's travel-specific XML messaging standard" [47]. This has happened because with the OpenTravel specifications, travel companies do not need to worry about creating a new scheme each time they connect with a new trading partner, which would increase their cost of participation and lower their operating margins. Mike Kistner, chief information officer and vice president of Best Western International, a hospitality services provider, emphasized the benefits of moving to open standards for business process support: "I don't have just one business partner. So if I've implemented the [OpenTravel] specification and my second business partner comes along, I can use the same specification. I don't want to maintain fifteen interfaces to my business partners" [70].

By standardizing the technical elements of their business process framework—beyond the data-sharing formats typically used in electronic data interchange in the past—travel and hospitality firms can more easily establish connectivity with multiple trading partners and benefit from improved interoperability. John Turato, vice president of technology at the Avis Budget Group, has stressed these ideas: "Reusable, standard messages mean our architects and developers don't have to start from the beginning when we bring on a new distribution partner. Our experience in the implementation of OpenTravel schema shows in our robust distribution platform" [55]. With lower adoption, integration, and switching costs enabled by process standards, flexible travel networks are more likely to form to create greater value for consumers and improve their travel experiences.

Evidence for Business Network Demand

We next discuss the evidence that supports the business network demand propositions. We illustrate how the airlines' use of social networking tools affects consumer and firm informedness, and show whether the outcomes are consistent with the proposed theory. A case related to airline frequent flyer

programs and hotel alliances illustrates the proposed ideas about consumer demand-driven complementary network value.

Case 2a: The Airlines Embrace Social Networking Tools and Increase Informedness

Increasingly, airlines and their alliance partners are establishing a social media presence to engage customers, become informed about customers' needs, and communicate about product and service promotions. For example, JetBlue has more than 1 million followers on Twitter, and it also follows about 120,000 of those "tweeters" (http://twitter.com/jetblue/). Southwest Airlines has more than 600,000 followers on Twitter (http://twitter.com/southwestair/) and more than 76,000 fans on Facebook (www.facebook.com/south-west/). Delta Air Lines has more than 11,000 followers on Twitter (http://twitter.com/deltaairlines/), and United Airlines has about 33,000 followers (http://twitter.com/unitedairlines/). Meanwhile, in Europe KLM Royal Dutch Airlines also has more than 11,000 followers on Twitter (http://twitter.com/klm/) and more than 120,000 on the Dutch social network site, Hyves (www.hyves.nl).

Airlines use these social media as a sounding board for how they and their partners are doing. This is particularly important when an airline provides services with its alliance partners. In such cases, the quality of the services provided by the coalition of airlines is more important than the services provided by any single airline. This is because, although customers may book with one airline, they may experience the service quality levels of partner airlines as well. Services received from one member airline that do not match the quality levels offered by the services of other alliance partners may have immediate implications for the entire alliance [66]. These social media developments provide an efficient way for customers to express their frustration and for airlines to channel the right information to the right party across the boundaries of the business network to solve problems when they occur. A senior analyst of corporate communications at JetBlue said: "We want to engage [customers] and come up with options and get them to the right people with the right information" [1].

Similarly, the airlines use Twitter as an efficient channel to increase consumer informedness by updating the public on the latest news and broadcasting last-minute deals. For example, JetBlue created a Twitter feed in 2009 called "JetBlueCheaps" (http://twitter.com/jetbluecheaps/) to post its last-minute deals, and United developed Twitter-only fares called "Twares" to attract customers. A United Airlines spokeswoman further noted: "Twares are all about surprising our customers with low fares for a very, very limited time. [They] sell extremely fast because the prices are unbeatable" [40].

Case 2b: Frequent Flyer Programs Become Vital Assets for Hotels

Shortly after the industry's deregulation and the first launch of the CRSs occurred in the late 1970s, American Airlines introduced the first frequent

flyer program in May 1981. Since then, other airlines, hotels, and rental car companies have followed American's lead. Today, frequent flyer programs have become strategic necessities in the operations of most major airline firms, and, in spite of the many offerings, continue to be effective marketing tools for service providers. Not hooking up to a loyalty program became too expensive for service providers. Herb Kelleher, president of Southwest Airlines, stated: "We didn't want a [frequent flyer program]. But . . . [these programs] were siphoning business travel away from us. We did it defensively, and I think if we had not done that we would have been terribly disadvantaged" [27].

Many travel firms have established business networks that involve airlines, hotels, cruise companies, rental cars, and a variety of amenity programs. For example, the Hilton Honors Program of Hilton Worldwide (www.hiltonworldwide.com) works with more than fifty participating airline partners at 3,300 owned and franchised hotels [35]. Customers can earn airline miles for their hotel stays at any Hilton property by presenting their frequent flyer program account number when they check in. Hilton Honors works with a points and miles system that permits customers to earn credit by choosing from participating airlines in its networks. In addition, customers can redeem their points in a dozen different ways, including vacation packages, cruises, car rentals, entertainment, and shopping. As a result, Hilton Worldwide is able to create network-based value to its customers through the Hilton Honors Program, by involving airlines, hotels, rental cars, and many other participating firms providing complementary services. This complementary network value-creation activity is also reflected in the convenience and flexibility the program creates by allowing customers to purchase points, transfer points to friends and family, and donate them to charitable organizations. The collaboration between the firms and their customers is essential for delivering a completely new level of utility and value in the marketplace.

Evidence for Business Network Stability

The evidence to support the network stability propositions includes a case that probes the role of sustainable value creation in business networks and the influence on their duration and stability over time. Another case follows that demonstrates fair value sharing and incentive alignment for the joint maximization of network value to promote network stability.

Case 3a: 24K.com Implements a Digital Gold Points Reward Network at the Carlson Companies

Carlson Companies (www.carlson.com) is a privately held $20 billion business based in Minneapolis, Minnesota. It spans the hospitality, travel, and marketing services industries, including loyalty programs (Gold Points Reward Network), hotels (Radisson Hotels and Resorts, Regent International Hotels, Country Inn and Suites), restaurants (T.G.I. Friday's), ocean cruises, and other travel services. In 1994, the Carlson Travel Network in the United

States and Wagonlit Travel in Europe, one of the largest travel and hospitality firms operating outside North America, merged to form the Carlson Wagonlit Travel Network, creating one of the first truly global travel and hospitality network. The equal partners both invested the equivalent of $45 million over three years to create a combined operating company.

In February 2000, the company announced a new business unit to embrace the e-commerce revolution and extend its capability with corporate loyalty and marketing programs. It brought together its "Gold Points Reward Program," created in 1996 by Carlson Marketing Worldwide, with a new business unit called 24K.com on September 30, 2000 [6, 26]. This enabled Carlson Companies customers to plan and book travel on-line via Carlson Wagonlit Travel, and enjoy shopping at more than 1,500 bricks-and-mortar stores, while earning "Gold Points" rewards [9]. The company's effort with 24K.com was intended to extend the Carlson Companies' customer-centered marketing emphasis to the Internet from its physical channels.

This effort is an instance of a *business network-based value-creation strategy* since it involved the Internet, Carlson Companies business units, and Carlson's business partners in the network. Gold Points was a business systems-based "network rewards program" [30]. Some of these partners operated behind-the-scenes. More than 100 loyalty program products and services providers of its 1,500 rewards supply partners were willing to hook up to the Internet to support Carlson's customers [26]. The rewards partners included Air France and the Concorde, Thrifty Car Rental, and National Car Rental, for example. The Carlson Companies also offered Gold Points for consumer purchases at many Internet retailers and physical retailers locations based on loyalty card swipes.

Mike Larsons, project manager for 24K.com at the Carlson Companies in 2000, commented: "The revenue model . . . that's where we separate ourselves. . . . We also have shopping . . . and we are going to generate revenue through affiliates, through private labeling and . . . where our biggest revenue driver is going to be with Gold Points. . . . The more Gold Points partners that we sign up, . . . the better off we are going to be. . . . We have been sponsored by [Carlson] but we are essentially on our own now, so that the revenue we generate from here is the only revenue that we get to use" [20].

Although travel and hospitality industry observers believed that 24K.com had an innovative business model, the market ultimately showed that its value was not sustainable. Three reasons combined to undermine the lack of sustainability of the business network's value as an Internet-focused firm. First, the dot-com boom was in full bloom in the United States. Shortly afterwards though, the perceived value of e-business firms fell, so the expected returns on investment for 24K.com were viewed as unrealistic. Funding was limited, as a result. Second, consumers saw a literal explosion of on-line loyalty programs, with many new competitors converging in the new marketspace of the Internet. Third, 24K.com did not offer a strong value proposition for its key stakeholders. In spite of its efforts, and those of the Gold Points Reward Network, to bring enough e-retailers together, there simply were not enough to sustain revenues to offset the fixed costs of running the network. Moreover, the e-retailers that 24K.com had signed on were also unable to make a compelling case to their

customers about the benefits associated with Gold Points. Customers were not convinced of the efficacy of their value co-creation efforts with 24K.com and the e-retailers. Carlson Companies quietly pulled the plug on 24K.com, due to the digital business network's lack of sustainable value.

Case 3b: Aligning the Incentives of Airline Partners to Promote Network Stability

In a code-sharing agreement, it is critical to ensure that there is appropriate alignment of the incentives of individual airlines to fairly share value in cooperative airline services production. Individual airlines typically have different incentives when they work with other airline firms in code-sharing agreements. Some may want to develop a new market presence and benefit from an expanded network scope to provide their customers with more choices. Others may want to achieve better consumer segmentation or product differentiation. In May 2009, Delta, Air France, and KLM announced a joint venture that represented about 25 percent of the transatlantic market to generate about $12 billion in annual revenues [24]. By building a fully integrated network across the Atlantic, the three airlines have been able to expand their services on key routes, resulting in lower fares and increased consumer choice. Pierre-Henri Gourgeon, president and CEO of Air France–KLM, explained the company's incentive for participating: "By integrating our trans-Atlantic operations, we will give our passengers what they desire: more choice, more frequencies, more convenient flight schedules and superior customer services . . . by optimizing the use of our pooled resources, this joint venture will help us weather the current economic situation and protect our product offering" [21].

In some other instances, however, airlines may exhibit self-interested behavior for joining code-sharing alliances. Past research has shown that airlines may charge higher prices under code-sharing agreements, as compared to what a single airline would charge, that control prices over the joint itinerary [37]. This may be occurring due to the airlines' ability to create high value for their customers. It may also be that each airline has been trying to maximize profit from its own segment independent of the other airlines. Another incentive is known as *crowding out*. The airlines also use code sharing to increase the number of their listings in CRSs so that they can benefit from reduced competition and higher fares [37]. Such self-interested behavior on the part of code-sharing airlines reflects their desire to maximize their own revenue, resulting in suboptimal revenue for the alliance.

In order to fairly divide revenues, it is common for airlines to implement revenue allocation techniques through proration agreements [8]. *Proration schemes* are defined as arrangements that specify the manner in which route-level revenues are shared by the airlines [69]. Most proration schemes involve fixed transfer prices for particular flight and fare combinations or simple allocation mechanisms, such as a split in revenue based on the city-pair mileage of the different carriers that fly segments of a multi-segment airline route. Although such *static proration schemes* are easy to manage, they do not solve the problem of suboptimal decision making. They may still result in lost revenue for the

network as a whole because an airline may reject an itinerary if the transfer price undervalues the real-time value of its seat inventory, even if the total revenue from the itinerary is profitable.

The major airlines are now working toward dynamic proration schemes to support a greater degree of fairness in airline code-sharing alliance value sharing and to align the incentives of individual airlines to jointly maximize the value of the network [65, 69]. This is exemplified by the joint venture of Delta, Air France, and KLM. In an interview after the announcement of the joint venture, Richard Anderson, the CEO of Delta Air Lines, explained the importance of aligning incentives to support the success of their cooperation. He stated that the "structure of this joint venture, in which we operate as a single business where we consensually develop our strategies and share revenues and costs, provides the incentives for us to collaborate in a way that generates benefits for customers, shareholders and employees of our three airlines. Customers will benefit from the unique scope and choices we will offer, while shareholders and employees will benefit from the stronger competitive and financial position of our respective airlines" [24]. This case supports the Monitoring and Fair Value-Sharing Proposition (P3b).

Conclusion

The research in this article has sought to understand why business networks exist and the conditions under which they are likely to be enduring industry organizational forms in the presence of IT. We touched upon the existence, consumer-demand-driven complementary value, and stability of business networks. We also validated the proposed theory with cases from the travel and hospitality industry. We next present the main findings and contributions of the research, together with an assessment of the generalizability of the propositions to other industry contexts. We close with some thoughts about the limitations of this work and future research.

Main Findings

We constructed the theoretical perspectives presented in this article based on extensions to the existing body of knowledge in the competitive strategy, economics, and IS literature. First, the Business Network Existence Proposition (P1a) explained why this form of business network exists. We used the Process Standards Support Proposition (P1b) to explain the effects of cost reduction that make the networks more likely to form. Second, we argued that firm and consumer informedness enhance the value of business networks. We stated this as the Firm Informedness and Consumer Informedness Proposition (P2a). Our evaluation of how network firms and their customers jointly add value in production prompted our specification of the Demand-Driven Complementary Network Value Proposition (P2b). Third, we also presented two additional business network value and stability propositions. They include the Sustainable Network Value Proposition (P3a) and the Monitoring and

Value-Sharing Proposition (P3b). These discuss sustained value and network stability over time.

A series of cases related to the travel and hospitality industry provided empirical support for the theory. The massive IT-driven changes in this industry in the past two decades have enabled business network-based value creation to become a viable and valuable business model. Our discussion showed how airlines use advanced code-sharing systems with their alliance partners and how an open travel framework facilitates electronic exchange among travel companies. We also explained the informational role of social networking tools and how hotels embrace frequent flyer programs to enhance value for customers. Furthermore, we examined the rise and fall of Carlson Companies' 24K.com, together with the ways airlines share value through joint ventures. Table 3 summarizes the propositions and the supporting empirical evidence.

Theoretical Contributions and Managerial Implications

The IT-enabled transformation of business explored in this article stems from the increased availability of information and of ITs able to support business network-based value creation. In the presence of improved informedness, customers demand more and more complex and individually tailored products and services that require flexibility in production and service delivery from firms. Firms have been engaging in joint product and service creation and delivery with their business partners, and they have invited their customers into the process as value co-creators. As a result, business value is increasingly being generated at the network level rather than the firm level.

The "move to the middle" hypothesis argued that IT has been a force for stable relationships between individual buyers with a small set of permanent suppliers [16]. What we propose in this article is different. We argue that business networks are now able to deliver capability for flexible product and service production and delivery. These are now more closely tailored to the needs of the informed consumer, as made possible by much lower transaction costs through on-line search support, decision technologies, and other digital capabilities associated with the Internet. In addition, these networks have become stable and sustainable for the first time because fair value sharing is made possible by advanced IT, the implementation of technology and process standards, and a managerial understanding of what it takes to bring these elements together effectively. Based on transaction cost economics, informedness theory, and agency theory, this research offers a new perspective on business network-based value creation.

Based on the proposed theoretical perspective and empirical analysis, we offer a number of managerial implications and predictions. Travel companies are no different from other industries in that they have realized that delivering hyperdifferentiated travel services is increasingly important when customers are looking for products and services that especially suit their needs. Based on the second set of propositions (informedness and complementary network value), it seems likely that service providers in the travel and hospitality industry will develop advanced IT capabilities to tailor customized services that

Table 3. Theoretical Propositions and Empirical Evidence on Network-Based Value Creation.

Condition	Theoretical proposition	Empirical evidence: travel and hospitality industry
Network formation	Business network existence	Airlines jointly deliver travel services under airline alliances such as Star Alliance, SkyTeam, and OneWorld. Delta Air Lines has developed a profitability system for code-sharing with its alliance partners.
	Process standards support	OpenTravel Alliance facilitates electronic exchange of business process information among travel companies. Service providers now build collaborative travel applications around these standards.
Network demand	Firm informedness and consumer informedness	Airlines embrace social networking tools such as Twitter and Facebook to listen to customers' voices for service improvements across alliance partners and also to offer last-minute deals.
	Demand-driven complementary network value	Frequent flyer programs have become vital assets for hotels. The Hilton Honors Program allows customers to access more than 50 airlines through 3,000-plus properties to create value complementarities.
Network stability	Sustainable network value	Carlson Companies merged its Gold Points Rewards Network and 24K.com and established an e-commerce platform. But 24K.com failed due to limited value creation for participating firms and consumers.
	Monitoring and fair value sharing	Delta, Air France, and KLM established a joint venture and developed a joint strategy to share revenue and costs to collaborate and generate benefits for customers. The individual airlines employ effective incentives to pursue joint maximization of network value.

involve multiple firms to match their customers' increasingly sophisticated demand for travel services. This is exemplified by the increasing popularity of the dynamic packaging and service-bundling options used by major travel operators and on-line portals to drive transaction value, while offering all-in-one solutions. Demand-driven product bundling, based on prespecified rules and conditions, combines travel services from different providers to offer flexible itineraries. British Airways has seen a sales increase of 9.2 percent in the last quarter of 2009 since introducing this approach. A British Airways spokesperson explained that dynamic packaging was behind this growth: "Since we replaced the old shopping basket approach with dynamic packaging, customers have been booking more hotels, car hires and insurance," and "They are comfortable using the site to build their own package holiday and like the savings" [19].

As business networks gain greater stability and become more strategically sustainable, based on the tenets of the third set of propositions (sustainable network value and fair value sharing), a change is now taking place in the nature of market competition. It is moving from firms competing against other firms to network-to-network competition. In a recent move in November 2009,

Continental Air Lines announced that it was leaving the SkyTeam Alliance, which had just 11 member airlines in 2008 [63]. This decision was based on Continental's expectation that it would be able to collaborate with more alliance partners through the Star Alliance. It also expected to gain access to a larger airline route network and be able to provide better travel options to its customers. The Star Alliance today includes 22 international airlines and three U.S. regional carriers, and has announced plans to add another five additional members in the future. Thus, there are continuing opportunities for network-based value creation in this airline alliance.

Generalizability

We studied the travel and hospitality industry and conducted exploratory cases to validate our research propositions. In an exploratory sense, this study offers theory that is potentially applicable across multiple product and service domains (e.g., rental cars, realtors, lenders, home repair services) to firms that have a will to compete in a business network. We consider the issue of generalizability with the discussion of another example that illustrates this form of value creation—this time in the public transportation industry. Public transportation serves many of the same consumers as the travel and hospitality industry, albeit more locally. Enabled by new technological innovations and enhanced IT capabilities that produce much more information than ever before, a variety of public transportation operators have begun to deliver multimodal transit services across multiple firms that have the potential to dramatically enhance their customers' experience and satisfaction.

Public Transportation in the Netherlands

An example is Business Card, a travel product launched by Netherlands Railways during the past several years to support business network-based value creation in the public transportation industry [53]. Imagine that a cardholder makes a request to travel from one location to another within the Netherlands. Upon receiving this request, the operator will arrange all the necessary transportation for the customer, including booking a taxi, booking a regular or possibly a high-speed train, reserving a parking space at one of the stations, hiring a bike or scooter, and providing additional services. These may include wireless computer access, entry into the station lounge, and real-time travel and traffic information.

In contrast to standard public transportation services that operate based on fixed timetables, this approach delivers transit services through a set of firms in a flexible network on an as-needed basis. This is consistent with the idea that a business network must be able to flexibly create value. This form of network-based value creation exists today because the cost of linking and integrating services across different service providers is much lower, supported by advanced IT. This reflects the thinking behind the Business Network Existence Proposition (P1a). The formation of network-based transportation

services is supported by standards involving point-of-sale systems, data formats, platform applications, product descriptions, and security. Standardized ticketing technologies and processes allow service providers to make seamless travel arrangements for travelers. This standards development is consistent with the European Union's Interoperable Fare Management Project (www.ifm-project.eu), which was initiated on January 1, 2008. The project aims to achieve interoperability of electronic ticketing processing and allow travelers easy access to all public transportation systems in operation in the member nations. This is in line with the Process Standards Support Proposition (P1b).

This network-based operation involves a coalition of service providers in different geographic locations being called upon to deliver complementary services in support of a particular customer's request. The service is composed and delivered as changes in customer demand occur. The network provides a one-stop shopping destination for customers with a total value-added package: from the service request and travel options matching, to the service selection and quality assurance, through to service delivery and real-time travel information updates. This demonstrates the Demand-Driven Complementary Network Value Proposition (P2b). Customers are much better informed than previously, due to real-time updates from a travel and traffic information service called 92920v (www.92920v.nl). Public transportation providers across the Netherlands were involved in its development. With this service, customers can receive detailed door-to-door travel advice related to their requests, including travel time, number of interchanges, alternative routes and travel modes, and delays and schedule changes. Firms also are better informed about the entire door-to-door journey of their customers, which allows service providers to charge their customers' accounts on a monthly basis, without requiring advance payment. The improved information availability allows them to learn and understand their customers' needs and preferences. It also permits them to develop new products and adjust their services and schedules, further improving service levels and customer satisfaction. Freek Hofker, a senior manager for marketing research at Netherlands Railways, said, when interviewed, that "the rich customer data provided can help us to design a better fare policy [to] ensure financial targets, manage demand, ensure effective use of resources, and maximize social benefits." This illustrates the Firm Informedness and Consumer Informedness Proposition (P2a).

As argued in this article, the creation of sustainable value business networks must occur over time for a network to be stable. This is true for the public transportation setting described above because the service providers' participation may change depending on their availability and the related operating schedules. The sequence of their participation also may change depending on each customer's specified origin and destination, preferred departure and arrival time, and preferred mode of travel. The success of this network-based service delivery also offers a means to demonstrate network stability. Service providers will only continue to provide services to this network-based production if they can continue to achieve profitability from participating. This is consistent with the Sustainable Network Value Proposition (P3a). This success also relies on Netherlands Railways' active monitoring of the providers' service-delivery performance, and its efforts to align the incentives of

individual participants to achieve fair value sharing. This has been facilitated, in turn, by the nationwide introduction of an electronic ticketing system that makes it possible for all participating operators to connect their ticketing systems to a central clearing house for data. As a result, data on customer actual usage levels for the transportation services can be used to calculate and apply accurate revenue apportionment and to manage the different operators that provide the services. This corresponds to the Monitoring and Fair Value-Sharing Proposition (P3b).

Limitations and Future Research

Finally, it is important to consider some limitations of this study and some avenues for future research. Firms like the ones discussed in the article do not operate in isolation—they are embedded in business networks that require a lot of interfirm coordination, systems integration, and deft managerial practice. Understanding how a firm chooses the boundaries of its operations is a key step in understanding how it creates value and can share value in a network environment. The discussion here has focused on offering relatively basic economic explanations of network formation, the role of network demand, and the conditions for network stability. To offer a richer interpretation of the issues related to network-based value creation, future research should develop analytic models that examine in greater detail specific elements of what has been studied here. For example, it may be useful to model how firm-level, transaction-level, and network-level characteristics affect a firm's boundary choices in the presence of technological innovations, and the network's value in a game-theoretic, competitive setting involving multiple business network choices. It may also be worthwhile to examine how firm behavior is shaped by the presence of different incentive structures for fair value sharing and what happens when the business partners in a network have access to outside options. This is similar to what is discussed for the airline alliances cases.

The travel and hospitality industry was the empirical context in this article. Several compelling cases were selected to validate the proposed theory. Arguments were proffered to justify why there is meaningful explanatory power from a small number of cases in an industry where there are rich opportunities for validation. Nevertheless, there are likely to be differences in the processes that lead to the creation of network-based value as a result of the unique characteristics of different industries. Future research can analyze cases from other industries to further enrich the overall understanding of the theoretical perspective here offered.

IT and the information it generates continue to transform the landscape of modern firms. IS researchers are in a unique position to study the impact of informedness and how it relates to the creation of IT value for firms and business networks. This study has shed some light on a number of important issues related to network-based value creation. More research is required to fine-tune the boundary conditions and application of the theoretical propositions here presented. For example, it will be important to understand how increased information can help firms determine which partners to collaborate with so that

they can position themselves in business networks to maximize the beneficial outcomes they obtain. It is equally beneficial to investigate how firms can, on the one hand, encourage product and service co-development with their customers, and on the other, foster trust and balance control and empowerment among network participants to achieve greater value and higher profits.

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