A Framework for Selecting E-Commerce Business Models

Imran K. Jalozie

Illinois State University
School of Information Technology- College of Applied Science and Technology; Normal, IL 61790-5150

H. Joseph Wen

Southeast Missouri State University-Harrison College of Business
Dept. of Accounting and Management Information Systems; Cape Girardeau, Missouri 63701
E-mail: hjwen@semo.edu

H. Lisa Huang

Southeast Missouri State University-Harrison College of Business
Dept. of Accounting and Management Information Systems; Cape Girardeau, Missouri 63701
E-mail: hlhuang@semo.edu

ABSTRACT

In this study, we developed a framework for e-commerce business models based on twelve essential business components. Data was collected for 250 of the Fortune 500 companies using the twelve components as determinants. Statistical analysis of the data was performed using K-cluster, hierarchical cluster, and discriminant analysis. The results of the data analysis yielded e-commerce business models as clusters grouped together based on the similar characteristics of their components. The following clusters were detected: e-shopping model, store front model, image building model, access charge model, and third-party marketplace model. The research supported the arguments made by some researchers that a combination of the traditional bricks-and-mortar model combined with a web interface reduces costs and allows businesses to provide better value to customers.

INTRODUCTION

Electronic Commerce is defined as electronic form of business where suppliers and customers are involved in exchange of goods or services for an amount of money (Bartelt and Lamersdorf, 2001). This form of business has been used in many sectors such as retail and automotive, electronic data interchange (EDI), defense and heavy manufacturing, and also to integrate information across larger parts of the value chain of a particular business (Cebrowski and Raymond, 2005; Looney, Jessup, and Valacich, 2004; Hauswirth, Jazayeri, and Schneider 2000). One of the most significant benefits of electronic commerce has been the tremendous reduction

in the marginal costs of reproducing and distributing products and services to consumers and businesses.

Electronic Commerce has harnessed the power of the Internet and its features such as interactivity, speed, networked connectivity, and multimedia. It provides an opportunity for many businesses to conduct their business in a more efficient, fast and reliable manner. Many companies have moved their entire business systems online and have provided a large segment of their consumers with innovative product-delivery capabilities. The Internet has changed the way business is performed, and, at the same time created many new opportunities for businesses (Cuffe, 2005; Kelleher, 2004; Affuah and Tucci 2001). The most important objective of e-commerce businesses is to provide products and services to customers with an almost zero marginal cost (De, Mathew, and Abraham 2001). E-commerce businesses are organizations that conduct business transactions with other customers or businesses over the Internet (Mahadevan 2000).

The internet has the potential to transform an ordinary brick and mortar business model or strategy into a competitive and eventually a successful one. Some of the reasons for this are:

a) *Low Cost:* Comparatively, it is less expensive to set up a business online and perform business transactions online, rather than opening a store in the real world. The marginal cost is almost zero when a company starts conducting its transactions online.

b) *Time:* Online business saves a lot of time for customers and the business too. A customer can research the products and services offered by the company online. After they are satisfied, the customers can complete the transaction online.

c) *Fast Interactivity:* This is another attractive feature of doing business online. The user can get information just by the click of a mouse, reach any part of the website, and customize their requirements. The user can also use features such as order tracking to see where their order is at a particular stage.

d) *Universal Reach:* A customer in one part of the world can order a product or service from a totally different part of the world by sitting in front of his computer. This removes the problem of geographic constraints.

E-COMMERCE BUSINESS MODELS

A business model is defined as the methods and techniques employed by a firm to generate revenue and sustain its position in the value chain (Hedman and Kalling, 2003; Rayport 1999). There are an increasing number of e-commerce business models as more businesses choose the path of electronic commerce (Lai and Wong, 2005; Drejer, 2004; Jaqueline 1999). The basic research issue this article explores is to provide a framework of e-commerce business models and a classification of these models.

Business models are very essential because they help in understanding the basics of specific businesses. Changes can be made, improvements can be observed, and results can be obtained using a business model by simulating various business scenarios. Business models can also be

used a baseline for evaluating progress (Applegate 2000). Many new business models are being introduced in the e-commerce industry. These new business models attempt to exploit information technology to overcome the limitations of traditional business models (Mitchell and Coles, 2004; Leem, Suh, and Kim, 2004; Hauswirth, Jazayeri and Schneider 2000). The high level of uncertainty that prevails in the e-commerce business world is another reason why companies involved in e-commerce must have a sound and stable business model in place. It helps managers to communicate easily and share their understanding of the e-business among other stakeholders (Osterwalder and Pigneaur 2002). Changes can be easily tracked with the help of a business model.

The definitions of a business model have some noticeable similarities in the way they are classified based on their components such as,

1) Value provided to the customers

2) Degree of customer service

3) Personalized services provided for the customers

4) Revenue generated

5) Other business network partners involved

According to Mahadevan, the components of e-commerce business models include the value stream for the business partners and buyers, the revenue stream and the logistical stream (Mahadevan, 2000). The value stream provides value proposition for the buyers, sellers and market makers and portals in the e-commerce market. This leads to long term sustainability, which is a key component of the definition of a business model. The revenue stream takes care of the revenue generation aspect for the business. The logistical stream deals with issues such as management of the supply chain and the value chain and infrastructure management. All these three streams are interconnected to one another.

Some of the e-commerce value propositions that can be provided to the customers online are product guides, assisted search, order fulfillment, credit verification, security and trust, financial tools, and customer service.

The revenue stream opportunities provided by the Internet are much more robust that the traditional business model revenue streams. A few revenue streams such as those earned from product sales and service and advertising are similar to the ones observed in the traditional bricks-and-mortar model. Some other revenue streams such as revenue from online communities, referrals, variable online price strategies and complementary offerings are unique to the e-commerce business environment.

The e-commerce business environment provides an opportunity for a firm to position itself in the supply chain based on its value stream and revenue stream. This is known as the logistic stream. The Internet allows for three unique logistic streams according to Mahadevan (2000):

a) *Dis-Intermediation*: This is defined as the stream in which the business can shrink its supply chain by reducing the operational and transactional costs and can also provide better customer service.

b) *Infomediation*: Infomediaries handle details about the information related to buyers and suppliers. They store and release the information about the suppliers to buyers and vice versa (Hagel and Rayport, 1997).

c) *Meta-Mediation:* This logistic stream not only preserves and allows the exchange of information, but adds additional features such as secure transactions. This helps the businesses to place themselves in a different position when compared to their competitors and provide additional value to its consumers.

Combining the definitions of e-commerce / business models, we developed a framework to evaluate various e-commerce business models. The purpose of this framework is to provide a more comprehensive look at the concept of e-commerce business models on the basis of their components and the relationships among those components. The components used to develop this framework are listed below.

1) Target Customer

2) Feel and Serve

3) Customer Information

4) Trust and Loyalty

5) Value Proposition

6) Business Activities

7) Business Capabilities

8) Available Resources

9) Partner Business Networks

10) Revenue Stream

11) Operational/Transactional Costs

12) Profit/Loss

RESEARCH DESIGN

A total of about 250 websites were randomly selected from the websites of Fortune 500 companies. These websites were visited and data was collected about them with respect to 44 variables. The data collected was subjected to various types of cluster analyses to figure out if there is one dominant e-commerce business model, or whether clusters of various business models were formed. K-cluster analysis, hierarchical cluster analysis and discriminant analysis were used.

250 companies based in the United States were selected randomly from the Fortune 500 list of companies for the year 2004. The companies that were selected had a significant presence on the Internet, which means that these companies use the Internet to derive at least some part of the revenue. For the purpose of this research study, the companies that derived a minimum of 10% of their total revenue from the Internet were taken into consideration.

The variables for the data collection were derived based on the literature review and the e-commerce business model framework developed. These variables were categorized into five major categories namely value proposition, customer relationship, product innovation, financial aspect and business network. Each category had a set of questions associated with it. The responses for each question were obtained on a 7-point Likert scale ranging from strongly agree to strongly disagree. A total of 44 variables were used for all the five categories and the responses were collected by visiting the company websites and studying them in a comprehensive manner. A pilot study was performed and it was determined that the inter-rater reliability of the scales used was high.

After 250 companies was selected, the websites of these companies were examined in a comprehensive manner to understand all the details about the various business aspects such as product/service details, types of customization options, transactional approach, customer service availability, etc. A questionnaire was filled out for each company and values ranging from one to seven were assigned to all the 44 variables.

The statistical software SPSS was used in order to perform the data analysis. K-cluster analysis, hierarchical cluster analysis and discriminant analysis were performed on the data set. Hierarchical cluster analysis was used to determine the patterns of business models. K-cluster analysis was performed to find out the exact number of cases in each cluster and to find out which case belonged to which cluster. Discriminant analysis was used to establish the correlation between the various members of each cluster.

The 250 companies were categorized into 15 different business models after a thorough analysis of their websites and their respective business policies. These 15 business models are listed below:

1)   E-retail model

2)   E-mall model

3)   E-shop model

4)   E-broker model

5)   Merchant Model

6)   Virtual Community model

7)   Brand Awareness model

8)   Portal model

9)   Manufacturer model

10)   Catalog Merchant model

11)   Subscription model

12)   Service Provider model

13)   Infomediary model

14)   Affiliate model

15)   Advertising model

HIERARCHICAL CLUSTER ANALYSIS

The hierarchical clustering method proposed by Ward and Jennings (1973) was used to identify the patterns of business models. This method forms clusters between the variables by calculating the Squared Euclidean distance between them. The Squared Euclidean distance is the default method of determining distances or similarities between cases or clusters of cases (George and Mallery 2003). Although there was an issue in deciding as to how many clusters would be considered as the cut off point, the R^2 value indicated that significant number was 5. According the Everitt (1979, 1980), "there are no satisfactory methods for determining the number of clusters for any type of cluster analysis". Hence, the R^2 value was used to determine the appropriate cut off point for the number of clusters. After performing a number of iterations with the number of clusters, it was observed that the R^2 value was significantly high for a 5 cluster scenario.

Table 1: Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate	Change Statistics				
					R^2 Change	F Change	df1	df2	Sig. F Change
1	.908	.824	.776	.627	.824	17.050	44	160	.000

As shown in Table 1, the R^2 value was significant at 0.824 for the 5 cluster scenario. Hence the value of 5 was taken as the cut-off point for the number of clusters. The results of the hierarchical cluster analysis indicated the formation of clusters in a uniform pattern. The Dendogram graph indicated the formation of patterns among all the 250 cases taken as the test data. Initial observation of the Dendogram graph indicated a close proximity between business models with similar traits. This leads to the forming of clusters.

K-CLUSTER ANALYSIS

The K-Cluster analysis uses the Lloyd algorithm that uses the squared Euclidean distances to find the classification of clusters. The K-Cluster analysis was performed to find out the exact number of cases in each cluster and to find out which case belonged to which cluster. All the 44 questions pertaining to each case were considered as the variables in this analysis which would form the clusters, and indicate the number of cases in each cluster, and also give the value of cluster for each case. The iterations indicated in Table 2 resulted in the final cluster centers with the maximum absolute coordinate change for any center is .000 at iteration 5.

Table 2: K-Cluster Iteration History

Iteration	Change in Cluster Centers				
	1	2	3	4	5
1	9.148	11.199	10.812	8.918	10.075
2	1.196	1.803	.654	.000	3.602
3	.222	1.012	.211	.000	1.347
4	.252	.301	.176	1.530	.745
5	.000	.000	.000	.000	.000

Table 3 indicates the numbers of cases in each cluster after the final cluster centers were formed. It shows that cluster 1 has 32 cases in it, cluster 2 has 72 cases, cluster 3 has 54 cases, cluster 4 has 20 cases and cluster 5 has 27 cases in it.

Table 3: Number of Cases in each Cluster

Cluster	1	32.000
	2	72.000
	3	54.000
	4	20.000
	5	27.000

Valid	205.000
Missing	.000

CLUSTER MEMBERSHIP

The analysis of the observed results and the data indicates that there are 5 clusters with 32, 72, 54, 20 and 27 cases in each one of them respectively. These clusters are as indicated in Table 8.

Table 4: Cluster Classification of E-commerce Business Models

Cluster Number	Number of cases	Case
Cluster 1	32	E-mall (100%) E-shop (88%) Catalog Merchant Model (85%)
Cluster 2	72	Service provider (89%) E-retail (86%) Manufacturer (86%)
Cluster 3	54	Merchant Model (88%) Brand Awareness (87%)
Cluster 4	20	Advertising (100%) Subscription (86%) Virtual Community (100%)
Cluster 5	27	Affiliate (90%) Infomediary (100%) Portal (75%) E-broker (100%)

Table 4 indicates the high percentage of each case in their respective cluster thereby indicating a high degree of correlation between the cases in each cluster. For example, cluster 4 consists of three business models namely advertising model, subscription model and the virtual community model. The degree of grouping of all these models is 100%, 86% and 100% respectively for the advertising model, subscription model and the virtual community model. This indicates a high degree of correlation between these business models in cluster 4, thereby predicting that these three business are an integral part of cluster 4.

CONCLUSIONS

The patterns of the e-commerce business models obtained show that the four most important determinants that were responsible for the clustering of the business models are

1) Level of product customization provided to the customer

2) Degree of customer service available to the customer

3) Availability of incentives to gain lock in for the customers and gain their trust and loyalty

4) Reducing the overall cost of operation and increasing revenue

Another interesting aspect noticed was that of increasing prevalence in the bricks-and-mortar and the Internet commerce strategy. Many companies have realized that it is essential to not only have a strong virtual presence but also have a strong physical infrastructure for essential factors such as better customer service and guaranteed product availability. Hence an optimum business model would be that involving both the characteristics of bricks-and-mortar as well as an e-commerce model.

RECOMMENDATIONS FOR FURTHER RESEARCH

This research was a point in time analysis. Hence one of directions for future research would be to conduct research over an extended period of time in order to observe the success or failure of a particular company or their e-commerce business model.

The firms used in this study were large Fortune 500 U.S firms. A future research study involving firms from all around the world can provide more insight into the understanding of the concept of e-commerce business models from a global perspective.

It would be interesting to compare and contrast the business models of the companies which were studied in this research which had operations both in the physical space and well as in the virtual space versus the pure-play Internet companies which operate solely in the virtual space.

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