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# Planning and Deployment of Collaborative Commerce: A Conceptual Framework

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## Abstract

This article proposes a conceptual framework for planning and deploying collaborative-commerce (c-commerce). The framework consists of two dimensions: the type of inter-organizational relationships and the level of engagement that involved organizations want to achieve. The combination of these two dimensions generates nine categories of collaborative-commerce. Each category designates an opportunity for c-commerce initiates. The article characterizes each category with two concepts: focus and linkage interface. Focus means the interest or benefits that one type of c-commerce is expected to achieve. Linkage interface refers to major elements that facilitate the type of c-commerce to move forward and keep the involved parties as a whole. Examples are identified to illustrate the nature of each category.

Practitioners can use the framework as a roadmap to assess the commitment and trust level and subsequently, determine the type of c-commerce. Researchers can use the framework to identify issues specific to each category and specify features of enterprise application pertaining to each category. Three main directions are also identified for future research to further understand the phenomenon of c-commerce.

## 1. Introduction

As the competition of business environment becomes more intense and information technologies (IT) become more sophisticated than ever, firms are rapidly adopting innovative use of IT to outreaching customers, building partnerships, and creating new forms of organizations. Ramifications of this trend include the creation of various new forms of commerce, such as electronic-commerce, electronic-business, and mobile commerce. According to a recent report [2], the next stage of growth in the enterprise application software business is collaborative commerce (c-commerce). The report estimated that the size of the c-commerce market would grow from \$5.8 billion in 1999 to \$36.5 billion in 2004 (estimated by AMR and IDC). Several successful cases of c-commerce have been reported in various industries, such as the aviation and aeronautics, automobile manufacturing, and telecommunication. For example, Boeing improved its production productivity from 228 airplanes per year in 1992 to 620 expected in 2002 by using collaborative e-marketplace [5].

As many firms start adopting c-commerce, issues surrounding c-commerce have caught researchers' attention. For example, Welty and Becerra-Fernandez (2001) investigated the issue of managing trust and commitment in collaborative relationships. Kumar [13] delineated the features of information and communication technologies for supporting c-commerce.

Although sporadic research about c-commerce has been reported, an examination of extant research shows that there is a lack of systematic research into the phenomenon of c-commerce. The purpose of this article is to propose a conceptual framework for planning and deploying c-commerce at the firm and industry level. We believe that, in the early stage of e-commerce, such a conceptual framework is crucial for understanding the phenomenon of c-commerce. With the conceptual framework, researchers could synthesize previous studies and identify issues specific to different types of c-commerce. The framework can also be used by practitioners as a roadmap to take into account relevant issues when they consider investing in c-commerce.

## 2. Literature Review

C-commerce is claimed as the next generation of enterprise software applications, yet the practice of collaboration is not new. In fact, collaboration is part of human life. By working together, people could overcome challenges imposed by the nature and survived from acts of the nature. As a result, while research in c-commerce in the field of IT is still in its infancy, the topic of collaboration has caught researchers' attention in a variety of disciplines. For example, researchers in the field of social services have investigated how business, government, and stakeholders form collaborative alliance to generate constructive solutions to social problems [8]. In the field of marketing, researchers examined the factors that affect the development of collaborative relationship between buyers and sellers [24] and how to develop and sustain collaborative supply chain relationships [23].

Meantime, only limited research in e-commerce has been conducted in the field of IT. Those existing studies focused on two themes: (1) reporting successful anecdotes and (2) IT infrastructures for building c-commerce. Examples of successful stories [5] [12] are available in companies in various industries: those are Boeing Co., Lockheed Martin Aeronautics, Co., General

Motors Corp., Juniper Networks Inc., and Toshiba Canada Office Corp.

The emphasis of IT infrastructure prevails in the extant literature of e-commerce. For example, Bellini, Gravitt and Diana [2] define the e-commerce market by three categories of enterprise application software: supplier relationship management, knowledge management, and product lifecycle management. They assert that the demand for software in these three categories will grow when companies look for ways to close the loop of product development value chain. They report that the collaborative capabilities of those applications usually leverage the Internet, rather than an enterprise proprietary nationwide network. Also, the collaborative capabilities require an environment to “facilitate inter-company business processes and community management with integration to extend the enterprise in a unique and ubiquitous way” [2, p. 7].

Fou [7] claims that the ultimate aim of e-commerce is to maximize return on intellectual capital investment, improve business agility, and provide better quality of customer experience. In order to achieve the objective, Fou believes that the next stage of e-commerce must be built on web services, and he proposes a Web-service-based collaborative architecture that consists of four tiers: c-commerce vendors, web services, business rule engine, and multi-dimensional c-commerce enterprise web portal. Furthermore, Fou classifies the evolution of c-commerce into three stages: (1) web-enabled single-dimensional and single-process c-commerce, (2) B2B exchanges-based, single-dimensional and multiple-process c-commerce, and (3) web service-based, multiple-dimensional and multiple-process c-commerce.

In contrast, Derome [4] downplays the importance of state-of-the-art technologies in developing collaborative relationship. For example, according to him, e-mail is a c-commerce tool, as are Electronic Data Interchange (EDI) and Extensible Markup Language (XML). Thus, Derome [4] believes that c-commerce capabilities should be depicted from a functional standpoint. He defines e-commerce as a three-layer architecture: Free-form collaborative services, process collaboration layer, and the structured data exchange category. The IT environment, duration of collaboration, and goal of collaboration vary from category to category. Although Derome suggests a variety of technologies (so-called collaboration over Internet Protocol, CoIP) for each of the three categories, he emphasizes the importance of deriving value propositions from the development of a collaborative relationship. However, the value propositions he proposes are mainly from transaction-focused applications.

Li and Williams [16] examined six case studies and found that companies that had established a successful cooperative relationship at the transactional level by creating interfirm network (via proprietary or open systems) tended to develop new and collaborative partnership at the strategic level. They observed similar evidence in the sectors of retailing and manufacturing. Their studies show that further developed collaborative

relationship could occur in the existing transactional application or a new application devoted to the new partnership. However, they found that different types of applications were more often developed on different IT infrastructures.

In addition to studies regarding successful c-commerce cases and IT infrastructures for e-commerce, several other studies have been reported. For example, Alexander [1] reported benefits of c-commerce and barriers of deploying c-commerce from a practitioner’s point of view. Mulani and Matchette [18] propose a total lifecycle collaboration framework that ties the mutual strategic objectives of two companies to actual inter-company execution. The connection between strategic objectives and actual executions is realized by developing critical decisions and metrics for various types of collaboration in different stages of the lifecycle of new product development. Ramachandran and Tiwari [20] studied the air cargo industry and reported that collaborative supply chain providing economic global air cargo services should be based on a business model that consists of three layers: connectivity layer, knowledge layer, and functionality layer.

As shown by the above review, research studies of c-commerce are scarce. Reporting successful cases and IT infrastructure for c-commerce dominate the extant research. Although the selection of appropriate IT infrastructures is critical for developing successful c-commerce, yet it is not sufficient. This is because collaboration is not a purely technological issue. As indicated in several studies, successful c-commerce depends on trust and commitment among partners, as well as individual partner’s capability of providing required services. We believe that a framework for planning and deploying c-commerce that considers those aspects should be developed.

### **3. Framework for Planning and Deploying C-Commerce**

#### **3.1 Rationale**

Before we delve into the detail of a framework that we propose, it seems appropriate to address the rationale for those factors we consider in the framework. Himmelman defines organizational collaboration as “a process in which organizations exchange information, alter activities, share resources and enhance each other’s capacity for mutual benefit and a common purpose by sharing risks, responsibilities and rewards” [9, p. 28]. This definition suggests that the development of collaborative relationship has a profound impact on the involving parties. Thus, firms that plan to invest resources into a collaborative relationship should consider c-commerce as gradually progressive applications of enterprise-level IT that attain and support the collaborative relationship. They should evaluate their relationships with business partners and the level of engagement that they would like to be involved. While inter-organizational relationship depends on objective factors, such as the industry sector, and the nature of the

business, the level of engagement is determined by trust and commitment held by the firm on its business partners.

Trust and commitment are generally considered as premises for establishing a collaborative relationship [23]. Trust could be broadly defined as the belief that others will act or react in a predictable way [17]. Trust is important for the creation of partnership because it could reduce uncertainty and provide certain extent of assurance for managers' decisions. Consequently, it might determine the commitment we assert on a partner relationship. Trust and commitment are a relative concept. Just like relationship between individuals, relationships between companies begin, grow and develop [11]. The level of trust and commitment grows following the development process of relationship between two parties. The trust level built from an acquaintance is presumably lower than that acquired from a friendship. The level of trust and commitment will determine the level of involvement that one party is willing to engage with another party and as a result, it will indirectly determine the level of e-commerce that one party would like to establish.

In practice, previous studies [16] also show that the first step of developing interfirm collaboration seems to be developing a routine application so that trust and commitment could be nurtured. Consequently, a framework for planning and deploying e-commerce should take into account the variation of trust and commitment between organizations and provide sufficient granularity of choices so that firms could determine the type of e-commerce to create.

### 3.2 Dimensions of the Framework

Our conceptual framework for planning and deploying e-commerce is based on two factors: (1) type of inter-organizational relationship (IOR) and (2) the level of engagement determined by trust and commitment. There are several classifications of IOR available in literature of organization sciences. We believe the classification proposed by Whetten [28] is sufficient to serve the purpose of our study. Whetten classified IOR into four categories: dyadic linkages, organization sets, action sets and network.

Dyadic linkage is the simplest form of interaction between organizations, and this linkage occurs "when two organizations find it mutually beneficial to collaborate in accomplishing a common goal" [28, p. 5]. A typical example of this type of IOR is a joint venture by two organizations. Another example of this linkage can be simple coordination that one organization performs some part of production activities while the other performs the rest to achieve higher efficiency.

Organization sets are the total sum of inter-organizational linkages between a focal organization and its trading partners [28]. There is only one focal organization that mainly manages the interactions and conflicts. In this IOR, relations among non-focal organizations are minimal and thus can be ignored. A typical example is a big manufacturer that coordinates its product design effort with several small parts suppliers.

Another example is a manufacturer whose parts or work-in-process are supplied by multiple suppliers.

Action sets are coalitions of organizations working together to accomplish a specific purpose [28]. Action sets are networked interacting group of organizations. Unlike organization sets, there is no one clear focal point in action sets; however, it is still possible that one, two or more organizations play roles of leaders in this type of IOR. An example of this type of IOR is coalition of small banks to provide shared ATMs to their customers. It should be noted that this is one type of networked IOR, which will be described below, since there are direct interactions among partners without going through a focal organization.

The last form of IOR is a business network. A business network is defined as "the structure of interdependent relationships between the activities of a given firm and those of other firms in its competitive environment that influence each other's strategies" [10, p. 60]. A business network, thus, usually represents all interactions that occur among trading partners [28]. A typical example is the supply chain of manufacturers, distributors, wholesalers, and customer-facing firms at the retail level for any commercial products [13]. As mentioned before, action sets are a special type of network IOR, and thus we treat both action sets and business network as "network" type of IOR in our framework.

The three stages of organizational evolution in using IT [22] are employed to differentiate the level of engagement. Those three are: Automate, Informate, and Transform. "Automation" means using IT to reduce the cost of production. Here production has a broader meaning, including the production of physical goods, information processing, and any other forms of human activities. Typically, traditional, manual and paper-based operations are computerized to reduce manpower necessary to carry out the operations.

A company in the "informate" stage is to empower managers with IT. The empowerment is mainly achieved by providing managers with information generated by IT tools. Meanwhile, a company may create economic value of information that is the by-product of automation. Typical examples include using decision support systems to "informate" managers to make better decisions or using data mining techniques to identify patterns and trends of customer purchasing behavior from transaction data for better planning. A company at this stage needs workers who have ability to interpret and analyze information that generated from basic transactions.

A company in the "transform" stage might have successfully gone through the first two stages and been ready to capture opportunities presented by the environment by transforming its organization and/or by changing the rules of the games of the market. Companies in this stage are characterized by strong IT leadership, vision, and a sustained process of organization empowerment. In other words, a company in this stage is committed to align business and IT strategies well and exploit IT-enabled opportunities.

### 3.3 The Framework

Using these two dimensions, we propose a conceptual of framework as shown in Table 1. We will discuss each category in terms of concept, focus, and linkage interface. Focus means the interest or benefits that one type of e-commerce is expected to achieve. Linkage interface refers to major elements that facilitate the type of e-commerce to move forward and keep the involved parties as a whole.

#### 3.3.1 Automatic Dyadic Relationship

The main concept of automatic dyadic relationship is to use IT to automate existing interactions between two companies in order to improve the efficiency and other benefits of the interaction. The main focus of this e-commerce application is to improve the efficiency of business transactions, such as reduction in time, reduction in labor, and increase in transaction accuracy. The

linkage interface in this type is structured data format, which may be based on proprietary or open standards. Because the linkage interface is structured data format, this type of automatic relationship seldom causes changes in internal processes of the firms, although it may change job descriptions and requirements for skills. This is the most basic or simplest form of e-commerce. As a matter of fact, this type of relationship dated back to 1970s when companies started to use electronic data interchange (EDI) to automate highly structured transactions. Wal-Mart's continuous replenishment system (CRS) is an example of automated dyadic relationship [14] (It should be noted that even though a retailer like Wal-Mart apparently has many suppliers, since those suppliers are relatively independent of one another, the relationship between Wal-Mart and each of its suppliers could be considered as dyadic relationship.) The continuous replenishment system enables Wal-Mart to reduce its inventory cost to a minimum level with a stockless

**Table 1. A conceptual framework for planning and deploying e-commerce**

		Types of Inter-Organizational Relationship			
		Dyadic	Organization sets	Networks	
IT Capability	Automate	Concept	Automate existing interactions between two companies	Automate interactions among partners via a focal company	Automate linkages among members of the business network
		Focus	Efficiency	Efficiency of individual relationships and a group seen by a focal partner and timely action	Efficiency of flows and effectiveness of managing uncertainty
		Linkage interface	Structured Data	Structured data/information	Data/information/algorithms
	Informate	Concept	Informing partners with IT products	Informate and strengthen critical relationship	Informate partners and strengthen all partners as a group or redesign the business network.
		Focus	Effectiveness	Efficiently and effectively identify and strengthen critical relationships	Efficiency, effectiveness, and competitive success
		Linkage interface	Information/know-how	Knowledge about its business, partners, and products	Information/knowledge, experience, and insight.
	Transform	Concept	Transform relationship b/w partners	Transform relationships and create miniature community around a focal partner or function as a virtual organization	Change the scope, boundary, and/or structure of the business network
		Focus	Efficiency, effectiveness, new value, & new opportunity	Efficiency, effectiveness, values, and new opportunity	Collaborative advantage/competitive advantage, new economic opportunity, efficiency of the whole industry
		Linkage interface	Knowledge/division of labor & rewards	Complementary partnership/compatibility between skills/knowledge/division of labor/vision of a focal partner	Value, vision, and potential external threats.

business model. This allows Wal-Mart to implement its low cost strategy and thus, to create competitive advantages over its rivals.

In the past, because most of EDI systems were based on proprietary technologies, investment in EDI systems reflected a high level of engagement companies committed to this type of relationship. However, as open standards (such as TCP/IP, XML) become popular, companies could adopt a technology based on those standards to automate a dyadic relationship. Because of lower switching cost with technologies based on open standards, the company could relatively easily switch from a relationship to another and, consequently, the engagement level will not be as strong as it used to be.

### **3.3.2 Informed Dyadic Relationship**

The main concept of informed dyadic relationship is that one company uses information generated from its applications of IT to inform its partner so that its partner will make necessary arrangement to respond to anticipated future events. The focus of the relationship is to effectively respond to changes in the environment. Information that could be helpful for responding to plausible events in the future is the interface that holds involved firms together. The sharing and use of the information might cause minor changes in internal operations in one party. In an even closer relationship, one party of a dyadic relationship might even share the know-how of forecasting and/or its historical data set.

An example of informed dyadic relationship is the continuous replenishment program (CRP) in Procter & Gamble, Co. The CRP has similar functions as those of CRS in Wal-Mart. The CRP is capable of analyzing changes in customer buying habits and, subsequently, Procter & Gamble adjusts its product schedules to both and actual purchases and anticipated demand. Furthermore, Procter & Gamble kept its retail customers informed by sharing the analysis result to improve supply chain efficiency and effectively respond to changes in the needs of customers.

The engagement level of this type is high because companies must share their proprietary information as well as how to use the information. Sharing this type of information not only reflects the engagement level that one party is committed to the relationship, but also paves a foundation for further enhancement of confidence and trust. As the nature and sharing of information is the linkage interface, the type of technologies becomes less an issue.

### **3.3.3 Transformed Dyadic Relationship**

The main concept of transformed dyadic relationship is that companies use IT to transform its relationship with its partners. The focus of transformed dyadic relationship is creating new value to existing market or capturing new opportunities, while it may include improvement in efficiency and/or effectiveness. The linkage interface is knowledge. Examples of knowledge include an understanding about the business that one firm is in and/or knowledge of division of labor when a new

opportunity opens. The firm and its partner will be able to divide the work and fully take advantages of their strengths. Another scenario is that a firm changes the structure of its relationships with partners and invite them work together. For example, a personal computer maker has an OEM company. In the past, the PC maker sells products (computers) to its customers via transportation service that it arranged. With the assistance from IT, the PC maker may change the structure in terms of division of labor by providing information about its customers to its OEM and the OEM is in charge of the delivery of products. The level of trust and commitment between the PC maker and its OEM is stronger than that between them in informed/automated dyadic relationship because in the present case, the PC maker firm will need to provide specific information about its customers and know-how of customer service and delivery to its OEM.

The engagement level of this type is very high because two companies must be willing to share responsibility and risk involved in the transformation of their relationship. The transformation of their relationship may require them to align their business strategies and IT strategies for common goals. Typically, if and after going through the automated and informed stages together, both companies might possess well-compatible IT infrastructure and are well ready for transformed dyadic relationship. The adoption of complicated, customized, enterprisewide applications can be planned.

### **3.3.4 Automatic Organization Set**

The main concept of automatic organization set is that the focal firm uses IT to automate its interaction with partners. An example of automatic organization set is that a builder (or a construction company) who deals with several contractors in the construction industry may use IT to coordinate its interactions with contractors. In this case, after being commissioned to construct a building, the focal firm (i.e., the builder) might need to consult the architect for any doubt in the blueprint, to solicit constructors with different skills and techniques, and to make a plan to accomplish the project on time under budget. The main focus of the focal firm (i.e., the builder) is to maximize efficiency of its interactions with individual contractors as well as the efficiency of the group as a whole. In order to maximize the efficiency of the group as a whole, the builder could employ coordination technologies (e.g., groupware) to coordinate tasks performed by different contractors, to monitor the progress of tasks, and to keep contractors informed. Another example of automatic organization set is that a company may implement an electronic bidding system, which selects the best bidder following predefined criteria from a pool of suppliers.

This type of e-commerce focuses on efficiency of each relationship and the overall efficiency seen by the focal organization. The focus of automatic organization set is to efficiently exchange data among partners and take actions efficiently and effectively. The linkage interface is data and/or information about business transactions.

In this type, more partners are involved than the dyadic IOR and thus managing IT is more complicated. However, since there is a clear focal firm in this relationship, the means of data/information exchange is usually selected by the focal firm and partners follow the rules and protocols selected. The engagement level of this type is not high. Thus, industry standard or open standard should be used to avoid unnecessary switching costs on partners.

### 3.3.5 Informed Organization Set

The main concept of informed organization set is that the focal firm uses information generated from its application of IT and know-how's to enhance and strengthen its critical relationships with partners in its organization set. As Kanter [11] indicates, "Successful partnerships manage the relationship, not just the deal." [11, p. 96]. Thus, the focus of informed organization set is to effectively identify and manage relationships with those partners that are critical to the success of the firm. The linkage interface of informed organization set is to disseminate knowledge about the business, its partnership, products and/or its customers that is critical for the focal firm to identify and strengthen critical relationship with its partners. An example of informed organization set is the development of a Collaborative Planning, Forecasting, and Replenishment (CRFR) system in Procter & Gamble, Co. Based on inputs from its partnerships with retail customers, Procter & Gamble, Co. created an instrument called CPFR Capability Assessment for the baseline evaluation of the partnership's four core CPFR processes in eight key elements. The CPFR Capability Assessment is used to assess the strength and weakness of the partnership and actions needed to improve the development process of CPFR [26]. There are two purposes of developing a CPFR system: (1) providing inputs to further fine tune the CPFR Capability Assessment; and (2) improving inventory and reducing out-of-stocks through the supply chain from the manufacturing plants to customers' distribution centers to customers' retail store shelves to consumer homes.

A focal firm's main concern in this type is to handle conflicting interests of partners, enhancing the effectiveness of individual relationship and the overall effectiveness of the group simultaneously. Reasoning of its decision making must be shared with the partners, each of which compromises its own short-term interest, if necessary, for a long-term prosperity.

### 3.3.6 Transformed Organization Set

The main concept of transformed organization set is that the focal firm uses IT to transform its relationships with its partners, or enable itself function as a virtual organization. A focal firm needs to find critical complementary partners and divide the work so that a group can work toward the shared value and exploit an opportunity. The focus is to respond efficiently and effectively to the need of customers and to add value to the whole organization set and to capture economic

opportunity as a group. One possible scenario of transformed organization set is that with the accumulation of experience in using IT to automate and informate its linkages, the focal firm might gradually outsource its activities in design, production, and delivery to its partners and eventually becomes a virtual enterprise. In this case, the linkage interface includes knowledge about its products, customers, and the business that the focal firm is in, as well as guiding goals, strategies and values established by the focal firm. Even more important linkage interface is the knowledge about how to manage a virtual enterprise, how to make and execute plan, and how to coordinate independent activities in the virtual environment. For a focal firm to share those with its partners openly, a group can form a community around a focal firm. Thus IT applied in this relationship must be able to support planning and execution of a plan, as well as sharing information and exchanging transactional data. An example of transformed organization set is the case of Lockheed Martin Aeronautics Co. [12]. Lockheed used Net-collaboration technology to bring more than 80 suppliers that scattered in 187 locations to design and build components of a new family of supersonic stealth fighter planes for the Department of Defense. The Net-collaboration technology employed allowed Lockheed and its partners to keep all parts in sync by sharing designs, tracking the exchange of documents, and monitoring the progress of the project. While the impact of using this type of technology is at operational level in this case, in the long term, it may change the role of Lockheed because Lockheed will be able to tap the best talent, employ new business processes, and redefine roles of partners.

The above descriptions about automatic, informed, and transformed organization set highlight an important point: new and usually "soft" management skills and techniques are progressively more important when a company moves from automatic stage to transformation stage. As a result, how to overcome challenges imposed by a new environment that the firm is in becomes an important issue.

### 3.3.7 Automatic Business Network

The main concept of automatic business network is that all group partners use IT to automate existing linkages among partners. In order to make the business network work efficiently as a whole unit, involved companies usually need to exchange transaction data with its partners without a focal firm. Participating partners must share common goals and understand their roles in a network so a group can achieve maximum efficiency. This feature differentiates this relationship from the automatic organization set and from automatic dyadic relationships. The major objective is to make necessary adjustments in participating firms' internal operations so that the business network, as a unit, becomes able to move goods, information, and payment as smooth as possible. Efficiency in terms of flows and effectiveness in terms of the management of demand uncertainty is the focus of this relationship. The linkage interface of this

relationship is data and algorithms that could smooth the ripple effect generated from disturbances that may occur in one node in the network. Technologies often named “advanced planning systems” (APS) provide techniques, such as forecasting, time series analysis and linear programming, to analyze and optimize the flows of the network [13]. Those applications work best in a relatively stable environment because in such an environment, the structure of the business network will be stable enough to be modeled and optimized [13].

Although a leading firm (“lord of the chain” in Kumar’s word [13]) or a coordinator might appear in a business network in the long term, there is generally no dominating firm in the network. The commitment level, compared to other types of business network, is relatively low; however, the investment in those model-based technologies could be significant. Furthermore, sharing and assuming responsibility and risk in the network is critical for the whole network to function as a whole. As a result, the commitment level might be higher than automatic dyadic relationship.

### 3.3.8 Informed Business Network

Informed business network means that firms in a business network use IT to create values for themselves and partners in the same network by informing each other or redesigning the business network as a knowledge network [25]. Although information derived from historical data might be critical for informing partners to make necessary adjustments so that the flows of payment, goods, and information can move smoothly, the major drive of informed business network might be from experiences in the field, insight for the business, and intuitive judgments [13]. As a result, although data mining and optimization techniques might still be employed to manage demand uncertainty, experiences, insight, and expertise from different companies might be used to create “collective wisdom” to grasp the market opportunity. This scenario is particularly plausible when the business network faces the crisis of survival. The example of battle between the supply chain of buggies, buggy whips, stables and roadside carriage-hostelries against automobile described by Kumar [13] well illustrates the scenario. In this scenario, because the competitive success of a firm is no longer dependent on the firm’s effort, companies in the same business network will be more willing to share risk and obligations by informing its partners and being informed by its partners. The focus of this type of relationship would be efficiency, effectiveness, and competitive success of the business network. The interface linkage of informed business network will be information, knowledge, experiences, and insight.

### 3.3.9 Transformed Business Network

The notion of transformed business network is that the structure, scope, or boundary of a business network is changed with the introduction of IT into the network. Transformation may occur in the form of redefining the scope of the business network [25], creating an IT-

enabled value-net [3], or organizing as an EHub in an industry [19]. The scope of the business network could be redefined with new products, new markets, and/or new partners that are brought about by IT. Developing an IT-enabled value-net is intended to create collaborative advantage as well as competitive advantage [21]. The creation of an E-Hub might improve the efficiency of transactions for the whole industry, provide a forum in which industry-wide issues can be addressed and expertise and knowledge can be shared. Those purposes are all concerned with the development of the industry. Therefore, the focus of transformed business network is to create collaborative advantage, capture new economic opportunity, identify potential threats, and/or foster the growth of the industry by exploiting the capability of information technology as the network. The linkage interface of transformed business network is value, vision, and external threats.

An example of transformed business network is the transformation in the tax return preparation network [10]. The transformation of the tax return preparation is characterized by the expansion of the network, addition of new players, changes in roles of existing players and re-structure of the network [12].

## 4. Research Agenda

There are many issues that need to be addressed before we can truly understand c-commerce. In this section, we make an attempt to identifying several issues that we believe deserve researchers’ attention in the near future.

1. Conceptualization of coordination mechanisms in e-commerce: The process of c-commerce involves communication, cooperation, and coordination among partners. Various IT infrastructures proposed by extant research in c-commerce as well as advanced information technology, such as enterprise systems, might have sufficiently paved a foundation for serving the purposes of communication and cooperation. In order to depict the complete picture of c-commerce, conceptualization of coordination mechanisms in e-commerce is crucial. Answers to the following questions are critical to understand the phenomena of c-commerce: What coordination mechanisms are available? How do those firms coordinate their activities? On what ground do they choose one coordination mechanism over another? How does IT support selected coordination mechanisms? What c-commerce applications are best suited to support a particular coordination mechanism?
2. Evolution of e-commerce process: The creation and sustain of c-commerce involves tremendous investment in resources and commitment. The relationship among partners is usually not temporary. Our position is that those partners that progressively go through the automated, informed, and transformed stages over time will have greater success possibility, because mutual trust and commitment would be gradually built up in each stage and because partners could gradually cultivate



skills and techniques for managing their partnership. In this case, what enables and/or inhibits the transition and how an IT-enabled partnership evolves from one stage to another is an important topic to study. Meanwhile, we believe that other factors might offer opportunity for companies to engage in one particular type of collaboration rather than starting their relationship with automated relationship. As a result, what causes the evolution of intra-stage process and how the intra-stage process evolves is also essential for understanding e-commerce. Both inter-stage or intra-stage evolution can be examined by investigating into changes in properties of links (such as strength of the link and symmetry), roles participating firms play, position participating firms occupy, and properties of the network (such as connectedness, density, and reachability) [6].

3. Typology of collaborative network: Although it is claimed that the basic architecture of collaborative networks would be in the form of hub and spoke [19], we believe that the form of hub and spoke will not completely take the place of peer-to-peer communication. We further assert that although the form of hub and spoke is a preferable architecture of collaborative network at the firm or industry level, specific topology varies depending on the nature of projects, groups, and tasks. Also, the topology may vary depending on the stage of the life cycle of a project.

## 5. Summary

C-commerce creates a new form of commerce. Extant literature has focused on the issues of IT infrastructure and benefits. In this article, we proposed a conceptual framework for planning and deploying e-commerce at the firm or industry level based on two dimensions: the evolution of organizational computing capability and commitment, and the type of inter-organizational relationship. This framework allows researchers to classifying commercial applications of computer and communication technologies for e-commerce. It can be also used to identify issues specific to each type of e-commerce, and help practitioners to examine their standing in terms of planning and deploying e-commerce. Moreover, in the early stage of the development of e-commerce, we also identified several key issues that we believe need to be addressed to understand e-commerce better.

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