APPLICABILITY OF SELECTED E-COMMERCE MODELS TO AN E-COMMERCE PLANNING PROCESS MODEL

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ABSTRACT

E-commerce is currently perceived to be a necessary component of a successful business venture. However, there is little research that addresses the planning stage of e-commerce. We believe there is a need for a model to fill this void. In this paper, we consider the definition of e-commerce within the context of our research and examine a selection of existing models and frameworks for various aspects of e-commerce to consider their relevance and applicability to the e-commerce planning process.

Keywords: e-commerce planning process**,** e-commerce modeling

INTRODUCTION

Adopting e-commerce in the business environment is considered advantageous and, perhaps, necessary for an organization to remain competitive. The growing number of e-commerce failures, however, suggests that more care must be taken in the planning of e-commerce ventures. We believe that lack of e-commerce planning is detrimental to many organizations.

We have undertaken a search for a model, or models, that will assist in determining a pragmatic approach to the e-commerce planning process. We have examined a number of representations developed to reflect various aspects of e-commerce in an attempt to ascertain if they provide any support in this process. While most of the existing models confirm the merits of e-commerce, they offer little insight into planning e-commerce initiatives. This paper presents a sampling of the representations and considers the assistance each model may provide in e-commerce planning.

In the next section, we choose an e-commerce definition appropriate to our research. In the following section, we examine some of the existing e-commerce models: models that describe e-commerce, models of e-commerce processes and models representing e-business. Then, we compare examined models with the systems development life cycle. Finally, we suggest a focus for further research in e-commerce modeling.

DEFINING E-COMMERCE

Many definitions for electronic commerce exist. Researchers remain unable to reach a consensus of opinion as to what e-commerce means (11, 10, 7, 13). It has been suggested that the very complexity of the elements of electronic commerce makes definition difficult and will prompt different authors to suggest different interpretations that focus on their specific area of research (13). For our research, we have chosen to adopt the following definition:

> Electronic Commerce involves the undertaking of normal commercial, government, or personal activities by means of computers and telecommunications networks; and includes a wide variety of activities involving the exchange of information, data or value-based exchanges between two or more parties (2).

We use this definition because it encompasses what we believe is an inclusive interpretation of the components of e-commerce. We would suggest that e-commerce is not as narrow a concept as to be defined as a business transaction over the Internet (7). As Choi, Stahl and Whinston (1997) observed, electronic commerce is a fast-moving target. In fact, the rapid evolution of technology supports the need to avoid narrow definition.

E-COMMERCE MODELS

Models Describing E-commerce

Choi et al (1997) presented the Electronic Commerce Areas model (Figure 1). This model depicts differences between e-commerce and traditional commerce. The representation portrays e-commerce as a three-dimensional space, with purely traditional commerce in the front bottom left area and purely electronic commerce in the back top right area. All other areas represent a mixture of the two commerce vehicles. This model also identifies product, agent and process as three key dimensions distinguishing e-commerce from traditional commerce. The representation underlines the fact that e-commerce may be implemented to compliment an existing or new venture, or may be used to establish a totally electronic venture. The model may also assist in identifying the location of an enterprise in the marketplace/ marketspace and be useful in determining the organization's focus in relationship to technology. It does not, however, assist in developing an e-commerce strategy.

Figure 1 – Electronic Commerce Areas (adapted from Choi et al, 1997)
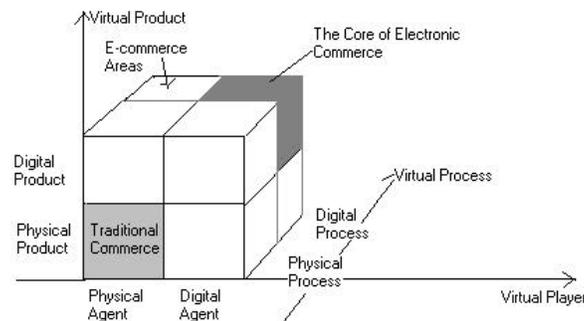
Zwass (1998) developed an e-commerce framework of seven levels. His premise was that the lower levels support the higher levels. Infrastructure supports services, which, in turn, support products and structures (Figure 2). A difficulty with the hierarchy is that the sequence of layers may not be sufficiently flexible to accommodate the changing functions and activities of e-commerce. It does, however, focus attention on important technical components to be considered within the e-commerce context (2).

Figure 2 – The Hierarchical Framework of E-commerce (adapted from Zwass, 1998)

Meta-Level	Level	Function
Products and Structures	7	Electronic Marketplaces and Electronic Hierarchies
	6	Products and Systems
Services	5	Enabling Services
	4	Secure Messaging
Infrastructure	3	Hypermedia/Multimedia Object Management
	2	Public and Private Communication Utilities
	1	Wide-Area Telecommunications Infrastructure

Riggins (1998) advanced The Electronic Commerce (EC) Value Grid (Figure 3) to aid managers in determining where Web-based electronic storefronts could improve profitability. This representation compares the value creation dimensions of efficiency, effectiveness and strategy to the dimensions of time, distance, relationships, interaction and product to identify 15 advantageous applications for e-commerce. While the EC Value Grid is useful in identifying opportunities, it is specific to Web-based sales applications and may not transfer to other e-commerce developments. Additionally, it does not identify difficulties that may emerge when adopting e-commerce, such as legal restrictions or financial obstacles.

Figure 3 – The Electronic Commerce Value Grid (adapted from Riggins, 1998)

Value Creation

	Efficiency	Effectiveness	Strategy
Time	Accelerate User Tasks	Eliminate Information Float	Establish 24X7 Customer Service
Distance	Improve Scale to Look Large	Present Single Gateway Access	Achieve Global Presence
Relationships	Alter Role of Intermediaries	Engage in Micro Marketing To Look Small	Create Dependency to Lock-in User
Interaction	Make Use of Extensive User Feedback	User Controls Detail of Information Accessed	Users Interact Via Online Community
Product	Automate Tasks Using Software Agents	Provide Online Decision Support Tools	Bundle Information, Products, and Services

*Five Dimensions of Commerce* (left axis label)

Riggins and Rhee (1998) contributed the Electronic Commerce Domain Matrix (ECDM) to represent four dimensions of e-commerce (Figure 4). The matrix was developed by crossing the location of the application user (external or internal to organization) with the type of relationship (technology enhanced or technology facilitated). The model is useful as a tool for classification, but is mainly representative of trading relationships (2). In the context of our research, the matrix suggests possible benefits in adopting e-commerce solutions. It provides us with a backdrop to examine an entity to determine if one of the merits will contribute positively to the entity's goals.

Figure 4 – Electronic Commerce Domain Matrix (adapted from Riggins & Rhee, 1998)

		Improve Coordination with Existing Trading Partners	Market Creation to Reach New Customers
External			
		Cell 3	Cell 4
Location of Application Users		Improve Coordination with Internal Business Units	Information Exchange to Work with New Team Members
	Internal		
		Cell 1	Cell 2
		Technology Enhanced	Technology Facilitated
		Type of Relationship	

Chan and Swatman (1999) advocated The Electronic Commerce Component Model (ECCM) (Figure 5). The purpose of the ECCM was to develop a research framework that included all current components and extensions of e-commerce. The meta-view of the model identifies legal, services and infrastructure as the components, with the e-commerce definition at its core. Within each component, current aspects of the component are represented. The intent of the model is to provide an illustration encompassing all aspects of e-commerce that will be representative of the concepts as time progresses. As technologies and environments change, the object within the component can also be changed to reflect modifications. The ECCM provides a useful snapshot for evaluating e-commerce. At any given point in time, and for any given configuration, the model may be employed to represent e-commerce concepts. However, it does not provide insight into processes or opportunities available within the context of e-commerce.

Figure 5 – Component Model for E-Commerce (adapted from Chan & Swatman, 1999)
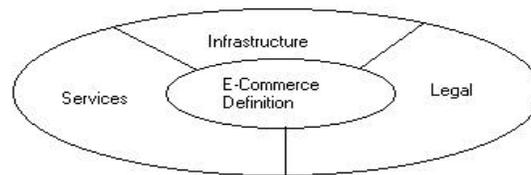
Models Representing E-commerce Process

A process model may be described as a model that answers *how* value-creating activities are carried out (5). As such, insight may be gained about methods of conducting e-commerce and possible weaknesses for a specific organization. However, as technology and environment change, models will also need adaptation.

Lazcano, Alonso, Schuldt and Schuler (2000) demonstrated a virtual process within the individual business environment. The model recognizes the integration of technology in materials management from the ordering of the product to the delivery of the finished goods. At the physical level, it reflects the traditional business activities of manufacturing, trading, shipping and distribution. At the virtual level, the model diagrams the electronic flow of data to support the physical manufacturing process. The virtual process model presents a depiction of how virtual tools are incorporated in a specific area of commerce. It does not consider digital

products, nor does it represent such e-commerce processes as e-mail or information searching. Therefore, models such as this do not provide much assistance in decision-making processes beyond a highly conceptual level for the particular mode of commerce it represents. At this level, it does provide some insight into process design.

Clarke (1993) represented e-commerce as a five-stage process. The model suggests that e-commerce can be utilized in the pre-contractual, contractual, ordering and logistics, settlement and post-processing phases of business activities. It also demonstrates the interrelationships between those activities. The model is compatible with a bricks and mortar manufacturing environment, with e-commerce tools integrated into the process. In making a decision to adopt e-commerce, this model is useful for applicable businesses in that it presents a structure for technological innovation. However, it does not address issues such as funding or receptiveness of customers, nor does it translate well into such digital opportunities as online auctions or content provision.

Models Describing E-business

A number of models have been suggested to describe e-business models (12, 8). Viehland (1999) identified three specific business models that rely on interorganisational networks to exist – the virtual retailing model, the distributed storefronts model and the buyer-led pricing model. Rappa (2000) suggested nine forms of business models exist on the web. They are the brokerage, advertising, infomediary, merchant, manufacturer, affiliate, community, subscription and utility models. Afuah and Tucci (2001) stated that models vary not only between industries, but also within industries. As such, it is difficult to depend on existing e-business models for guidance in developing a business strategy.

For an entity considering e-commerce, the e-business model provides a possible starting point. The organization or individual may select a model to emulate, and work backwards from that point. Additionally, an organization may consider features of one of the models as a potential method of diversifying or of strengthening its existing business model.

EXISTING MODELS AND THE SYSTEMS DEVELOPMENT LIFE CYCLE

The Systems Development Life Cycle provides a metaphor for our investigations. The decision-making process for e-commerce planning in the organization should give consideration at both the planning and analysis stages. In planning, the goal is to identify and prioritize technologies that will most benefit the organization. The analysis phase studies the current business and information systems, and defines user requirements and priorities for the new system (14). We have examined the models and frameworks presented as they apply to the life cycle stages. Models discussed above are summarized in Figure 6. The examined models generally concentrate on specific subsets of e-commerce, such as electronic storefronts or electronic document flow. Consequently, they are too specialized to support all e-commerce decisions. We also observed that the models provide some assistance in analysis and design (evaluation of alternative solutions and detailed specifications (14)), but limited direction relative to the planning stage. In order to provide decision makers with a valid decision model to determine whether an e-commerce venture is worthwhile, one should extend merits stated in existing

models, such as models in Figures 1 to 5, to see how these merits could be used in the planning stage.

Figure 6 – Existing Models in E-commerce Planning Process Context

Model	Comments	Life Cycle Stage
Models Describing E-commerce		
Choi et al, 1997 (Electronic Commerce Areas)	• Assist in locating enterprise within marketplace/ marketspace • Help determine focus in relationship to technology	Planning, Analysis
Zwass, 1998 (The Hierarchical Framework of E-commerce)	• Help focus attention on important functional components within current e-commerce context	Analysis
Riggins, 1998 (The Electronic Commerce Value Grid)	• Aid in determining where Web-based storefronts may improve profitability	Planning, Analysis
Riggins & Rhee, 1998 (Electronic Commerce Domain Matrix)	• Classification relating to trading relationships • Suggests possible competitive benefits in employing e-commerce solutions	Planning, Analysis
Chan & Swatman, 1999 (Component Model for E-Commerce)	• Snapshot for evaluating e-commerce	Analysis
Process Models		
Lazcano et al, 2000	• Helpful in conceptual design for manufacturing implementation of e-commerce solutions	Design
Clarke, 1993 (Phases of Electronic Commerce)	• Demonstrates interrelationships between activities in electronic document flows	Analysis, Design
Business Models		
Viehland, 1999	• Starting point to choose e-commerce • Provides suggestions for possible diversification or strengthening of existing business model	Analysis
Rappa, 2000	• Starting point to choose e-commerce • Provides suggestions for possible diversification or strengthening of existing business model	Analysis

CONCLUSIONS

While there are many electronic business models available to reference, as well as models that demonstrate e-commerce process, they provide insufficient guidance in the issues related to e-commerce at the planning stages. The lack of a comprehensive model for planning and analysis in the decision to pursue an e-commerce strategy has most certainly contributed to the number of failures that are currently being observed. There have been, to date, insufficient questions raised about the ability of e-commerce to support all business formats. There is, presently, a need for further research to develop a model that encompasses the necessary questions that should be raised prior to embarking in an e-commerce venture. As well, further research needs to be undertaken to identify problems impeding e-commerce success and to develop strategies to address the problems.

We feel that there is a need to develop an e-commerce planning process model that is all-inclusive and transportable. A good starting point would be to integrate existing e-commerce models discussed in this paper. We have started preliminary work on a model that incorporates discussions in this paper, as well as research found in such disciplines as psychology, marketing and law. The proposed e-commerce planning model will be presented in due time. It is our

intention that this model will be all-inclusive and therefore transportable as new technologies emerge and barriers fall.

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