



A framework for evaluating e-Business models and Productivity Analysis for Banking Sector in India

Dr. NVM Rao, Associate Professor, Economics & Finance Group, BITS, Pilani
 Dr. Prakash Singh, Assistant Professor, Management Group, BITS, Pilani
 Ms. Neeru Maheshwari, Lecturer, Management Group, BITS, Pilani

Email: nvm@bits-pilani.ac.in, p_singh@bits-pilani.ac.in, neeru@bits-pilani.ac.in

Abstract

In the world of e-business the rapid growth of the market and fierce competition between the increasing numbers of participants add up to new innovations every day leading to short development cycles. New business models and a herd of start-up companies emerge every few months, to exploit the new opportunities. However, the business has had rough times trying to keep up with the rapid development of e-business. Despite the fact that more and more efforts are made to grasp the essentials of e-business and in particular e-business models, the existing literature on the subject is scattered. Moreover, the studies are quickly out-dated due to the fast phase of the 'new economy'. A clear need exists for an objective and up-to-date literature study of e-business models. This study is an effort to draw together some of the e-Business models and real-life experiments that has been circling around the e-business models. To study the sweeping changes brought about by e-initiative measures in the banking sector some banks were chosen, from public sector like SBI ,BOB etc and from private sector like ICICI, HDFC etc. The paper analyses a comparison of various models using metric method. The different elements of the metric include revenue generation, value proposition, infrastructure etc. A mathematical model taking into consideration various ranking and weightages to the elements of the metric has been developed to analyse whether investments in e-initiative increased productivity and profitability in the Indian banking system. The model suggests that the performance of the banking sector has improved considerably. Profitability, customer satisfaction, and many other parameters show a market improvement. It is believed that a mathematical approach proposed in this paper will find extensive application in other sectors of the economy also.

Introduction

In the new millennium, the internet-based way of doing business has certainly changed many industries and has influenced many customers and businesses. It has changed the shapes of whole set of industries and markets and has already had a great impact on consumers and is all set to have a very exciting future. It has improved services, reduce costs, open new channels and transform the competitive landscape. e-Business has changed the way many companies do business. To them, e-Business is no longer an alternative but an imperative. Many companies are struggling with the most basic problem: as to what is the best approach for establishing and doing business in the digital economy. Some companies are moving their businesses entirely to the Web. Some are establishing subsidiaries, and then spinning them off as separate online business. Others are investing in or merging with online startups. There is no simple prescription and almost no such thing as an established e-Business model for companies even within -the same industry.

The biggest challenge most companies face is not how to imitate or benchmark the best e-Business business model in their industry but how to fundamentally change the mindset of operating the traditional business. The essence of e-Business is to change organizations from a products-centric to customer-centric philosophy. One of the most important processes of e-Business is extracting valid, previously unknown, and comprehensible information from a large database and using it for profit. As enterprises pursue e-Business strategies, they become aware that the costs and benefits of e-Business initiatives are significant, and they strive to grasp the financial impacts and economic factors that contribute to their success.

The paper is broadly divided into two sections:

' In Section I, a review of the existing literature on business models is done by looking into the variables and parameters which are being used by researchers across the world.

' In Section II, an attempt has been made to further streamline the research by trying to analyze whether investments in e-initiative increased productivity and profitability in the banking system in India.

SECTION I

1) Literature Review on Internet Business Models

There have been number of studies to classify all the e-business models emerging over and over with the coming of the new economy. So the first step to this paper was a thorough review of the existing literature on business models. Therefore, the following sections analyzes as to how the concept of business models has been defined in literature, how business models have been classified, what components they are composed of and what modeling efforts have been put into business modeling A business model (design) is defined by Slywotzky (1996) as 'the totality of how a company selects its customers defines and differentiates its offerings, defines the tasks it will perform itself and those it will outsource, configures its resource, goes to market, creates utility for customers, and captures profits. It is the entire system for delivering utility to customers and earning a profit from that activity'.

The comprehensive study done for various models of e- business by different authors has given an idea about various components and elements of e-Business and has been compiled and assessed by giving values for various attributes in the table given below. Table 1 illustrates what elements of the models are covered by different authors and how exactly they have been treated. The various authors in the business model domain define elements differently in depth and rigour. For example, Hamel's (2000) approach covers all the elements but stays relatively noncommittal on their description. On the other hand, Gordijn's (2002) value-exchange-centric model does not cover many customer-related issues but is very rigorous in defining the value configuration and value exchanges of a company.

Table 1: Analysis of e-Business model: literature Review

Authors/Business Model Elements	Value Proposition	Target Customer	Distributional Channel	Customer Relationship	Value Configuration	Capability	Partnership	Cost Structure	Revenue Model
Stahler	2	0	0	0	2	0	2	0	2
Weill and Vitale	2	2	2	0	0	2	0	0	2
Petrovic, Kittl et al.	1	0	1	1	1	1	0	0	1
Gordijn	1	1	0	0	3	0	3	3	3
Afuah and Tucci	2	2	0	2	3	2	0	0	2
Tapscott, Ticoll et al.	0	0	0	0	3	0	2	0	0
Linder and Cantrell	1	0	1	1	1	0	0	0	1
Hamel	2	2	2	2	2	2	0	2	2
Chesbrough and Rosenbloom	1	1	0	0	1	0	0	1	0
Number of times the element is mentioned	8/9	5/9	4/9	6/9	8/9	4/9	3/9	4/9	7/9

The values 0, 1 and 2 provided in the above table represent respectively whether a particular element has or has not been mentioned, described or modeled by the researchers mentioned above. As given in the above table the various elements considered for review are value proposition, target customer, distributional channel, customer relationship, value configuration, capability, partnership, cost structure and revenue model. The review is based on the definitions given by the researchers Stahler, Weill and Vitale, Petrovic, Kittl et al., Gordijn, Afuah and Tucci, Tapscott, Ticoll et al., Linder and Cantrell, Hamel and Chesbrough and Rosenbloom.

In the last row, all the values corresponding to a particular element are summed up and divided by the number of researchers. These values indicate the significance of the elements. Following this approach, the significant elements of a business model are value proposition, customer relationship, value configuration and revenue model. Several authors showed that with the success of Information and Communication Technologies (ICT) ?particularly the Internet ?C organizational transformations are taking place in industries and companies. The e-Business Model approach proposed in this paper shall help a firm to structure its organization in a way to become more efficient, more flexible and responsive to customer demand, to forecast possible future scenarios and therefore to stay competitive in the Internet era. Modeling helps firms develop business visions and strategies, redesign and align business operations, share knowledge about the business and its vision and ensure the acceptance of business decisions through committing stakeholders to the decisions made.

II) Implications of Internet Business Models for the Banking sector

The opening of Indian economy in 1990's brought in its wake forces of market competition in small measures in the economy and all sectors including Banking sector were exposed to such forces for the first time. The liberalization and globalization necessitated the need for bringing measures to cut down cost, to increase efficiency, to provide better, value added, customized and cost effective services to the customers in all the sectors of the economy. In this paper the banking sector has been chosen for study because of its unique potential to be a very large user of e-Business. In banking, communication and records keeping are prime activities and thus the application of e-Business should be natural and useful. Advances in IT and data processing are rapidly changing the methods of communication and transaction processing procedures used by banks. During the last decade, the focus of many banks on revenue growth resulted in major new e-initiative investments, the largest involving services and market tools for customer information management and support. Banks have traditionally been organized

around product lines, such as deposit accounts and loans. Co-ordination among departments was loose, and customer information didn't flow easily across the organization. To remedy this problem, banks attempted to create a single customer interface, which forced them to integrate their databases and e-initiative systems. Once this was accomplished, banks adopted customer relationship management tools to improve their customer retention and to help up-selling and cross-selling. All this required significant investments in personal computers as well as the integration of complex systems.

New product combinations and services, such as, automated teller machines (ATM), Internet use, etc. were made available. Moreover, e-initiative can increase a bank's ability to reduce risks. The ultimate impact of e-initiative depends on the types of services the bank provides. If banks provide transaction services, e-initiative is expected to improve productivity, increase efficiency, provide scale economies, and reduce the cost structure. If banks provide risk management services, e-initiative will tend to reduce the risk of imperfect information. The best tool to provide this was e-initiatives (increased use of computers) and this also led to development of various e-Business models. Internet banking is both an opportunity and a challenge that is a consequence of the arrival of Internet and the wide usage of personal computers in the whole world.

III) Proposed Model for Banking

Literature reviews related to business model definitions and components as mentioned above, and the views presented by different authors mostly revolve around and sum up to certain facts- that for a viable business model to succeed it should consider the following components for banking sector:

Value proposition:

Value is what an investor gets and what gets created when organization acts to pursue their mission. Value consists of economic, social and environmental value components. Therefore if we consider the organization as an independent entity then both the revenue and the value to customer come under value proposition. Products and services of Indian banking have been traditionally around mass banking products. The most common deposit products are Savings Bank, Current Account, Term deposit Account and lending products are Cash Credit and Term Loans. Further, remittance products include issuance of Drafts, Telegraphic Transfers, Bankers Cheque and Internal Transfer of funds. It takes into consideration factors like:

- a) Services Provided
- b) Product Innovation
- c) Schemes and Benefits

Customer Relationship:

This consists of customer the company wants to offer value to. This also includes the tools, customer relationship management, the companies used to create trust, loyalty and branding and the communication tools the company uses to get in touch with the customer. New age channels like ATMs and net banking have opened up a demographic divide: the young frequent tech channels more than the old. The Internet banking targeted to the customer who need anywhere, anytime, anyway banking. Besides that the net banking also allows banks to reach out to a larger customer base from a low branch network. The banks are defining new segments, trying to reach the most unnoticed segment in India ?C The rural India (ICICI banks virtually provides services to many rural areas in India). Nobody denies that India is under-served. A country of 1.1 billion people has only about 250 million account holders. Three parameters are of key importance while defining customer segments i.e. accessibility, awareness and affordability. It takes into consideration factors like:

- a) Ease of Use and Design and Layout
- b) Security
- c) Customer Support

Value Configuration:

This includes the capability and resources the company needs to implement a business model. It includes Internet Servers, Softwares, ATMs and Call Centers etc. It also includes the relationship with partner and suppliers of fund. The relevance of banks products and services in future will be decided not on their emotional imagery, but perceived value. In this context, introducing new products and services variety entails creating need-based customer value propositions, prioritizing target market. It takes into consideration factors like:

- a) Strategy
- b) IT Infrastructure
- c) Technologies Used
- d) Capabilities

Financial Aspects:

Analysis of the financials of any business entity signals how well the organization is performing. The following are some of the inevitable factors in assessing the financial performance of any bank:

- a) Revenue
- b) Cost
- c) Net Profits

Methodology:

The following parameters are studied for selected banks in India as it helps us in the design of better business models for internet banks. Based on the literature reviews conducted above and from analysis, significant elements of business model that are to be considered for evaluation are identified. The following are the factors that are considered for the analysis of various banks. Each bank is evaluated based on each of the factors given below out of a scale of 5 for each factor. The above factors are considered for the analysis of various banks. Each bank is evaluated based on each of the factors given below out of a scale of 5 for each factor.

IV) Results and Analysis

Table 3: Evaluation of Various Banks in India

Name of Bank	Value Proposition			Customer Relationship			Value Configuration			Total Score	Average Rating
	1	2	3	1	2	3	1	2	3	◆◆	◆◆
Allahabad bank	3	4	3	1	2	2	3	2	2	22	2.44
Bank of Baroda	3	4	4	5	4	3	5	2	2	32	3.56
Bank of Punjab	2	4	3	4	4	3	5	2	2	29	3.22
Canara Bank	3	5	4	3	3	2	4	3	2	29	3.22
Centurion Bank	3	4	3	4	3	2	5	3	3	30	3.33
Corporation Bank	4	5	4	2	4	3	5	4	4	35	3.89
Federal Bank	2	5	3	4	2	3	3	2	1	25	2.78
Global Trust Bank	4	5	2	3	3	2	3	3	3	28	3.11
HDFC Bank	4	5	4	4	5	4	4	4	5	39	4.33
ICICI Bank	5	5	5	3	5	4	4	5	5	41	4.56
State Bank of India	3	5	4	2	5	3	5	5	3	35	3.89
Union Bank of India	2	5	2	3	3	3	3	2	2	25	2.78
UTI Bank	4	4	3	4	3	3	5	4	3	33	3.67
Standard Chartered	4	3	3	4	4	3	4	2	3	30	3.33
ABN Amro	4	3	4	4	4	4	3	2	3	31	3.44
Industrial Average	3.3	4.4	3.4	3	3.6	2.9	4.1	3	3	◆◆	◆◆

- Most of the banks offering Internet banking facility in India had high overall scores indicating high quality of their websites at all the functional and interactivity levels.
- The overall scores indicate that the scores for all the banks considered for evaluation have scores in the range 22 ?C 41; with the highest score 41 for ICICI Bank and the least score for Allahabad Bank.
- The banks, which have good scores, include ICICI Bank, HDFC Bank, State Bank of India, Corporation Bank and UTI Bank.
- The industrial averages for various factors taken into consideration lie in the range 2.87 ?C 4.4.
- Some banks have integrated their database with their website, and users could make address or other account changes without customer service support.
- ICICI Bank, State Bank of India and Bank of India now have mobile ATMs or vans that go along a particular route in a city and are stationed at strategic locations for a few hours every day. This saves the bank infrastructure costs since it has one mobile ATM instead of multiple stationary ones.
- Centurion Bank presents all resident individuals above the age of 60 years unique Term Deposit schemes for their benefits.
- Websites for ICICI Bank, HDFC Bank, SBI, Corporation Bank, UTI Bank and Global Trust Bank were organized into clean sections, with definite points as to where to begin a search for specific information.
- Almost all the internet banks had privacy statements and about half of these had a security statement.
- SBI even included security guarantees where the banks would cover 100% of improperly removed funds.
- ICICI Bank with its net banking service called 'Infinity' goes a step forward by allowing the account holder to transfer funds into another person's account within the bank.

SECTION II

In this section two important issues have been analyzed. Have investments in e-initiative increased productivity in the banking system in India? And Have investments in e-initiative improved Indian bank's profitability. The first question asks whether e-Business has enabled the banking system in the country to produce more 'output' for a given level of 'input'. The second question considers whether banks are able to use e-Business to gain competitive advantage and earn higher profits than they would have otherwise. A number of studies have used the theory of production approach to evaluate the productivity of e-Business investment. By assuming a production function, it is possible to econometrically estimate the contribution of each input to total output in terms of the gross and net marginal product. Following Hitt and Brynjolfsson (1996) and Prasad and Harker (1997), the following two productivity-oriented testable hypotheses can be derived:

H1: e-Business investment makes positive contribution to output (i.e., gross marginal product is positive)

H2: e-Business investment has zero net marginal product, after deducting all costs.

Analysis of e- Business initiatives will be tested through a Production Function for the above listed Banks for the period 1998-2003. The estimation of the impact of e-Business investment has been approached in three different ways: production function estimation, growth accounting and applied growth theory. As cost? Cbenefit analysis of e-Business investment is difficult to perform due to the absence of measures of actual benefits of IT/e-Business investment, production functions that relate IT-investment to overall productivity or output measures are seen as the best alternative. This has led to an extensive use of production theory in the e-Business investment. Using this theory, each firm is modeled by a multifactor production function $y_t = P(x_1(t); \dots; x_k(t))$, where $x_1(t), \dots, x_k(t)$ are the k inputs used to produce value added output of a firm in time t .

The Cobb-Douglas production function is given by

$$Y = e a_0 C a_1 K a_2 S a_3 L a_4$$

where Y = output of the firm; C = e-Business capital; K = non-e-Business capital; S = e-Business labour expenses; L = non e-Business labour expenses; and a_1 , a_2 , a_3 , and a_4 are the associated output elasticities. Total labour is separated into e-Business-labour and non e-Business labour. The former include all those involved in the design, implementation, and operation of telematics based systems for production activities. The latter includes product and service specialists and general support staff. Similarly, capital data is divided into e-Business capital and non e-Business capital. e-Business capital includes all production computer systems, peripherals and software. The cost of system development, physical operation, and maintenance is also included in this. Non e-Business capital includes the rental costs of all premises, non-data processing office equipment, and other miscellaneous operating expenses.

For estimation purposes, taking natural logarithms results in the following linear equation:

$$\log(Y_t) = a_0 + a_1 \log(C_t) + a_2 \log(K_t) + a_3 \log(S_t) + a_4 \log(L_t) + u_t$$

where u_t is the error term. Using the coefficients a_1 , a_2 , a_3 , and a_4 , hypotheses H1 and H2 can now be expressed as

H1: $a_1 > 0$; $a_3 > 0$

H2: $a_1 * (\text{Output}/ \text{e-Business Capital}) ? C \text{ Cost of e-Business Capital} > 0$;

$a_3 * (\text{Output}/ \text{e-Business Labour}) ? C \text{ Cost of e-Business Labour} > 0$.

Hypothesis H1 tests if there is any net positive benefit associated with e-Business; while H2 tests whether the benefits from e-Business investment exceeds the cost.

V) Results and Analysis:

The production theory also proves or shows that e-Business will create benefits by reducing production costs for a given level of output. In order to analyze the impact of e-business investment, the production approach has also been used for testing the two productivity based hypotheses mentioned below.

Table 4. Productivity based analysis

Variable	Coefficient	Ratio to output	Marginal product
(a) Dependent variable: total loans + total deposits			
e-Business capital	0.0149 (4.32)	0.0038	3.84
e-Business labour	0.0176(3.31)	0.0028	5.76
Non- e-Business capital	-0.0098 (1.80)	0.0026	-3.48
Non- e-Business labour	0.0167 (3.35)	0.0086	1.85
Adj. R ² =0.60 (OLS)			
99 per cent (2-step WLS)			
(b) Dependent variable: Net Income of Bank			
e-Business capital	0.0086 (3.02)	0.0058	1.46
e-Business labour	0.0058 (2.56)	0.0022	2.67
Non- e-Business capital	0.0019 (1.04)	0.0016	1.37
Non- e-Business labour	0.0137 (2.94)	0.0052	2.72
Adj. R ² =0.52			

99 per cent (2-step WLS)

The reported results are obtained with 2-step Weighted Least Squares (2SWLS).

The figures in parentheses are the absolute values of the t-statistics.

In this analysis, output is taken to be the sum of total loans and deposits (Table 4). The coefficients of e-Business capital and e-Business labour are positive and statistically significant. This provides support for the H1 hypothesis, which states that e-Business investment makes positive contribution to output. The coefficient of non e-Business labour is also positive and statistically significant. The marginal product of e-Business labour is highest at 5.76 followed by that of e-Business-capital at 3.84. The marginal product of non e-Business labour is 1.85. These figures indicate that each one of these three variables is associated with increase in the output of the bank. For instance, with every dollar invested in e-Business labour, output increases by \$5.76. The fact that both e-Business and non e-Business labour coefficients are statistically significant is perhaps reflective of the Indian banking industry where the emphasis on service delivery means that labour is considered to be a highly worthwhile investment.

Non e-Business capital has the wrong sign and is statistically insignificant. Given the negative productivity with investment in non e-Business capital, we find no support for hypothesis H1 and conclude that non e-Business capital investment impacts negatively on bank productivity. The rejection of hypothesis H1 for non e-Business capital means that we can also reject the stronger hypothesis H2 for this variable. As both the e-Business and non e-Business labour are flow variables, every dollar of e-Business and non- e-Business labour costs a dollar. So the excess return from e-Business labor is 5.76?C1.00 or \$4.76; while excess returns from non- e-Business labour is \$1.85?C1.00 or \$0.85. With positive excess returns, the hypothesis H2 cannot be rejected for the labour variable.

As far as H2 is concerned with capital expenses, the marginal product of e-Business capital is positive while that of non e-Business capital is negative. Hence the calculated value will be positive indicating that we cannot reject H2 for e-Business capital. Thus it can be concluded that investment in e-Business capital and e-Business labour have definitely led to an increase in productivity in the banking sector. The above Table4(b)shows the case where net income is used as the output. The results are qualitatively similar to those reported in Table 4(a). e-Business capital and labour have a statistically significant impact on bank productivity; while non e-Business capital has a statistically insignificant impact.

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