Success Criteria for Financial Institutions in Electronic Commerce

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Abstract
Since the World Wide Web became a medium for commercial activities in 1993, a tremendous number of companies joined in. Companies want to reach new markets through this low cost and massive computer network. The financial services industry is one of the early players. Since the nature of this delivery channel is very different from the traditional ones, banks are faced with competition from traditional foes as well as from non-traditional competitors. Through the use of web crawlers, this study has identified the key players in Electronic Commerce and has identified 5 success criteria for banks to compete in this new market: a complete e-Commerce strategy; innovation; high risk tolerance; an efficient communication network and significant asset size.

1. Background
Since the Internet opened its doors for commercial activities through the World Wide Web (WWW) in 1993, it has become the focus for business activities. Companies of different size and in all industries look for ways to enter the cyber market via the Internet. The size and the potential growth of the cyber market are extremely attractive to businesses. According to Forrester Research, electronic commerce activities will amount to U.S. $160 billion in 2000 (1). Besides the potential growth, the demographics of this market present a unique opportunity to businesses. Various barriers in the physical world prevent companies from reaching global markets. In contrast, the massive network power of the WWW minimizes these barriers; thus allowing businesses to reach out to new markets that otherwise cannot be explored.

Various market research results suggest that electronic commerce will grow exponentially in the next few years. However, companies already taking part in this market are having a difficult time generating adequate profits. Pioneers such as Amazon.com have successfully attracted much attention but have not been able to turn their competitive advantage into real profit.

Since the cyber market is very different from the physical market, it requires different skills and strategies for companies to be successful. At present, the prescription for success in electronic commerce is yet to be found.

The financial service industry is one of the early players actively seeking opportunities in electronic commerce. Typically, Financial Institutions (FIs) start with providing product and service information on the Web site. Over the last 3 years we have been monitoring this activity and have noted that FIs made great progress in their Internet service offerings. Those banks that were early entrants into the cyber market are now also offering most of the services they do in the physical world on their Web site. The more aggressive players are seeking ways to offer innovative products and services specific to this new delivery channel. Although the WWW presents opportunities for cost saving and new revenue generation to FIs, it also encompasses threats and new competition that are not present in their physical world.

2. Competition
As mentioned in a report published by the Bank Administration Institute in 1995 (2), banks are facing two groups of competitors at the beginning of the electronic age: from other financial institutions (FIs) and from non-financial institutions. Over the last three years, the Internet, and in particular, the World Wide Web (WWW), has become the new battlefield for FI and non-FI competitors. The WWW has provided new market niches in the financial services industry for non-FIs to explore. The presence of these new markets is the result of technology advancements and customer demand.
2.1. Traditional Competition

Traditional competition for banks comes from other financial institutions. These financial institutions include compete for the best street corners for their branches and their ATMs in order to obtain a larger market share. FIs rely on the community around their branches for businesses. However, the types of products that these FIs offer in the physical world or traditional channels are fairly limited in terms of innovation. Convenience, product features and costs are the most important factors that a customer considers before he or she chooses a FI.

Tactics used by FIs to compete in the physical world can not be applied in the virtual world of electronic commerce. Although FIs still compete with one another in this new channel, the environment is so different that many FIs can no longer find a direction for their business. Many banks try to offer what they have been offering in the physical world in this new channel, hoping that it will give them some indication about which direction they should take in the future. Other FIs simply ignored this medium thus far and continue to focus on traditional channels. Two of our previous studies have shown that banks act slowly in offering products and services over the Internet (3, 4). However, as the cost of performing a transaction over the Internet drops to 1 cent (5), staying with traditional channels such as the ATM, the phone and the branch that cost the banks anywhere from 25 cents to $1 per transaction is not feasible. As profit margins decrease due to competition, reducing costs is the only way that FIs can survive. Therefore FIs must offer products and services over the Internet in order to benefit from this low cost delivery channel.

In order to succeed in the new virtual world, banks have to take on a new set of strategies and tactics. The Internet is a channel that provides unlimited opportunities. The key to success is continuous innovation. Convenience is not limited to the hours of operation that a bank offers; it is also represented by how quickly a customer can access his/her financial data, measured in seconds. The so-called 7/24 operating time is the standard on the Internet. Banks no longer control where a customer can access his/her account information. The “anytime, anywhere” service offering is becoming the norm for the financial services industry. For the products, standard features such as the number of free transactions per month, interest rate on the account, are no longer the most attractive features to customers. They now consider it a necessity that they can download banks, trust companies, credit unions, credit card acquirers and issuers, payment processors and credit card associations. In the physical world, these companies recent transactions to their personal financial management software such as Quicken and Money.

2.2. Non-Traditional Competition

Banks face new types of competition from non-FIs on the Internet (6). These competitors include software developers, hardware manufacturers, telecommunications companies and Internet Service providers. In the traditional channels, these companies are not visible to the banks’ customers even though they take part in a financial transaction. However, the role of these companies changes on the Internet. As customers access their financial information through the Internet, they are exposed to various technologies such as browsers, computers, modem speeds and different types of communication systems. Different combinations of these technologies offer different service levels to customers. Instead of controlling the type of equipment and technology that a customer will use for banking services, banks now have to adapt to the type of computers and browsers that are available to a customer. On the other hand, online banking customers are controlled by technology companies in terms of the kind of software and hardware that are available to them. This difference requires banks to adopt new paradigms and new thinking along with the new technology.

Technology companies become competitors of the banks because they offer products and services that disintermediate between banks and their customers. Software companies such as Intuit and Microsoft developed personal financial software, which has become an important tool for consumers in managing their money. These consumers will tend to use those online banking services that provide downloading capability of their banking transactions. Various studies (7) have shown that Quicken.com (8), a web site developed by Intuit, is becoming the portal for consumers who use Quicken, to access their banks’ online services. In addition to financial software vendors, browser developers such as Netscape and Microsoft also are potential competitors for banks. As these companies control the Web and PC interface, banks are bound to support these browsers when developing their Internet services. Furthermore, these browsers are the key gateways for Internet banking services.
Hardware manufacturers are also becoming competitors for banks as they enter e-Commerce. As technology progresses, new devices such as smart cards, palm top computers and personal digital assistants offer new gateways to electronic commerce. These new devices and the networks they are attached to represent the new marketplace that cannot be controlled by banks. Although these companies do not sell financial services directly to the general public, they can develop application interfaces for these devices so they are able to offer financial services and then sell these to the FI.

Telecommunications companies represent another type of competitor. These companies control the communication network that is essential for electronic commerce. Not only firms offering services are depending on these networks to do business electronically; consumers also use these networks for accessing the Internet. Telecommunications companies can take advantage of this situation to enter new markets. Companies, such as AT&T, are offering end-to-end Internet solutions for small enterprises to do business on the Internet (9). AT&T is also a significant credit card issuer. The payment portion of these business transactions represent one of the banks’ core service offerings in traditional channels, where businesses of various sizes interact with banks directly for payment services. However in the virtual world, companies that offer end-to-end electronic commerce solutions become the intermediates between businesses and banks. These companies determine the type of virtual connections between the back end system of a business and its bank.

3. Objective

In order to prosper in cyber space, banks have to develop the necessary skills and strategies for this market. The objective of this study is to determine the success criteria for banks to participate in consumer and business electronic commerce. As banks now face competitions from both traditional and non-traditional players, it is very important for them to identify the survival characteristics of these competitors before they formulate any new products and services.

4. Methodology

Since the WWW became a medium for commercial activities, the number of bank Websites has increased to over 2000 (10), and the numbers are growing rapidly. In order to determine the types of electronic activities that a bank is involved in, we utilized a sophisticated Web crawler. We actually used five web crawlers with different keywords related to the area of e-Commerce. The crawlers then returned lists of URLs (Universal Router Location) of those sites that contained those keywords. The web crawlers then searched this list using a more specific set of e-Commerce keywords. The process was repeated until a refined set of Website addresses were obtained. As a result of this process 127 websites were identified for analysis. These are websites of companies including payment processors, technology companies, banks and corporations that do business transactions over the Web. The keywords used in this search are categorized as shown in Table 1.

<table>
<thead>
<tr>
<th>Keyword Categories</th>
<th>Sample Keywords</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail Banking Services</td>
<td>Account balance, recent transactions, bill payment, transfer, loan, credit card, applications</td>
<td>1 point each</td>
</tr>
<tr>
<td>Electronic Investment</td>
<td>Online trading, stock quote</td>
<td>2 points each</td>
</tr>
<tr>
<td>Electronic Cash</td>
<td>Mondex, VisaCash</td>
<td>3 points each</td>
</tr>
<tr>
<td>Consumer Electronic Commerce</td>
<td>SET, SSL, Electronic wallet, digital certificates, digital signature</td>
<td>4 points each</td>
</tr>
<tr>
<td>Business Electronic Commerce</td>
<td>SET, SSL, Merchant server, digital certificates, digital signature</td>
<td>4 points each</td>
</tr>
<tr>
<td>Smart Card</td>
<td>Authentication, digital certificates, smart card, smart card reader</td>
<td>5 points each</td>
</tr>
<tr>
<td>Micropayment</td>
<td>Micropayment, micropayment processing</td>
<td>6 points each</td>
</tr>
</tbody>
</table>
4.1. Scoring System

In order to measure the degree of e-Commerce participation for the organizations under study, we assigned a score for each activity they participate in. Every activity in the Retail Banking category is worth 1 point. Since Internet banking has been around for more than 4 years, these services are no longer considered to have many value-added components. Customers expect banks to offer this kind of the service on the Internet, hence, only 1 point is given.

Since executing a securities transaction online or obtaining stock quotes has also become common offering on the Net from discount brokerage houses and investment firms, they are no longer considered as value added to services for online customers. Therefore we used a low score of 2 to reflect this trend.

Our definition of electronic cash applications is the use of electronic money contained on a smart card in a physical location, such as Mondex and VisaCash. This definition limits the complexity of an electronic cash transaction. It acts as a new payment mechanism, in addition to credit cards, debit cards and cash, for purchases at physical locations. Therefore, the complexity of this offering mainly comes from the smart card chip. We consider these types of applications more advanced than the regular Internet offerings and therefore we assigned 3 points to it.

In order to provide secure online purchasing capability for its customers, companies have to spend significant efforts in developing protocols such as SET and software such as electronic wallets. Although the electronic commerce market is supposed to grow rapidly according to the various market prognosticators, the real growth is still slow at this point in time (11, 12, 13). Companies participating in these developments are taking large technology and financial risks. There is still a serious lack of standards in electronic commerce, protocols such as SET are still not generally accepted by either businesses or consumers (14, 15). Companies that spend their resources in this market place may need to trade off other new technology investments. Since there are high risks involved in participating in these areas, 4 points are awarded to each offering in these two categories.

At present, smart card applications such as digital certificates for authentication and SET certificates on smart cards for online purchases, are considered to be very complex applications on the Internet. We consider these services as one step ahead of the existing Internet fare. Digital certificates on a smart card can act as a portable digital identification to authenticate an Internet user. In order to offer this sophisticated security tool, a company has to have a public key infrastructure (16, 17) and smart card technology. Therefore, due to their complexity, we awarded these applications 5 points.

The last category shown in Table 1 is micropayment. This includes any tools that can accommodate Internet payments from less than $5 down to as low a value as the Millicent (a thousands of a cent). There are two ways of providing such a payment scheme: virtual currency and electronic cash on smart cards (18, 19). In both cases, implementation requires special skills and technologies. In the case of virtual currency, exchanging this kind of value over the Internet as well as integrating this new type of currency into a bank’s back end system are not trivial. In the case of electronic cash on a smart card, chip to chip communication has to be accommodated between the consumer and the merchant, as well as potentially between the merchant and the bank. Performing such communications over the Internet is a complex process. Therefore a high score of 6 is awarded to these activities.

According to the scoring scheme outlined above, we assessed the key participants in electronic commerce.

5. Results and Discussions

The 127 companies studied cover several different parts of the world. According to the scoring scheme in the previous section, a total score was calculated based on visible Internet offerings for each of these companies. An e-Commerce percentage was also calculated by adding the scores a company has on: consumer e-Commerce; business e-Commerce; smart card applications; e-Cash and micropayment, then it was divided by the total score. The data were analyzed and correlated to other factors to determine the characteristics that companies required to survive in e-Commerce.

5.1. Key Players in Overall Electronic Commerce

The total score that a company obtained based on our scoring scheme indicates the degree of participation in Electronic Commerce. Figure 1 shows the distribution of the companies with scores from 0 to 7; 8 to 12; 13 to 20 and above 20. Companies whose total score falls between 0 to 7 are mainly offering basic Internet retail banking functions. Those that score between 8 and 12 are offering retail banking and potentially electronic investment functions. Those scoring between 13 and 20
are offering e-Commerce functions either to consumers or businesses as well as participating in smart card or e-Cash implementations. Companies whose total score is higher than 20 are well ahead of the others and they must be involved in essentially all categories shown in Table 1 in order to obtain such a high score. Figure 1 shows that about 47% (those scored less than 7) of the 127 companies offer just basic Internet services. About 20% (those with scores between 13 and 20) of the sample offer some e-Commerce related services. While just 7% (scored more than 20) of the entire sample are heavily involved in e-Commerce. Among the latter, there are 4 US banks, 1 Asian bank, 1 Asian Investment firm, 1 British bank, 1 Australian bank and 1 New Zealand bank. Assets of these companies ranged from about US$20 billion to more than US$600 billion. In contrast, companies that scored between 0 and 7 have assets ranging from a few million to just less than US$100 billion.

In general, big companies, measured by assets, are more aggressive in e-Commerce.

![Figure 1. Distribution of companies in various total score ranges.](image)

**5.2. E-Commerce Success Characteristics**

**5.2.1. Electronic Commerce Strategy.** To further assess the Electronic Commerce involvement of the 127 companies, we calculated the percentage score attributed to e-Commerce by adding the scores from e-Cash; consumer and business e-Commerce; smart cards and micropayments then divided this by the total score. As a result, 65 companies among the 127 have an e-Commerce % greater than 50 in their total score. Figure 2 shows the industry distributions for these 65 companies, 66% of these companies are banks; 16% are technology companies; 13% are payment processors and only 5% are retail corporations. These results suggest that competition in e-Commerce for banks, at the present time at least, is mainly from their own peers. Nevertheless, technology companies together with payment processors represent a significant potential competition to banks in the future.

It was observed that those with a total score of higher than 20 and a e-Commerce % of more than 50 participated in almost all of the following 5 activities: e-Cash; both consumer and business e-Commerce; smart cards; and micropayments. In fact, the percentage contribution of each of these activities to the total score is almost the same. This suggests that those 9 companies have a clear vision of their role in e-Commerce. As all five activities mentioned earlier are closely related to one another, companies must be able to visualize the entire e-Commerce horizon before they can develop a viable strategy. Hence, companies must first identify the key components required for participation in e-Commerce before they develop their own strategy.

![Figure 2. Industry distributions for companies where more than 50% of their total score is contributed by e-commerce.](image)
innovative products and services allows a company to retain and attract customers more effectively. Innovation is key in achieving this goal.

5.2.3. Risks Tolerance. In order to achieve more than 50% e-Commerce contribution in the total score, a company has to have a relatively high tolerance for both financial and technological risks. For technology companies, this need is quite obvious because they are compelled to invest in technology in order to prosper in their industry. Therefore technology oriented companies are driving the development of new standards and trying to push customers to demand new technologies by constantly releasing new products. The risks for these companies are that they will not be able to maintain their leadership without ongoing investment. For banks and other companies, risks arise from investing in the wrong technology. Since most of these companies do not have the expertise to determine the type of technology that is required for a certain initiative, they have to rely on products and services developed by the technology vendors. Once a company invested time, money and human resources in a particular project, it is very difficult to quickly change to another. For banks and FIs, a mis-investment in technology may have pronounced detrimental long-term effects. For example, a security breach in a bank’s Internet service may have significant financial and credibility impact. Therefore, to become a key player in e-Commerce, companies need to have high risk tolerance and the ability to handle problems if they should arise.

5.2.4. Communication Network. As banks are still the major competitors of each other, it is not unexpected that among the 65 companies whose e-Commerce % are higher than 50, 43 were banks. We further investigated the geographical distribution of these aggressive banks; the results are shown in Figure 3.

As can be seen from Figure 3, about 40% of these banks are United States and Canadian institutions. These results suggest that North American banks are ahead of the others in e-Commerce. This finding is consistent with the results of one of our earlier studies (3). Since Electronic Commerce heavily relies on communication networks to carry data, a good and relatively inexpensive communications network is essential for success. As North America has the most advanced and lowest cost communications networks, it has created a competitive advantage for companies operating in this market. Hence, one of the success factors for companies participating in e-Commerce is to have access to advanced and highly reliable communications networks. This is why telecommunications companies may pose potential competition for banks.

5.2.5. Size. In order to assess the impact of firm size on e-Commerce, company assets were correlated with their total score, as can be seen in Figure 4. It is obvious that larger size has a positive impact on e-Commerce; 8 of the companies that scored higher than 20 have greater than US$ 100 billion in assets. This can be explained by the fact that large companies have more resources to pursue their initiatives. Although the Internet is a low cost delivery channel, the costs involved in setting up the infrastructure for commercial activities is not a low cost undertaking. This expense is higher due to a lack of standards and unpredictable transaction volumes.

![Figure 3. Geographical distribution of companies whose e-Commerce contribution is greater than 50% in their total score.](image)

Since it is not immediately evident how asset is related to e-Commerce activities, we further analyzed the data on Figure 4 by dividing the data into two sets. First a linear regression was done on the entire data set to determine whether asset size is linearly related to the total score. The dashed line in the middle on Figure 4 represents the result of this regression. According to this result, it is apparent that asset is not linearly related to the total score. It appears that asset size to total score correlation is different for companies whose score is above the solid linear regression line. Therefore a different curve fitting method was applied to the data above and below this line. For the data above the regression line, we used non-linear regression. As a result, asset size and total score are exponentially related for data in this region. This exponential relationship is shown in equation 1.

Total score = 1.62 ln (Asset)  

For data that lies below the solid regression line, we used linear regression again to determine the relationship
between asset size and total score. The solid line shows the result on Figure 4. It appears that there is a linear relationship between asset size and total score for data in this regime. This relationship is shown in equation 2. The \( r^2 \) for the bottom linear regression is 0.76.

Total score = 0.0000276 (Asset) + 5.48 \hspace{1cm} (2)

According to Figure 4, companies that lie above the dashed regression line are aggressive players in e-Commerce. Companies that lie below the solid regression line are conservative players in e-Commerce. Regardless of whether a company is aggressive or conservative in e-Commerce participation, large asset size has a positive impact in taking leadership in e-Commerce.

Figure 4. Impact of asset size in e-Commerce participation.

6. Conclusions

As competition in e-Commerce heats up, financial institutions must identify their critical success factors early. This study proved that banks are faced with serious and largely undefined competition from their traditional competitors and even less understood non-traditional competition from technology companies and payment processors in e-Commerce. Behind the amount of research reported here is a substantial knowledge base of how banks operate both traditionally and in the new world of e-Commerce.

1. By following the progress of a number of banks over the past 3 years, we conclude that banks believe that they must address the opportunities available and the threats facing them in entering e-Commerce. As there is no data available to show conclusively the fiscal benefits of developing an e-commerce strategy, the rate at which banks are entering this distribution channel indicates that they do believe in the potential.

2. Innovation is the key to success in most industries, but especially so in the high-tech world. This innovation process provides an opportunity to banks to be innovative themselves and to create e-commerce vehicles that differentiate them from the pack. Will the innovators be successful in winning market share and showing profits? There is no evidence for this yet.

3. Banks must break away from their traditional risk averse outlook when entering the "bleeding-edge" of e-commerce technology.

4. E-commerce is tied to efficient, low cost, omnipresent and reliable communications networks. Availability of such networks is a must for any long-term success in this delivery channel. One can argue that North American banks are ahead of the rest of the world in e-Commerce because more of their customers are online and bank managers on this continent are more attuned to the technology. However, customers would not be able to be on-line as much as they are if the networks were not available to them. Clearly, a chicken-and-egg situation exists here and it applies to both customers and suppliers.

5. Asset size seems to have a positive impact on a bank's E-commerce position. A large asset size also allows a bank to take more financial risks and in turn be able to take on a leadership role in e-Commerce. By taking more risks, banks are able to experiment with different technologies that in turn creates a competitive advantage in the cyber market.

Our findings suggest that banks should look to leveraging their opportunities as described in the 5 points above and get on with developing a strategy for e-Commerce. While it is not surprising, our data suggests that a large asset size allows a bank to take more financial risk, hence, it should be easier for large banks to successfully enter e-Commerce. However, at this point in time, there is no significant indication that large banks are particularly good or successful at this effort. Once a bank has the right resources in place, it will be able to develop a complete strategy in e-Commerce before actual implementation.
7. References