Economic Feasibility Model for Investments in Electronic Commerce Systems

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Abstract

Electronic Commerce has become more a practice nowadays in developed and in developing countries. It is identified that the growth observed in Electronic Commerce applications is due to the investments made in the large business sectors and not considerably in small and medium business sectors. The lack of proper Economic Feasibility assessment model with regard to investments in Electronic Commerce application is considered as the reason for the poor investments in small and medium sectors of the business. Hence, to fill this gap, an Economic feasibility assessment model is developed in this work for different categories of Electronic Commerce Systems.

Introduction

Electronic Commerce is no more a buzzword in the field of business and commerce, rather it has become more a practice nowadays in developed and even in developing countries. This is evident from the growing number of web sites throughout the world. The total number of website in the year 1993 was 1,313,000, but it has grown into 147,344,723 sites in the year 2002 (http://isc.org/ds/www-200101/index.html). Though Electronic Commerce became an active component in Indian Business scenario only from mid 90s, growing potential for Electronic Commerce is observed due to consistent increase in the number of Internet users. In India the number of Internet users were around 10,000 in 1995, but now the number has grown up to 50 million (www.nascom.org). This number is expected to increase considerably further in future. In India, the Electronic Commerce transactions have grown considerably from Rs 1.31 billion in 1998-1999 to Rs 12 billion in 2000-2001 (www.nascom.org). Hence, based on the statistics available, it is observed that there exists a consistent growth in Electronic Commerce even in Indian scenario. But it is identified that these growth factors arise from the development in the large business sector and not in the small and medium sectors. “For small and medium sector some concerns with Electronic Commerce revolve around the fear of eroding their existing customer base and the technical issues arising out of lack of computer expertise and the cost of the necessary hardware and software” (Joseph, 2002). In small and medium sector, the Entrepreneurial investments in Electronic Commerce is hampered by cost considerations, due to the lack of Economic Feasibility assessment model with regard to investments in Electronic Commerce Systems. Thus, in this work an attempt has been made to fill this gap.

Electronic Commerce Opportunities and Classifications

The global opportunities for Electronic Commerce have been identified in the areas
of financial sector, stock trading, Banking, Legal and professional services, Tour and travel, healthcare, etc. In Banking Sector Automated Teller Machines (ATM’S) have re-engineered the cash withdrawal process. The National Securities and Depositories Limited (NSDL) is almost insisting on Demat and Remat process for shareholders in the stock trading (Rajmohan and Panchanatham, 2000). Hence, all these Electronic Commerce opportunities can be classified under four categories of Electronic Commerce Systems. They are (i) C2C (ii) C2B (iii) B2B and (iv) B2C.

The first mentioned category called ‘consumer to consumer’ (C2C) is the Electronic commerce Portal which can enable the consumers to buy and sell from each other. (e.g.) www.bazzee.com. This category of business system face problems with regard to the delivery of the commodity. C2B (Consumer to Business) are the Electronic Commerce Portals in which consumers fix the price and the companies bid to offer products and services. (e.g.) www.razorfinish.com. This type of Electronic Commerce systems have not yet fully emerged in India so far. B2B (Business to Business) are the Electronic Commerce Portals that can link different branches of the same business establishment or different business establishment altogether. (e.g.) www.indiaconstruction.com. The concept of Supply Chain Management (SCM) has turned into E-SCM due to the development in this category. This segment has been identified as the segment with largest volume of business both in India and abroad (India Today, 2000). B2C (Business to consumers) are the Electronic Commerce Portals which can help in selling Products and Services directly to the consumers within specific geographical limit. (eg) www.rediff.com. “This is the segment with maximum number of websites, it is worst affected by economic slow down”. (India Today, 2000)

Electronic Commerce Sub-Systems.

Electronic Commerce can be defined as doing business over the vast interconnected networks of computers. Thus, Electronic Commerce as a Business system must consist of different sub-systems out of which a few are very essential to calculate the Economic Feasibility for investments in such systems. Figure 1 gives the conceptual design for Electronic Commerce system of the category B2C and C2B. The four

![Figure 1. Online Trading System](image-url)
sub-systems that are of importance are (i) Consumers (ii) Web Server (iii) Order Processing System (iv) Logistics operations. For the Electronic Commerce System of the type C2C, the four sub-systems that are most important are (i) Consumer1 (ii) Web Server (iii) Consumer2 (iv) Logistics operations. The Conceptual design for the Electronic Commerce System of the type B2B (Business to Business) is shown in the Figure 2.

From the conceptual design shown in the figure 2, the sub-systems that are most important are (i) Client operations (B1) in the business organization 1 (ii) Web server corresponding to B1 (iii) Client operations (B2) in the business organization 2 (iv) Web server corresponding to B2 (v) Logistics Operation. The number of sub-systems that are required for calculating the Economic Feasibility for investments in the B2B type of Electronic Commerce System, exactly depends on the number of branches or the partners with which the business operates. In the figure 2, five Sub Systems are identified but the number of branches for the organization considered is only two in number. Hence, the total number of Sub-Systems for B2B type of electronic commerce system depends on the branches that are likely to be connected in the corporate network called Intranet. These Sub-Systems are essential to calculate the cost on Investments to be made as a whole in a specific category of Electronic Commerce Systems.

Cost-Benefit Analysis

The Economic Feasibility for any project is identified based on the cost benefit analysis. The project will be Economically Viable only if the benefit obtained is greater than the cost invested. To find out the cost that are likely to be invested in a specific category of Electronic Commerce System, it is essential to find out the direct cost and the indirect cost associated with the project. Based on the literature regarding Direct Costs and Benefits

![Figure 2. Electronic Commerce System B2B](image-url)
associated with Information System by Rajaraman (2002), the list of Direct Cost and Benefits associated with the investments in Electronic Commerce Systems are identified as following.

1. The capital cost associated with the purchase of computers, peripherals and necessary software
2. Cost associated with additional space like rent, furniture etc. for the newly proposed Electronic Commerce System.
3. Cost to be paid for necessary software required to be designed and developed for the proposed Electronic Commerce System.
4. Cost associated with the operational materials like stationeries, floppy disks, toner, ribbon etc.
5. Cost associated with Internet access.
6. Cost associated with the Web hosting Services (Web Server).
7. Cost associated with logistics operation.
8. Cost associated with training the employees and system analyst to operate the System.
9. Other Indirect cost like discussing and solving the problems that may arise due to the operational modalities.

Some of the Intangible benefits are
1. Expanded market reach for the product.
2. Possibility of more visibility for the product.
4. Shorter time to market the product and subsequent fast response time from the customers and the business partners.
5. Improved customer loyalty and services through easier access to latest information.

Economic Feasibility model

The Economic Feasibility model for each category of Electronic Commerce System is going to be derived considering the subsystems in each categories namely (i)B2C (ii)B2B (iii)C2B (iv) C2C. In general the Economic Feasibility depends on the Return On Investments (ROI) derived, based on the cost savings generated due to the difference between the Investments and the corresponding cost benefit achieved through the System.

\[ \text{Cost saved} = \text{Cost value of the Benefit} - \text{Cost required to be invested} \]

In the equation (1) the cost value of the benefit should be calculated taking into account the tangible and intangible benefit for the business enterprise associated with the proposed Electronic Commerce System. “The difficulty in calculating ROI is in determining what constitutes the total cost of the project and what constitutes the total return of the project”(Manual and Mahesh, 2003). In this case the cost required to be invested depends on the exact category of the Electronic Commerce System.
Calculation of Cost investments in the Electronic Commerce System.

Cost factors for the investments depend on the number of sub-systems which an Electronic Commerce System consist of. In other words each category of Electronic Commerce System has different number of sub – systems, hence cost investments also varies for different category of Electronic Commerce Systems.

For Electronic Commerce System B2C and C2B, the subsystems that are necessary for calculating the Cost Investment are Web-Servers, Order Processing System and Logistics operations.

Hence,

\[ \text{Cost Investment} = H_c + S_c + W_c + O_c + L_c \]  \hspace{1cm} (2)

In the equation (2),

- \( H_c \) is the cost associated with establishment of Computer and Networking hard-wares required.
- \( S_c \) is the cost associated with the development of the necessary software.
- \( W_c \) is the cost associated with web hosting in web server.
- \( O_c \) is the cost associated with maintaining the online order processing System.
- \( L_c \) is the cost associated with establishing and maintaining the logistics division.

For the Electronic Commerce System B2B the sub-systems that are necessary for calculating the Cost Investment are Client operations (B1) in the business organization 1, Web server corresponding to B1, Client operations (B2) in the business organization 2, Web server corresponding to B2 & Logistic Operation. But in the figure 2 only 2 branches or partners of the business establishments alone are considered. In practical situations it may be more than 2, hence for the development of the cost investment model, n business establishments are considered.

Hence,

\[ \text{Cost Investment} = \sum_{i=1}^{n} (H_c + S_c) + \sum_{i=1}^{x} W_c + O_c + L_c \]  \hspace{1cm} (3)

In the equation (3),

- \( H_c \) is the cost associated with establishment of Computer and Networking hard-wares required in ‘n’ number of organizational Branches.
- \( S_c \) is the cost associated with the development of the necessary software required in ‘n’ number of organizational Branches.
- \( W_c \) is the cost associated with web hosting in ‘x’ number of web servers.
- \( O_c \) is the cost associated with the operation of various online features.
- \( L_c \) is the cost associated with establishing and maintaining the logistics division.

For the Electronic Commerce System of the type C2C, the sub-systems that are necessary for calculating the Cost Investment are Web-Server and Logistic operation. Basically C2C Electronic Commerce Systems are the portals which can act as a platform for two or more number of customers to interact and negotiate the business dealings.

Hence,

\[ \text{Cost Investment} = W_c + O_c + L_c \]  \hspace{1cm} (4)

In the equation (4),

- \( W_c \) is the cost associated with web hosting in the web server.
- \( O_c \) is the cost associated with the organizations online maintenance operation.
- \( L_c \) is the cost associated with establishing and maintaining the logistics division.
The equation (2),(3),(4) are the models developed to calculate the cost investments on the Electronic Commerce System of the categories (i)B2C (ii) C2B (iii) B2B and (iv) C2C. The cost values obtained based on the equations (2), (3) and (4) have to be substituted in the equation (1). The final value obtained from the equation (1) will give the cost savings due to the proposed investments in the specific category of Electronic Commerce System. Based on the value obtained in the cost savings from the equation (1), the ROI for the project can be calculated.

The financial aspect of measuring ROI.

In finance, the following standard steps are followed to evaluate the capital budgeted for a project (Brigham and Huston, 1999).

1. Determine the cost of the project.
2. Estimate the expected cash flow from the project, including the salvage value of the assets at the end of the project’s expected life.
3. Estimate the project’s risks.
4. Determine the project cost of capital based on the project’s risk.
5. Calculate the present value of the expected cash flow with the required outlay. If the present value of the Electronic Commerce application cash flow exceeds the cost, the project should be implemented otherwise, it should be rejected.

Though the above steps use the NPV, other finance methods like Payback period (PP), Discounted payback and Initial rate of return (IRR) can also be used to calculate the ROI of the Electronic Commerce applications.

Manuel and Mahesh (2003) have given the following comprehensive method for calculating the ROI for an Electronic Commerce application.

Initially, a project’s ROI can be calculated as:

$$\text{ROI} = \left( \frac{\text{Project return}}{\text{Cost to implement the project}} \right)$$

However, to further define the method, a project’s return can be determined by calculating the expenses that a company will incur with the new process and subtract that from the expenses that a company incurs with the current process. Normally, when a
new process is implemented, a value can be given to some other benefits. Now ROI formula can be written as:

\[
ROI = \frac{(Current\ Process\ Cost - New\ Process\ Cost + Other\ benefits)}{(Cost\ to\ implement\ the\ project)}
\]

Ideally, when implementing a new process, companies will incur a one-time-only cost, the initial investment. However, this is not normally the case. New processes may involve some new costs for maintenance and operation. Therefore, it is not only necessary to determine the initial investments, but also how much it is going to cost a company to operate and maintain this new process for a specified number of years. The time factor, measured in cost per year, needs to be included in the ROI formula.

Now ROI formula can be written as:

\[
ROI = \frac{{\sum_{i=1}^{n} (Current\ Process\ Cost - New\ Process\ Cost + Other\ benefits) \text{ per year} \times X\ Specific\ number\ of\ years}}{\sum_{i=1}^{n} (Initial\ investments + (Operation\ and\ Maintenance\ per\ year) \times X\ Specific\ number\ of\ years)}
\]

If the net present value (NPV) method is used, then the formula for ROI can be written as:

\[
ROI = \frac{{\sum_{i=1}^{n} NPV[(Current\ Process\ Cost - New\ Process\ Cost + Other\ benefit)\ Per\ Year]}}{\sum_{i=1}^{n} NPV[Initial\ investments + (Operation\ and\ Maintenance\ per\ year)]}
\]

**Conclusion**

Internet as a huge information system with a family of technologies has almost Re-engineered many of conventional Business Models. The operational effectiveness obtained with the ever growing technologies can be tapped into the business only if economic viability is within the reach of the business establishment. Identification of economic viability for using the technology in business requires the integration of ideas from both the Technology and Economics. The Economic Feasibility Model developed in this work might help many conventional Business Models in small and medium sectors to get Re-engineered into Electronic Commerce application. The operational effectiveness attained due to such Re-engineering will result in resource optimization which can lead to Economic Growth.

**References**

10. www.nascom.org