



giftjournal@l

# Global Journal of Flexible Systems Management

ISSN 0972-2696

(Quarterly Journal of Global Institute of Flexible Systems Management)

## Editor-in-Chief

**Sushil**

Chair, Strategic Management Group  
Department of Management Studies  
Indian Institute of Technology  
Hauz Khas, New Delhi-110016  
e-mail : giftjournal@giftsociety.org  
Tel : 91-11-6591167  
Fax : 91-11-6862620

## Editorial Board

### Rakesh Kumar Agrawal

School of Management  
University of Western Sydney  
Sydney, Australia

### Ali Dastmalchian

Dean, Faculty of Management  
The University of Lethbridge  
Alberta, Canada

### M.C. Jackson

Director of the Business School  
University of Hull, UK  
*Editor-in-Chief,*  
*Systems Research and*  
*Behavioral Science*

### Jatinder N.D. Gupta

Professor  
Department of Management  
Ball State University  
Muncie, USA  
*Associate Editor, Decision Sciences*

### Anthony Michell

Visiting Prof. (Strategy & Global Mgt.)  
School of Public Policy and  
Management, KDI, Korea

### H. Paul

Professor and Dean  
School of Management  
Asian Institute of Technology  
Pathumthani, Thailand

### Daniel Rouach

Professor  
School of Management  
ESCP-EAP, France

### Kulwant Singh

Head, Department of  
Management & Organization  
Faculty of Business Admn.  
National University of Singapore  
*Chief Editor,*  
*Asia Pacific Journal of Management*

### Nanua Singh

Professor and Director of Integrated  
Product Development Laboratory,  
Wayne State University, USA  
*Associate Editor-in-Chief*  
*International Journal of Robotics and CIM*  
*Editor : Product and Process Development*

### Kathryn E. Stecke

Professor in Business Administration  
The University of Michigan, USA  
*Editor-in-Chief,*  
*International Journal of Flexible Mfg. Systems*

### Ushio Sumita

Professor  
Graduate School of International Management  
International University of Japan, Japan

### Shashi Ullal

Vice-Chairman  
Hughes Escorts Communications Limited  
Gurgaon, India

### Henk W. Volberda

Professor of Strategic Management & Business Policy  
Rotterdam School of Management  
Erasmus University, The Netherlands

## Managing Committee

### Deputy Editors

K. Momaya  
Dept. of Management Studies  
IIT, Delhi.

O.P. Sharma  
Delhi College of Engineering,  
Delhi

### Members

A.K. Agrawal  
CEO  
Autometers Alliance Ltd., Noida

Rajat K. Baisya  
Dept. of Management Studies  
IIT, Delhi

P.K. Jain  
Dept. of Management Studies  
IIT, Delhi

K.M. Mital  
General Manager (HRM)  
EIL, New Delhi

Shyam Sethi  
Vice President  
Whirlpool of India Ltd., New Delhi

Sanjay K. Singh  
Editorial Coordinator-Higher Education  
Addison Wesley Longman (Singapore)  
Delhi

## Subscription and Advertising

For subscription or giving advertisements either write to Production Manager, giftjournal@l C/o Jay Dee Services Inc., 1893, 1st Floor, Udai Chand Marg, Kotla Mubarakpur, New Delhi-110003 or use 'subscription' button at the site [www.giftsociety.org](http://www.giftsociety.org), or use e-mail [giftjournal@giftsociety.org](mailto:giftjournal@giftsociety.org).

Subscription Rates (yearly for 4 issues including postage).

	Within India	Overseas
Institutions/Corporates	Rs 4,500	US\$ 200
Individuals	Rs 900	US\$ 50
Advertisement Rates		
Full page	Rs 25,000	US\$ 1,000

### Copyright © 2001, Global Institute of Flexible Systems Management

The Journal or any part thereof may not be reproduced in any form without the prior written permission of the publisher. All data, views, opinions etc. being published are the sole responsibility of authors. Neither the publisher nor the editors are in anyway responsible for them.

Published by **Global Institute of Flexible Systems Management**  
[www.giftsociety.org](http://www.giftsociety.org)

Printed by Jay Dee Services Inc., New Delhi.  
Mobile : 9810247997, Ph. : 91-11-6099537



## Contents

<i>Editorial</i>	<i>iii</i>
<i>Research Papers</i>	
• <b>Evolving Internet Business Model for Electronic Commerce Using Flexible Systems Methodology</b>	<i>1</i>
<i>Ramraj Palanisamy</i>	
• <b>E-Business Strategy of Car Industry : SAP-LAP Analysis of Select Case Studies</b>	<i>13</i>
<i>S.K. Majumdar and M.P. Gupta</i>	
• <b>Emergence of Flexible Distribution Channels for Financial Products: Electronic Banking as Competitive Strategy for Banks in India</b>	<i>29</i>
<i>Partha De Sarkar, Surendra S. Yadav and D.K. Banwet</i>	
• <b>Flexibility in Estimating Air quality Index : A Case Study of Delhi</b>	<i>39</i>
<i>P. Goyal</i>	
<i>Learning Lesson on Flexible Systems Management</i>	
• <b>Flexsy Tools</b>	<i>45</i>
<i>Sushil</i>	
<i>Book Review</i>	<i>51</i>
<i>Event Diary</i>	<i>52</i>



## Diverse Shades of Flexibility

*Flexibility is the buzz word of post modern management \**

*Flexibility is dealt with in theory as well as practice in various shades*

*Generic flexibility deals with basic concept of flexibility*

*At the level of the firm, the concept of organizational or strategic flexibility is used*

*Work place flexibility is a popular notion of flexibility in the form of flexi time and flexi place*

*Functional flexibility is of various types such as manufacturing, financial, marketing etc*

*Manufacturing flexibility consists of flexibility of various types; product, process, volume*

*The linkage of functional flexibility with generic flexibility is weak*

*Flexibility in personality is a less explored area*

*Flexibility* is slowly becoming the buzz word of post modern management. Interest, both in theory and practice, can be witnessed on diverse aspects of flexibility. Some of the important shades of flexibility in theory and practice are:

- Generic flexibility
- Flexibility at the level of firm: organizational and strategic flexibility
- Flexibility in value network
- Flexibility in work practices
- Functional flexibility-such as manufacturing flexibility, financial flexibility, information system flexibility and so on
- Flexibility at individual level-flexibility in personality
- Flexibility in products and services
- Flexibility in a colloquial sense

Generic flexibility deals with the basic concept of flexibility and is very abstract and vague. It has been treated as an antithesis of rigidity on the one hand and a synthesis of the thesis and antithesis on the other. Different researchers have defined generic flexibility in different ways.

Another shade of flexibility at the level of the firm is expressed in the form of organizational and strategic flexibility. This involves both the external or growth flexibility and internal or change flexibility. Multiple perspectives regarding new markets, new suppliers and partners leading to flexibility in the whole value network are carried on the one hand and multiskilled personnel, safety inventories, variable production capacities etc. are taken on the other.

A popular concept of flexibility in practice is workplace flexibility. The various dimensions of workplace flexibility include flexible location, flexible time, flexible contracts and flexible Human Resource practices such as compensation, recruitment and selection, rules and regulations etc.

Functional flexibility is yet another shade in which flexibility is addressed in literature as well as practice. This is the biggest chunk of terminology in the area of flexibility as there are different types of flexibility linked with each function, e.g. manufacturing flexibility, financial flexibility, logistics flexibility, operational flexibility, marketing flexibility, innovation flexibility, decision flexibility, information systems flexibility and so on.

Among various types of functional flexibility, the maximum attention has been received by manufacturing flexibility. A good deal of scholarly work is available in this area and taxonomies of flexibility have been developed. Some of the important flexibilities dealt with in the domain of manufacturing flexibility are: system flexibility, static flexibility, dynamic flexibility, product flexibility, process flexibility, volume flexibility, tooling flexibility, routing flexibility, design change flexibility, labour flexibility and so on. Work in this area has resulted into the application of flexible manufacturing systems and agile manufacturing systems in manufacturing enterprises.

Though the terminology of *functional flexibility* is rich, it lacks in proper conceptual understanding of the flexibility as each type of functional flexibility is defined in its own way. The linkage of functional flexibility with the generic flexibility is weak.

Lastly, flexibility at the individual level explores the into various dimensions of the personality that may connote flexibility, such as adaptiveness, openness, responsiveness, agility, versatility, resilience, compromise, adjustment and so on. This is a comparatively less explored area and standard instruments profiling a flexible personality are yet to be designed.



*Flexibility is seen as a positive attribute of products and services*

Flexibility is seen as a positive attribute of products and services. Now-a-days the products and services with multiple options are preferred so as to suit to the requirements of various customers. Some representative examples of flexibility in products/services are: Flexibonds, Flexigerator (Flexible Refrigerator), Flexible financing options, and so on.

*Flexibility is commonly used in day-to-day life*

The term *flexibility* is also commonly used in a colloquial manner in day-to-day life. It is seen as a desired attribute in political interactions. Some commonly used expressions are: “we should be flexible in our approach”, “go forth and become flexible”, “the issue can be better handled in a flexible manner”, and so on.

Keeping in view the diverse shades of flexibility, a comprehensive conceptual framework is lacking that may synthesize all types of flexibility.

*Flexible systems management is aiming for a synthesis in the form of a flexible enterprise and a flexible manager*

The aim of flexible systems management is to synthesize various types of flexibility at the level of process as well as of actor to deal with the dynamically changing situations. This would result into the evolution of a flexible enterprise on the one hand (incorporating the whole value network) and a flexible manager on the other. The flexible enterprise and flexible manager will synergize with each other leading to the evolution of a futuristic school of management rooted in the concept of flexibility.

**Sushil**  
*Editor-in-Chief*

# Evolving Internet Business Model for Electronic Commerce Using Flexible Systems Methodology

**Ramaraj Palanisamy**

Assistant Professor  
Department of Information Systems  
St. Francis Xavier University  
Antigonish, Nova Scotia  
Canada B2G 2W5.

## Abstract

To gain the attention of online customers and interact with them, a number of business models are developed over the Internet. Each model is unique in its application to generate revenue for an organization. Any given firm may combine different models as part of its Internet business strategy to increase profitability. This paper focuses on a methodology to evolve an integrated e-business model by combining available models over the Internet. A collection of e-business models is given for ready reference. The methodology is specified in Situation Actor Process–Learning Action Performance (SAP-LAP) framework, so that any given firm can identify the related issues in evolving an integrated business model. Business environment and e-commerce trends are considered in 'situation'; e-business model development team comprises the 'actor', and the 'process' part deals with evolving an integrated business model. The steps of flexible systems methodology are followed to combine the models in an integrated manner. Learning issues are given based on SAP analysis; action items and performance metrics are given to evolve an integrated business model. SAP-LAP issues addressed in the paper facilitate companies to enter the web with clear goals. A case study is developed to illustrate the various steps proposed by the methodology.

**Keywords:** e-commerce, Internet business models, flexibility, SAP-LAP models

## Introduction

Electronic commerce is doing business electronically (European Commission, 1997), and refers to the practice of selling real products for real money through online channels (Jeffrey, 1999) and execution of information-based transactions between two or more parties using electronic, inter-connected networks. Electronic commerce comprises trading steps such as online marketing, ordering, payment, support and delivery. The advent of Internet and World Wide Web has created explosive operational developments in e-commerce.

### *Internet Business Model*

A business model is a method of doing business by which a company can sustain itself, that is, generate revenue (Rappa, 2000). The business model spells-out how a company can get profit, describes the sources of revenues and explains the potential benefits for the various business actors (Timmers, 1998). Internet Business models are business models evolved in the Internet environment (Bambury, 1998). Some business models are simple. A company sells the products or services to its customers to realize profits. If all goes in favour of the company, then the surplus revenue after meeting the bills result into revenue for the company. This is a simple and typical business model. Besides such simple models, e-commerce gives rise to new kinds of business models.

Rappa (2000) gives the generic form of business models observable on the web. They are Brokerage, Advertising, Infomediary, Merchant, Manufacturer, Affiliate, Community,

Subscription, and Utility. A description about these models is given in the Appendix-I. A firm may implement any of these models or a combination of them. Before implementing the business model, the following questions are to be answered: Which models are to be selected? In what manner are they to be combined? How should a firm evolve an integrated business model? These uncertainties need to be cleared by a firm before rushing to Web to launch its web site.

### *The Need to Evolve an Integrated Internet Business Model*

Each business model shown in the Appendix generates revenue in its own way. To generate more revenue, models are to be implemented in an integrated manner. Any given firm may combine different models as part of its Internet business strategy for profitability (Rappa, 2000). Internet enterprises employ a creative combination of various models. For example, an advertising model may be blended with a subscription model to yield an overall strategy that is profitable.

A company may find that its current business model is not sufficient for the changing the business environment; the current model may not be successful at handling the complexity of technology in today's global era. Moreover, the changing business environment renders the current model outdated and calls for continuous improvement. Because of the changing business environment some models seem viable only for a few minutes or hours; some may be for weeks or months; and for some companies may be for years (Rayport,

1999). Moreover, there is no single, comprehensive and cogent taxonomy of web business models one can point to. Only generic forms of business models are observed on the web. So to cope up with new developments in Internet technology, the major challenge for every e-business manager is to develop appropriate and flexible business model for electronic interaction with the customer.

#### *Objectives of the Evolved Business Model*

Different stakeholder groups can define various categories of objectives. Core objectives of the evolved model could be: to create a net-center of attention in a novel way to attract and interact with customers, to provide directions to select state-of-the-art technology, to create market opportunities, to increase revenue, and to reduce cost (Bambury, 1998). So the Internet business model has to offer better prices, better services and nimble responses to consumer demands, all at a lower operational cost.

#### *Role of the Evolved Business Model*

The specific roles of the evolved business model must build new capabilities to the business prospective. Callahan and Pasternack(1999) give the expected role of the business model: Internet business model has to improve communication, enhance customer service, improve knowledge sharing, reduce costs, enter to new markets, support for globalization, create new products and services, foster innovation, reduce time to market, and increase revenue. John (1996) adds the following roles to the web business model: enhancing the corporate image, attracting prospective customers/ employees, marketing products, increasing employee productivity, and gathering and disseminating corporate data.

### **SAP-LAP Framework to Evolve Integrated Business Model**

For a given firm, situation Actor Process–Learning Action Performance (SAP-LAP) framework of management (Sushil 1997, 1999, 2000) is proposed to evolve the integrated business model and a conceptual diagram is shown in Figure 1. For a given firm, the ‘situation’ comprises of its

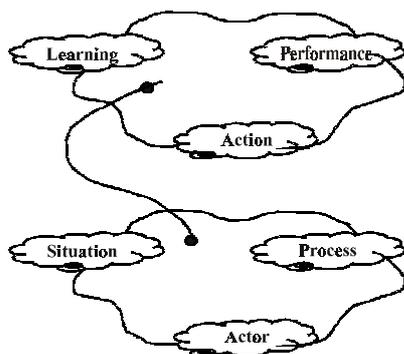


Figure 1 : SAP-LAP Framework

business environment and e-commerce trends, the ‘actor’ refers to the model development team and evolving an integrated business model is the ‘process’. The model development team forms a part of the situation as well as process. The team (actor) understands and learns the ambiguous situation through deep involvement, and exercises freedom of choice by actions. Learning issues are the outcome of Situation-Actor-Process analysis and may be in the form of pros and cons of the problem attributes or do’s and don’ts to guide the action plan or positive and negative reinforcements for the future. Performance measures are used to appraise the process of evolving the Internet business model.

#### *Situation*

Business environment and e-commerce trends constitute the situation for evolving the e-business model. Companies today operate in an environment of enormous and irreversible continuous changes. Major forces driving this age of change are information, markets, competitive pressure, the pace of business, technological innovations, capital markets, industry structures and the regulating environment (Albert and Bruce, 1996).

*Information:* Worldwide availability of the information highway facilitates customers and competitors to have instant access to each other at a record pace. The number of subscribers to on-line services is ever increasing.

*Markets:* Market boundaries are becoming global, as are the companies that compete in them. A major part of customer orders have started coming from outside the headquarters country.

*Competitive pressure:* Multi-line businesses competing in a variety of sectors and along a number of dimensions, such as speed, quality and service. Competition has been intensified and it becomes harder to achieve leadership.

*The pace of business:* Business velocity is faster with ever-rising customer expectations. Market is becoming swamped with new products.

*Technological innovation:* Technology-created market opportunities require rapid adjustment. Processing cost of information has come down drastically. The processing cost per instruction has reduced by half each year. Telecommunications costs have been steadily decreasing due to increased competition among between Internet service providers.

*Capital markets:* Investors demand better organizational performance in terms of financial parameters. Institutional investors are started owning the maximum percentage of all equities. With the advent of Internet, funds are mobilized on a more global scale today, with the exploration of new sources.

*Industry structures:* More mergers and restructuring of industries are emerging in the business arena.

*Regulatory environment:* More stringent environmental laws are enforced to protect the environment.

#### *Electronic Commerce Trends*

According to Forrester (1997), in business-to-business (B-to-B) electronic commerce the value of goods and services traded via the Internet will grow to \$327 billion in the year 2002. Between 1996 and 1997 electronic commerce has been growing at the rate of over 1000 percent per year. Datamonitor (1997) expected by the year 2002, 630,000 US companies and 245,000 European companies to be involved in full-fledged integrated B-to-B electronic commerce. The reports on electronic commerce expect that the business-to-business penetration rate will grow from 10% in 1997 to 90% in 2001. The number of consumers on the Net by now has crossed several 100 millions. The number of users from businesses and schools is growing steadily with more awareness about online shopping. Personal usage of Internet is beginning to skyrocket. Usage of employee Intranet, customer Extranet and supplier Extranet are ever increasing. International governmental policies are encouraging the Internet usage.

New ways of doing business using Internet are developing. New host sites per year is rapidly increasing because of cheaper and faster Internet access. As the number of host sites and Internet users increases, the number of online shoppers also increases. Charles and Bruce (1999) give the following Internet-enabled megatrends:

- Electronic networking of customers, suppliers, and partners
- Elimination of 'middlemen' in e-business
- Balance of power shift to the customer: customers are equipped with unlimited access to information afforded by the Internet
- Web's 24 hours availability
- Handy PC based access
- Travel cost and time saving
- Knowledge is becoming a key asset and source of competitive advantage.

#### *Actor*

The business model development team comprises top management, customer representatives, Internet business managers, e-commerce business analysts, e-commerce business modelers, system integrators, and other members of the web-site development technical team. The degree of involvement for each actor differs; some may play an advisory role, some select the model, some take the responsibility to implement the model and some may be

representatively involved. The roles and responsibilities of each team member are given in the following section.

*Top management:* The top management provides the team a clear focus and concise directions; facilitates to link strategic plans and e-business strategies to shareholder value; keeps pace with ever increasing functional/user demands for new or enhanced Internet based system.

*Customer service representative:* The purchase requirements of online customers, order fulfillment process, provides data to forecast customer visits, advocating client issues, policies, procedures and market rules are identified by the customer service representative.

*Internet - business manager:* The internet-business manager works closely with functional managers and customers to provide the most seamless interface possible for communication. The manager creates a strategy for e-Business expansion with an eye on sales growth and profitability. Managing web site activities is the major role and responsible for accomplishing Internet business model performance parameters.

***For a given firm, the 'situation' comprises of its business environment and e-commerce trends, the 'actor' refers to the model development team and evolving an integrated business model is the 'process'.***

*E-commerce business analyst:* Information inputs for the process of evolving the business model is provided by the e-commerce business

analyst. Such information could be customer expectations for products offered, describing business goals and business requirements. The analyst is responsible for developing information architecture for e-commerce site features. After evolving a business model the analyst has to come out with a plan for web site content management in liaison with web development team.

*E-commerce business modeler:* The major role is to develop business domain models (conceptual) in accordance with the existing meta model. E-commerce business requirements have to be converted into a conceptual business model. Selecting and integrating the appropriate business models are the major roles. The business modeler coordinates with the business analyst in developing the information architecture based on functional requirements.

*Systems integrator:* Basically a business modeler, the systems integrator is responsible for developing, updating and maintaining e-business processes, networks, and other communication models. The systems integrator works with business analysts to gather and understand business/ data requirements to integrate the trading partners with the given firm.

#### *Process*

The steps of flexible systems methodology (Sushil, 1994) are followed to evolve an integrated business model. The steps are reworded to suit the context of evolving the business model. They are conceptualizing e-business objectives, fuzzy clustering, matching e-business objectives and model,

selection of business models, integration and innovation, implementation and dynamic shift. These steps are dealt with in the following section.

- i) *Conceptualizing e-business objectives:* The business model development team (actor) may get the e-business objectives by understanding the business environment and e-commerce trends. The objectives could be: possible revenue generation by the evolved business model, providing a better service to the customer, enhancing the corporate image, efficient market penetration, imparting information to educate the on-line customers, increasing web traffic for the site, increasing the number of on-line buyers, increasing customer satisfaction by fulfilling their requirements, and other situation specific characteristics like providing relevant links, easy to remember web address, incorporating the most likely used keywords and phrases. The objectives for a given company can be defined collectively by the development team.
- ii) *Fuzzy clustering:* In view of e-business objectives, Internet business models need to be clustered. One or more business models may require accomplishing an objective. In other words, the objectives as well as a business model will have a membership value for the relevance. Each model can be assessed against each objective for the extent of applicability. Possibility values of applicability of a model for an objective can be used as the relevance score. The models with high relevancy scores can be identified and considered for the next step.
- iii) *Matching e-business objectives and models:* A matrix of e-business objectives and models can be used for matching. The objectives versus models matrix is used for qualitative assessment of the suitability of each model against each e-business objective. A model may not have high applicability for all objectives. So each model needs to be critically appraised in overall manner. To what extent each model contributes to the achievement of each objective should be the focus of this critical appraisal.
- iv) *Selection of business models:* Based on the critical appraisal, one or more sets of business models are selected. For this selection, the weighted average method can be used by giving suitable weights to the objectives. The selected models show high scores of applicability to accomplish the objectives. In what combination are the selected models to be used? This question emphasizes the aspect of integrating the selected business models.
- v) *Integration and innovation:* Different schemes can be followed for integrating the business models. Possible types of integration are: integrating the models in succession, using different models for different objectives, both way integrating the models, using one

model as a subset of other model maintaining its identity, and using amalgamation of models leading to a new model.

- vi) *Implementation:* Once an integrated business model is evolved, the implementation scheme is to be developed. The integrated business model is the major input for web site design.
- vii) *Dynamic shift:* As the problem situation is handled only by a set of business models, as long as the situation doesn't change these models are valid for the situation. When the situation changes there is a need to reconsider the models for applicability.

### Learning

The existing knowledge base of business models is to be continuously updated. As and when new models are introduced on the Internet, the applicability of the model for the given company should be tested. In case of suitability,

the model may be combined with the already chosen models. The integrated model needs to be upgraded in order to prevent obsolescence created by environmental forces.

Monitoring e-commerce trends and the impact on the evolved business model, opportunities and threats leads to decisions on the revamping of e-business model.

In the process of evolving business model, constant vigilance of customer feedback is to be enabled to redefine e-business objectives; Internet based cost saving models are to be explored to make profit. The integrated model provides guidelines to develop commercial web sites to maximize profit and hence provide a web-methodology. The contents of the web site can be derived from the integrated model. A blueprint for the basic functions such as providing information to the visitors, enabling commercial transactions, and entertaining visitors can be prepared based on the evolved model.

Including customer-focused models strengthens customer relationships. To satisfy customer requirements, information that is useful to customers may be provided, but this need not make them to buy from the site.

### Action

Based on Situation-Actor-Process analysis and learning issues, an action plan may be developed. The action plan gives guidelines to implement business models evolved in the 'process' part of SAP-LAP analysis. The action items suggest the issues to be considered before designing a commercial web-site. A sample of action items are given below:

- Identify target customers/visitors for the e-commerce web site
- Consider the web site content and design issues based on the evolved business model
- Specify business process design for the evolved model

***Forrester (1997) forecasts that in business-to-business (B-to-B) electronic commerce the value of goods and services traded via the Internet will grow to \$327 billion in the year 2002.***

- Derive information requirements to implement the web site
- Decide on what commercial information is to be included in the website. For example, company background, mission statement, financial statements, overview of completed projects, major customers, and product information, prices and delivery terms.
- Choose non-commercial information such as information about sponsored events, geographical location (e.g. a hotel web site providing information about nearby tourist spots) to go into the web site
- Decide on the kind of transactions such as online purchases, customer–seller interactions for price negotiations, customer services and e-payment that the web site should support.
- Determine web site features like virtual catalogues, screen order forms, questionnaires to elicit customer feedback
- Design web navigation structure for the web pages
- Decide on graphical user interfaces, database designs, network servers, and business process designs
- Plan the entertainment features such as animation, voice, video clips, cartoons, pictures, games (if necessary) for web visitors.
- Create an interactive, informative, entertaining, challenging, and unique web site to attract attention and interest
- Explore the possibility to collaborate with allied sites
- Create value added services like price comparison of products with different suppliers
- Categorize web content and customize according to the type of web surfers
- Implement policies for information protection
- Decide on information presentation such as layout, colours, font size, and mix of text and graphics.
- Develop mechanisms to get customer feedback to improve and new product development

***The business model development team comprises top management, customer representatives, Internet business managers, e-commerce business analysts, e-commerce business modelers, system integrators, and other members of the web-site development technical team.***

#### Performance

After implementing the evolved business model in firm's web-site, metrics is to be developed in order to assess the impact of the implemented business model. A sample of performance parameters are given below:

- Achievement level for e-business objectives
- Site page level usability
- Number of visitors visiting the e-commerce web site
- Revenue by on-line sales
- Reduction in intermediary cost
- Number of subscribed on-line customers
- Number of on-line customers who used free services provided by the site

- Number of complaints and grievances from online customers
- Number of value added customer services
- Extent to which the evolved business model copes with the business environment
- Easiness to find and navigate through the site
- Length of visitor sessions (domestic and international visitors)
- Number of repeat visitors
- Conversion rates from visitor to shopper, shopper to buyer as well as the number of visitors that abandoned their carts or failed to complete the check out process.
- Web traffic analysis, search engine effectiveness, activity statistics.
- Easy access to web site, user friendliness, easy navigation
- Usefulness of the web site to the visitor

#### Case Study

A case study on a courier service company is given to illustrate the steps. The case study illustration is given in Situation Actor Process-Learning Action-Performance (SAP-LAP) framework.

#### Situation

Business environment and e-commerce opportunities for the courier service company comprise the "situation". E-commerce opportunities are discussed in "Electronic Commerce Trends" sections, which are applicable for the courier service company under consideration. The impact of business environmental forces for the case are given below.

*Information:* Worldwide availability of information highway enables the customers to access the services provided by the courier company. The kind of information services available to customers could be package tracking, nearest available pick-up points and delivery locations and service fee rates. Besides these transaction services, availability of non-commercial information like corporate policies, financial reports may interest the potential investors. Encouraging customers to sign in for a subscribed service facilitates customized transactions. From the customer profile, the company can identify potential customers for a given global service. Online information focusing on customer requirements can be used for building more profitable customer relationships.

*Markets:* As the market boundary of a courier service company is based on pick-up points and delivery locations, assume the given company has local pick-up points and international delivery locations. Global customers are served through alliance companies in delivery locations. Customers may need to find the nearest pick-up and delivery points by an online search facility.

*Competitive pressure:* Competitive forces urge the company to provide competitive services such as quick delivery,

package tracking, providing software tools such as currency converter, providing real time information on movement of delivery vans, online signature services after delivery and so on.

*The pace of business:* Trends in the courier service business are introducing online signature services, online tracking through web site, providing specialized software tools to the customers, and making the entire business process transparent by providing online help information. The customer expects a guaranteed delivery for a reasonable price.

*Industry structures:* The industry encourages alliances with other courier companies to serve the global customers; these alliances help to overcome the barriers in global delivery. Also, alliances help for optimized delivery schedule by sharing the resources of the alliance company.

*Capital markets:* The given courier company can publicize its financial performance on the web site to attract potential investors. This facilitates the investors to make online buying and selling of the company's shares. The Internet enables to identify the potential investors globally in the process of exploring the new sources of fund.

#### Actor

Actors are the business model development members including top management, customer representatives, Internet business managers, e-commerce business analysts, e-commerce business modelers and system integrators. The rules and responsibilities of each team member are given in the "Actor" section of the methodology.

#### Process

##### Conceptualizing e-Business Objectives

For the given situation, the actors may set the following business objectives: to provide quick and guaranteed service

for the customers, on-line tracking of shipments, to generate more revenue, to create customer profile for better service, and to update the customers about new services. The description about these objectives is given in Table 1.

Each objective is mapped in continua of extreme options as shown in Figure 2. This is useful to consider the eligible business models required accomplishing each objective.

#### Fuzzy Clustering

The business models given in the Appendix are considered for applicability to each of the business objectives. The following models are identified with high possibility values: (i) buy-sell fulfillment model; (ii) business trading community; (iii) metamediary; (iv) search agent; (v) personalized portal; (vi) free model; (vii) recommender system; (viii) registration model; (ix) manufacturer; and (x) affiliate model.

Table 1: Description of e-Business Objectives

Business Objectives	Description
1. Quick and guaranteed service	The company aims to provide value-added services such as online tracking, on-line signature, easy pick-up schedule and quick service to customers whenever they are surfing.
2. On-line tracking of shipments	To track the shipments made, an intelligent software agent can be used to search the 'shipments database' by shipment number or customer name and date.
3. Revenue generation	To generate revenue by selling courier services directly to customers or by facilitating the customer to transact with the allied company.
4. Create customer profile	To collect customer data when a user is signing up the web site or filling an online order form.
5. Update the customers about new services	To update customer, information about new services may be given in buyer guides and directories or the company may recommend to customers based on their shipping experience and requirements.

#### Matching e-Business Objectives and Models

Each business model is critically examined to find how far it accomplishes each objective. Some models may partially

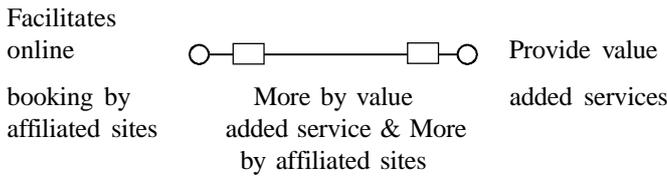
achieve an objective and some are not. A model is selected only if it achieves the objective fully or

partially. The quantitative remarks for matching and critical appraisal of each model in the firm of a given matrix is given in Table 2. Some of the remarks indicate the extent to which the model helps to achieve the objectives and some of them indicate the focus of each model in view of the objective.

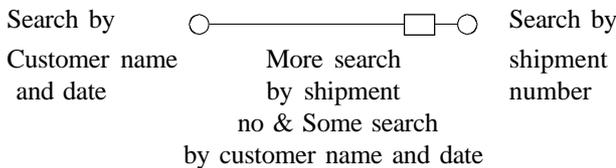
#### Selection of Business Models

Based on critical analysis of each model with each business objective the following business models are selected: (i) Buy-sell fulfillment model; (ii) Business Trading Community; (iii) Metamediary; (iv) Search Agent; (v) Recommender System; (vi) Registration Model; (vii) Manufacturer; and (viii) Affiliate model. Personalized portal and free models are dropped from the previous list because they show low applicability for the given objectives.

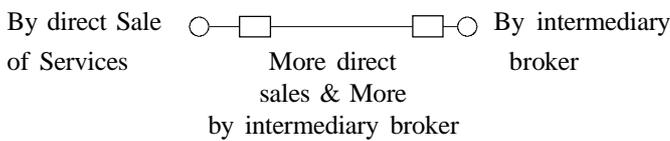
Quick and Guaranteed Service



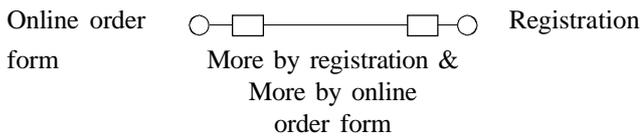
Online tracking of shipments



Revenue generation



To create customer profile



Integration and Innovation

To provide quick and guaranteed service to customers, the company can encourage the customers to book online through affiliated sites. The affiliated sites provide service opportunities to customers wherever they are surfing. Services like online booking, down loading of information/software will be much quicker. These sites can provide value added services like order tracking, billing, and collection services to ensure customer satisfaction. This is achieved by metamediary model, which protects customer satisfaction.

Implementing the search model can facilitate order tracking. Online tracking of shipment can be searched by several criteria; using shipment number or weigh bill number may result into exact matches; whereas criteria such as sender's last name, date etc. may result in many hits. In the web site, provisions can be made to give a range of possible keywords and phrases so that the customer can try one or the other.

Revenue may be generated by contacting the customers directly without middlemen. Compressing the distribution channel may give a price advantage to the customer. Direct sale of services follows the combined model of 'Manufacturer' and 'Brokerage'. For fulfilling the customer requirements, the company charges a transaction fee. Direct contact with customers enables understanding customer preferences. First hand information about the customer requirements can also be obtained.

Figure 2: Plotting the Business Objectives on Different Continua

Table 2: Matrix of e-Business Objectives Versus Models

	Business Objectives	Buy-sell fulfillment	Business Trading Community	Metamediary	Search Agent	Personalized portal	Free Model	Recommender System	Registration Model	Manufacturer	Affiliate model
1.	Quick and guaranteed service	Fulfills the customer requirements.	Customers are facilitated to transact.	Ensures customer satisfaction.	Online tracking by searching.	No much help for quick service.	Doesn't help for quick and guaranteed service.	Services are recommended based on customer's history of dealings.	Customer registration facilitates quicker service.	Direct contact with customers speeds up the service.	Quick services wherever customers are surfing.
2.	On-line tracking of shipments	Sequential integration of search model to track the shipment.	Sequential integration of search model to track the shipment.	Provides services like tracking orders, billing, and collection services.	Facilitates for searching by shipment no, customer name, date etc.	Only repeated visitors use customized interface.	No scope for online tracking.	Online tracking can be integrated with search model.	Online tracking becomes easier.	Online tracking becomes easier.	Online tracking is facilitated.
3.	Revenue generation	Charges a fee for every transaction.	Provision of comprehensive information. No direct revenue.	Charges a set-up fee and a fee for every transaction.	No revenue generated.	Revenue is based on volume of transactions.	No revenue generated.	By recommending the relevant services, revenue is generated.	No revenue generated.	Revenue through direct contact by eliminating middlemen.	Affiliated site(s) gets financial incentive.
4.	Create customer profile	Customer data can be collected by on-line order form.	Supply of information and no data collection.	No data collection. Sequential integration with registration.	No data creation; searches for the required information.	No creation of customer profile.	No scope for creation of customer profile.	Recommendations based on customer profile.	Customer profiles are created by registration.	Customer profiles are created by direct contact.	Customer profiles are collected from affiliated sites.
5.	Update the customers about new services	Provide information in customer guides and directories. Sequential integration of Business Trading community.	Update customers by providing information in consumer guides and directories.	No updating.	New services can be searched.	No updating of new services.	Information about new services can be given.	Customers are updated about new services.	Registration enables finding the targeted customers who gets updated.	First hand information about customer preferences enables for updating.	Possibility for customer updating about new services.

Customer profile and the requirements can be collected from various sources. Encouraging the customers to register with the site is one such source. Analyzing their shopping carts and online order forms are other sources. The e-customer profile can be used to categorize the customers based on the volume of transactions and nature of operations (local or global). These categories are useful to target the customers for a new type of service.

#### Implementation

This section deals with the ways of implementing the selected business models.

*Affiliated model:* Instead of having high volume traffic at one site, affiliated sites could be launched to distribute the availability of services. Also, customers may gain services through allied partner sites (for transportation and courier) thereby global service is provided.

*Metamediary:* In the company's web site, services such as online tracking of shipments, online billing, online payment, online signature services can be implemented.

*Search agent:* An intelligent software agent may be used to search out shipments from the database using keywords ranging from weigh bill number to last name.

*Manufacturer:* The company's web site may be launched to aim the customer services without any middleman.

*Brokerage- buy/sell fulfillment:* In the web site, online transactions such as online booking and online payment can be activated.

*Registration:* Sign in facility for customer profile form, customer database in the client-server architecture may be implemented.

*Recommender system:* Data mining techniques can be applied to identify the pattern of services required by the customers.

*Business trading community:* Customer guides and directories may be periodically updated for new services.

#### Dynamic Shift

One or several models may be used to accomplish each business objective. When the business objective changes, the business models are also changed accordingly. When the company focuses on "quick and guaranteed service", the value-added services are provided by metamediary model and the quick services are offered at affiliated sites. For "online tracking of shipments" objective, the company makes use of search model to search out the shipping. The revenue is generated by direct sale of services as well as by being an intermediary broker; so, manufacturer model and brokerage models are combined here. Data collection to create customer profile is done by registration and brokerage model. Finally, to update the customers about new services recommender system and business trading community are to be used.

#### Learning

The web-site may be expanded by including more features. For instance features like free downloading of software, online signature facility can be added. The integrated model explores the possible sources of revenue generation other than brokerage commission and fee based transactions.

Customer data on courier services requirements, shipping address and credit card details can be collected. The data can be converted into knowledge for building more profitable customer relationships; new product ideas or new promotion campaigns can be developed with more customer focus. The company can learn the type of services required particularly for each customer.

The web page contents can be decided on the basis of selected business models. Ways of redesigning the business processes to increase the efficiency of transactions can be unearthed from the integrated model.

#### Action

The following action plan is developed based on SAP (situation-actor-process) analysis. These action items can be considered before designing the web site.

- Create the web site contents for online booking, online payment and online tracking
- Decide the financial information contents for the interest of potential investors
- Design and develop the information architecture (input design, output design, interface design, process design, and the database design)
- Design the web navigation structure to access the contents
- Design an interactive and dynamic web site
- Explore the possibility to collaborate with other courier and transporting companies
- Categorize the customers and their service usage patterns
- Identifying ways of updating the categorized customers about new services

#### Performance

The following parameters are suggested to measure the performance of the evolved business model:

- Delivery time for the local and global services
- Number of missing shipments
- Amount of revenue generated by online services
- Statistics on number of visitors, page views, length of visitor sessions, repeated visitors, search engine effectiveness
- Visitor-shopper-buyer conversion rate
- Number of value added services
- Easy to find and navigate through the site

#### Concluding Remarks

Each business model creates revenue opportunity in its own

***A case study on a courier service company is given to illustrate the steps of flexible systems methodology.***

way. An e-commerce company has to understand its core strength before applying 'Flexible Systems Methodology' to integrate the models. Innovative companies continuously introduce innovative business models over the web. A constant vigil over new models helps a company to identify appropriate models to its business context. Continuous efforts are to be made in revamping the business model as and when the situation demands.

The integrated business model discussed in this paper is the first level of design, and it provides guidelines for web site contents and design. The information requirements and architecture can be derived based on the evolved model. To provide better services to customers at the least cost, the company has to explore innovative online business strategies.

To have more flexibility to the process of evolving the integrated business model, a company can develop its own steps. So (situation-actor-process-learning-action-performance) analysis will be unique for each company since the business situation and the strategic intent are different.

## References

- Albert and Bruce (1996) Toward a New Business Model, *Strategy & Business*, Second Quarter, . <http://www.strategy-business.com>.
- Bambury P. (1998) A Taxonomy of Internet Commerce, *Firstmonday*, Peer-reviewed journal on the Internet, 10(3), 1-11. <http://www.firstmonday.dk>.
- Callahan V.C. and Pasternack A.B. (1999) Corporate Strategy in the Digital Age, *Strategy & Business*, Second Quarter, Reprint No. 99202, <http://www.strategy-business.com>.
- Datamonitor (1997) Business-to-Business Electronic Commerce: Exploring Market Opportunities in the Extranet Age', 1997.
- European Commission, (1997) *European Initiative in Electronic Commerce*, COM(97) 157, April Chapter 1. [Http://www.cordis.lu/esprit/src/ecomcom.htm](http://www.cordis.lu/esprit/src/ecomcom.htm)
- Forrester Research Report (1997) *Sizing Intercompany Commerce*, 28 July. [Http://www.forrester.com](http://www.forrester.com)
- G7-10 (1998) WG, Electronic Commerce Better Practice, case study book of the G7 Global Marketplace for SMEs Pilot Project, first edition April. <http://www.ispo.cec.be/ecommerce/bonn.html>
- John M., Artz (1996) A Top-down Methodology for Building Corporate Web Applications, Internet Research: *Electronic Networking Applications and Policy*, 6(2), p.64-74.
- Kalakota and Whinston, (1998) *Electronic Commerce: A Manager's Guide*. Addison-Wesley, Reading.
- Rappa M. (2000) Managing the Digital Enterprise: Business Models, Electronic Document. <http://www.ecommerce.ncsu.edu/topics/models/models.html>
- Rayport F.J. (1999) The Truth about Internet Business Models, *Strategy & Business*, Third Quarter, Reprint No.99301. <http://www.strategy-business.com>.
- Sushil (1994) Flexible Systems Methodology, *Systems Practice*, 7(6), 633-651.
- Sushil (1997) Flexible Systems Management: An Evolving Paradigm, *Systems Research & Behavioral Science*, 14(4), p.259-275.
- Sushil (1999) *Flexibility in Management*, Global Institute of Flexible System Management, Vikas Publishing House, New Delhi.
- Sushil (2000), SAP-LAP Models of Inquiry, *Management Decision*, 38(5), 347-353.
- Timmers P. (1998) Business Models for Electronic Markets, *Electronic Markets*, 8(2), p.3-8.

Appendix I : Internet Business Models

Rappa (2000) gives a summary of business models available in the web. Mapping these models on meaningful continua enable to find where these models are clustered. It can be seen that the available business models are primarily clustered at the ends of continuum. This mapping is useful to identify the models, which are helpful to accomplish a set of e-business objectives.

**Brokerage Models**

**Buy/Sell Fulfillment:** Facilitates to transact by bringing buyers and sellers together and charges a fee for every transaction. Examples include online financial brokers, travel agencies and car dealers.

*Revenue Generation*



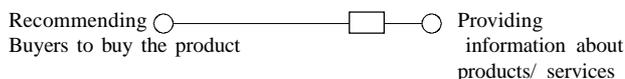
**Market Exchange:** The online broker charges the seller a transaction fee based on sales value, which is common in business-to-business market. In this model, the broker is not providing any value-added services like tracking orders, billings, collection and so on.

*Type of Service*



**Business Trading Community:** This model provides market information in the form of buyer's guides, product and supplier directories, news and articles about selected industry, classified job listings and interactive dialogue for a specific vertical market. Besides, this model enables business-to-business information exchange, publishing trade association activities, online team meetings, collaborative designs and so on.

*Information Content*



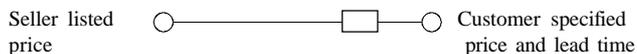
**Buyer Aggregator:** The individual purchasers of a product/service are brought together to transact as a group. Since the group purchases a high volume, seller gives a discounted price. So purchasers can see a fall in prices as more people buy.

*Aggregation to Transact*



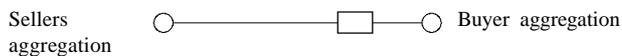
**Distributor:** Distributor model connects a large number of product manufactures with buyers purchasing in large and small quantities. B2B transactions are common in this model. Besides reducing the cost of procurement, buyers can search for preferred distributor(s) for affordable price and lead-time.

*Pricing*



**Virtual Mall:** Many online merchants are listed on one site. For listing the online merchants, the mall charges the fee for setup, listing, and for each transaction. Usually, a virtual mall has a high volume traffic, which may near millions of visits per month. It may thus be combined with advertising model.

*Aggregation to Transact*



**Metamediary:** Besides the features of a simple virtual mall, this model provides services like tracking orders, billing, and collection services. Metamediary looks after customer orders with online merchants and ensures customer satisfaction by charging a setup fee and a fee for every transaction.

*Type of Service*



**Auction Broker:** For individual sellers or merchants, the model conducts auctions with potential buyers. Seller takes the highest quoted bid from buyers. The auction broker charges a fee proportionate to the value of transaction.

*Price Negotiation*



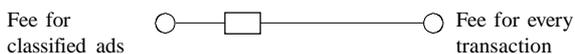
**Reverse Auction:** Here customer specifies the product/service name, brand, price and the broker seeks fulfillment by shopping for customer's request. The broker charges a processing fee based on customer's quoted price.

*Pricing*



**Classifieds:** This model includes items like sale or wanted for purchase of products or services. The price may or may not be quoted and a fee is charged for listing the sale or wanted items, no matter whether a transaction occurs or not.

*Revenue*



**Search Agent:** This model uses an intelligent software agent to search the web for the required information, which is hard to locate otherwise.

*Information Presentation*



**Advertising Models**

When the volume of traffic is large or when the web site has a highly specialized audience, banner ads can generate more revenue through this site. To create a high traffic site, free services like email, chat forums, and other free content service for the target audience are provided.

**Generalized Portal:** A high volume of traffic is generated by providing free services for the target audience. For example, search engines and directories like Yahoo!, Altavista attract tens of million visits per month; banner ads in these high volume traffic sites bring more revenue.

*Web site Traffic Intensity*



**Personalized Portal:** Repeated visitors to a site create portals by customizing the interfaces and contents. 'Yahoo' and 'My Netscape' sites provide personalized portals. Revenue is generated based on volume and value of information derived from user choices.

*Portals*



**Specialized Portal:** This model attracts special interest people like golfers, homebuyers, new parents and listeners to particular musical songs. Revenue is generated by banner ads. Advertisers are ready to pay a premium to reach the more specialized audience.

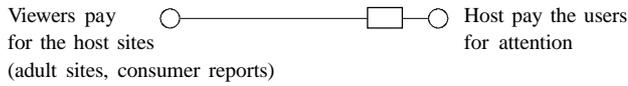
*Advertising Focus*



**Attention/ Incentive Marketing:** This model pays visitors for viewing the contents or to complete a form. This model is also called "pay for

the attention” which supports incentive based marketing and is useful for the consumers who are looking to save.

*Fee Payment:*



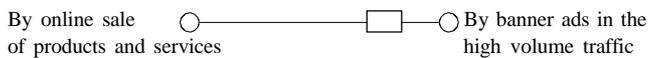
*Free Model:* This model gives free services such as site hosting, web services, Internet access, free hardware, electronic greeting cards to the users in view of creating high volume traffic. Popularity of such sites prompts other firms to place their ads.

*Services (To view the contents, chat, email etc.)*



*Bargain Discounter:* Through this site goods are sold at below normal prices; the revenue is generated from advertising placed on the site.

*Major Revenue*



*Infomediary Models*

These models provide consumer data on Internet surfing and their online buying habits so that the business firms can target their online market campaigns. Industry specific information is collected based on request and a fee.

*Recommender System:* This model recommends products and services to consumers based on a database of purchase experience with different sellers. The model monitors a user’s purchase habits and recommends the relevant products/services.

*Information Content*



*Registration Model:* This model requires the user to register before viewing contents. Site usage patterns of the registered visitors are used to target the advertising campaigns.

*Target Audience*



*Merchant Models*

These models facilitate sale of web-specific products and services by classic wholesalers and retailers (referred as e-tailers). The pricing is done by listing or through auction.

*Virtual Merchant:* This model operates only over the web and facilitates the sale of web based products and services like video games and electronic toys. The pricing is done by listing or by auction.

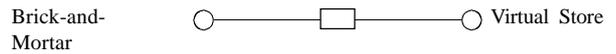
*Products*



*Catalog Merchant:* Transferring mail-order customers to online order business.

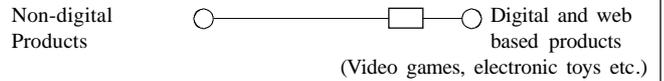
*Surf and Turf:* This model combines brick-and-mortar model with web store front to sell products and services. Orders are accepted through physical stores as well as virtual stores.

*Order sources*



*Bit Vendor:* The model allows vendors to sell and distribute only digital products and services over the web.

*Products*



*Manufacturer Model*

This model facilitates the manufacturers to reach the buyers directly and hence the distribution channel is compressed by eliminating wholesalers and retailers. Direct contact to customers improves customer service. First hand information on post purchase behavior of consumers and their preferences could be obtained.

*Intermediary*



*Affiliate Model*

This model provides purchase opportunities for people wherever they are surfing. The traffic volume is distributed to many associated sites and the affiliated partner site gets a percentage of the revenue.

*Site locations*



*Community Models*

These models are based on web user loyalty. Users invest time and emotion in the site and may regularly contribute content and/or money. This model generates subscription fee for premium services.

*Voluntary Contributor Model:* Revenue is generated by voluntary donations from the user community. Nonprofit organizations get funding from charitable foundations.

*Target Audience*



*Knowledge Networks:* Professional experts or someone knowledgeable about the subject share their expertise to other users. Experts share their knowledge by answering to the user’s questions. Sometimes, users will be discussing different issues by creating a forum on the subject. The site organizes experts for various subjects. Fee is charged for sharing the expertise.

*Knowledge Sharing*



*Subscription Model*

Payment is required to access site contents. So, only subscribers may avail services offered. These sites may provide news contents, consumer reports, adult contents and so on.

*Fee Payment*

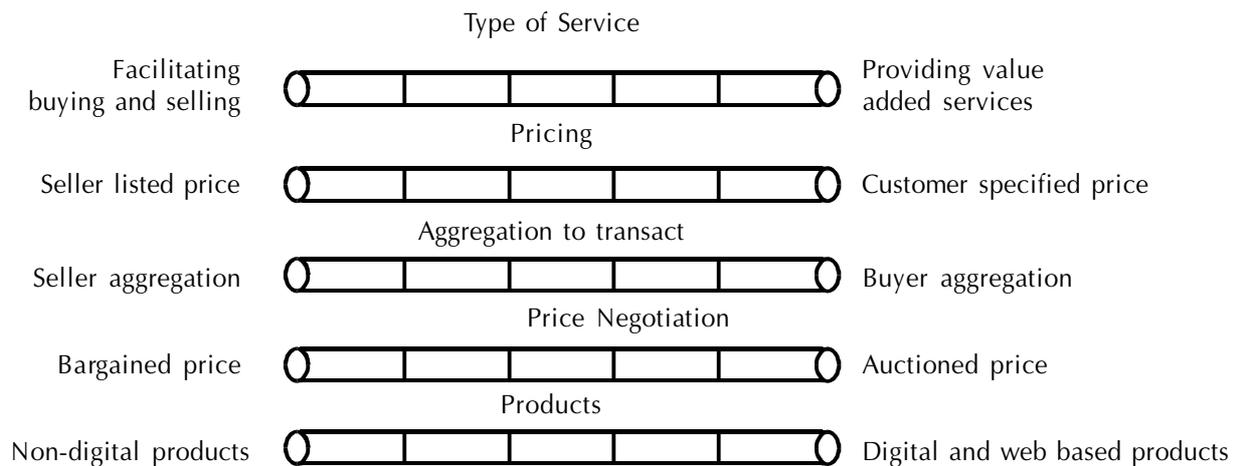


*Utility Model*

This model charges users based on their usage time. Sometimes, fees are charged based on bytes used.

**Flexibility Mapping : Practitioner's Perspective**

1. What types of flexibilities you see in the practical situation of "Electronic Commerce" on the following points:
  - Flexibility in terms of "options"
  - Flexibility in terms of "change mechanisms"
  - Flexibility in terms of "freedom of choice" to participating actors.
2. Identify and describe the types of flexibilities in e-Commerce that are relevant for your own organizational context? On which dimensions, flexibility should be enhanced ?
3. Try to map your own organization on following on continua. (Please tick mark in the appropriate box(es)).



4. Develop a SAP-LAP (Situation Actor Process-Learning Action Performance) model of "E-commerce" relevant to your organization.

**Reflecting Applicability in Real Life**

1. Implement the Internet business model for e-commerce proposed in this paper for you organization.
2. Select the relevant business models given in the Appendix and suitably integrate them to evolve a new business model for your organization.



# E-Business Strategy of Car Industry : SAP-LAP Analysis of Select Case Studies

**S. K. Majumdar**

Head of IT Education  
Webel Informatics Limited,  
Kolkata (West Bengal)

**M. P. Gupta**

Dept. of Management Studies,  
Indian Institute of Technology (IIT),  
New Delhi

## Abstract

*This paper examines the initiatives of Indian car manufactures in deploying Internet and eBusiness technology, and create Internet enabled business processes to gain competitive advantage. Virtually, every major automobile company in the country is vying for its presence felt in the new net-centric economy. To ensure economic gain through e-business would depend on the depth of understanding of business potential of the target market, strategic focus of the marketing organisation and fitness of the strategy. The findings of this study reveal that the overall eBusiness prospect of the Indian car retailing business is in a mid-way. The study indicates that eBusiness will not replace the traditional car sales channels, but will make it more efficient, flexible and customer centric.*

*Keywords:* carmakers, case studies, ebusiness

## Introduction

The rapid development in information technology (IT) development of and new ideas in recent years have large impacts on business organizations. Now the implementation of these pivotal new ideas in the form of e-commerce and e-business determines the success or failure of many business ventures. IT and communication networks as backbone of e-business furnishes companies with a powerful platform to facilitate data administration and transmission, including several complex data types (e.g. audio, video, and image). Earlier the excellent performance/cost ratio of information technology (IT) coupled with the global expansion of communication infrastructure, has enabled corporations to create and sustain large-scale strategic advantages (Cash and Konsynski 1985, Porter and Millar 1985, Bakos 1991a, Kekre and Mudhopadhyay 1992). The e-business system is actually a combination of technologies, applications, processes, business strategies and practices, which are necessary to do business electronically (Roberts and Mackay, 1998). The outstanding performance achieved by e-buisness in redesigning business processes and creating competitive advantages has generated interest among both the academic community and industry to understand the subject deeper by examining the underlying issues in detail (Sawhney and Zabin, 2001). One of the most prevalent issues that followed the introduction of e-business systems, is the ability to establish a dynamic and flexible structure for buyer-supplier relationships which deterministically drive both parties toward strategic partnerships and coordination

(Roberts and Mackay, 1998). This is more relevant in the auto sector.

The value chain in car manufacturing includes whole cycles of activities of production, exchange, distribution and consumption of cars from the design board to customers' use and recycling. Internet provides special opportunity to link all the activities and business entities of the value chain. The Internet technology has sets of powerful business tools known as eBusiness technology that can be used judiciously to improve coordination and communication to solve problem and to do complex, collaborative tasks faster and reliably (Dawar and Frost, 1999). Car manufacturers invest money, technology and personnel to manufacture and deliver cars - the technological marvels for specific sets of customers who admire the value of their products and services and have the ability to pay for it. To gain competitive advantage, carmakers must have distinct sustainable core competency in manufacturing and delivering unique values for their customers at a competitive price.

The Internet and eBusiness technology provide opportunities for carmakers to create integrated business processes to lower transaction costs across the value chain, increase company's responsiveness, decrease inventories, increase rate and pace of introducing new models of cars or services, and increase quality of customer services to enhance customers' satisfaction (AT Kearney, 2000).

However, the key question is not whether to deploy eBusiness technology, but for what purpose and how to deploy it. The Internet and eBusiness technology provides

opportunity to establish distinctive strategic proposition, but gaining such a competitive advantage requires building effective strategy (Porter, 2001). Figure 1 shows the spectrum of opportunities for the carmakers that Internet and eBusiness technologies provide for management of value chains. Figure 1 shows that Internet and eBusiness technology offers

Business Activities	Level I	Level II	Level III	Level IV
Communication with Business Community	■			
Coordination with Business Community	■			
Intra-Office Coordination	■	■		
Management of Service Chain	■	■	■	
Management of Dealers' Chain	■	■	■	
Management of Supply Chains	■	■	■	
Connecting Customers	■	■	■	■
Internet & eBusiness Technology	Internet	Intranet	Extranet	Virtualnet

Figure 1 : Opportunity Spectrum of Internet and E-Business Technology

four levels of opportunities. The simple Internet connectivity provides the first level of opportunities. Simply by deploying common public Internet facility, one could successfully perform all community oriented business communication and coordination. Secondly, one can set up dedicated Intranet for seamless integration of information and workflow across the various locations of the company and set up a global intra-office coordination and communication link for management of workflow while using the same Internet technology and harvest the second level of opportunities.

***The e-business system is actually a combination of technologies, applications, processes, business strategies and practices, which are necessary to do business electronically.***

Thirdly, when the same dedicated Intranet is extended to suppliers and distributors and business data are shared across the board seamlessly, it produces Extranet – 24 hours online dedicated business channel, where ideas, information, work and money flow synchronously and thus creates the highest abilities to seize third level of opportunities. Finally, when an organization creates Virtualnet and sets up virtual organization, it provides facilities for 24x7 hours interactive marketing facilities to its customers, it is posed for exploitation of highest level of opportunities by getting connected with its remote customers to provide interactive customer services.

The focus of first level is for random seizing of business opportunities that are available in a community. The second level urges to improve operational efficiency of multi-location organization. The third level focuses on the improvements of operation efficiency across the value chain. The focus of fourth level is creation of a closed community for the company and its customers.

The global car companies like Ford, GM and Chrysler harnessing the power of Internet and have created a global arm to collaborate, communicate and conduct business

transactions with their partners, suppliers, dealers and customers. They have developed Internet enabled business processes (eBusiness processes) and are reforming the production and retailing systems of automotive sector. The eBusiness processes providing efficient and timesaving tools for seep up information from customers to manufacturers and suppliers. Seeing the success of American companies, Indian car companies are also trying to innovate their production, distribution and servicing systems to deliver better products and services to woo their customers.

Virtually each major automobile company in the country is trying to put up its presence felt in the new net-centric economy. Every car manufacturer has its own Website and these Websites provide information about their cars and themselves. Not only the carmakers, but also most of the car dealers have or planning to have their own Website Some are focussing on getting to know their customers better, some on making their supply chains neat and transparent, some on creating electronic market places. The Pune based ancillary outfit Kalyani Group has created business-to-business portal for auto-parts (auto parts exchange), which will be transacting most of its INR 12000 million business via the net. (Dubey and Anand, 2000). Daewoo Motors India is personalising its servicing strategy so that customers can register on the company Website to not only have their own ID along with the brand they bought but also entrust the Website with the task of reminding them of car care issues. Complete online transactions processing between Maruti Udyog and its 160 dealers has compacted Maruti's order processing time to 15

minutes. Telco is trying to get its entire network connected, wherein all the dealers will

send information about the number of cars ordered. Almost all the indigenous e-Business transactions that have started with respect to Indian car industry are business-to-business transactions. Business-to-customer transactions are negligible in India in the car industry. Telco and M&M have just started their e-Business ventures. They are still not certain. Empirical data are not yet available. One has to watch and act. What is right for Indian market and what is not is not clear. The level of confusion is very high. Everyone is up in field and they all are experimenting. Carmakers have pronounced their willingness to deals through the net with their suppliers. This certainly is the beginning of a new era in the Indian car industry. One needs to find out the forces and factors that will reshape outcome of these e-Business initiatives of the Indian car industry.

To ensure economic gain through e-Business would depend on the depth of understanding of business potential of the target market, strategic focus of the marketing organization and fitness of the strategy. The environmental opportunities are dependent on socio-economic profile of the specific market, while the enabling power of the strategy is limited to the focus and potent of the strategy. The fitness of the strategy depends on the value configuration of the

proposed strategy versus the sustainable competitive advantage gaining power (i.e. unique value delivering capacity) of the said strategy. To learn the impact of Internet technology on Indian car industry, one has to study what eBusiness tools are in action in the Indian car industry, the ways of deployment as well as the fitness of Indian carmakers' eBusiness strategy. The following section presents case studies of select Indian car companies in order to understand the same.

## Methodology

A research method is a strategy of inquiry which moves from the underlying philosophical assumptions to research design and data collection. The choice of research method influences the way in which the researcher collects data. Specific research methods also imply different skills, assumptions and research practices. Klein and Myers (1999) define four research methods as method of inquiry, viz. action research, case study research, ethnography and grounded theory. Case study research is the most common qualitative method used in information systems. It is particularly well-suited to IS research, since the object of this discipline is to study the information systems in organizations, and "interest has shifted to organizational rather than technical issues" (Benbasat et al., 1987).

The term case study has multiple meanings. It can be used to describe a unit of analysis (e.g. a case study of a particular organization) or to describe a research method. A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. Case study method is used to carry out this research. It is a qualitative approach. The motivation for doing this comes from the observation that, if there is one thing that distinguishes humans from the natural world, it is our ability to talk! Qualitative research methods are designed to help researchers understand people and the social and cultural contexts within which they live. We have used the SAP-LAP methodology for critically examining the case study. Case studies developed are analyzed by selecting typicalness rather than uniqueness of the situation. Focus on typicalness leads to meaningful generalizations and scientific abstraction whereas uniqueness would preclude these. Case studies look simple, but they require thorough familiarity with the existing theoretical knowledge of the field of inquiry by the researcher and also the skill to differentiate significant variables from insignificant ones. An unbiased approach is mandatory. Unsystematic approach to the analysis of a case study till recently prevalent was as thorough and as deep as the analytic capability of the researcher. Occasionally, bias would creep in, some significant factors may be lost sight of, some factors even though not significant may get more attention, faithful longitudinal approach would not be taken,

***The value chain of car manufacturing includes whole cycle of activities of production, exchange, distribution and consumption of cars from the design board to customers' use and recycling. Internet provides special opportunity to link all the activities and business entities of value chain.***

etc. Sushil, 2000) has recommended a formal analysis methodology for critically examining a case study. This methodology consists of two phases as follows. In SAP analysis we describe the case through three basic components that define the dynamic interplay of reality in flexible systems management paradigm. These are situation, actor, and process (SAP). They interact flexibly on multiple planes in the ambiguous reality and help us in understanding the reality.

The case studies have been prepared by collecting data from both from primary and secondary sources. The cases were then analysed applying flexible systems methodology, i.e. Situation - Actor - Process, Learning - Action - Performance (Sushil, 2000) and flexibility tools to bring about the implicit issues of strategic deployment of eBusiness technology under the given context. Sushil discusses SAP analysis and LAP synthesis as method of case analysis. In SAP analysis, the dynamic parameters of a case is highlighted through the three dynamic interfaces of any business system. These interfaces are mentioned below.

*Situation:* The macroeconomic environment constitutes the situation under which a business system operates and which significantly influences the outcome of the actions and processes of the

business entities. Business entities have no direct control over the environmental factors. They are entitled to decide their strategic action plans for doing business under the given situation and thereby alter their position. Business entities are constrained to make continuous efforts to assess their position versus present and most probable future situations.

*Actors:* The decision-makers constitute the actors who assess the situation, use their specialised knowledge and judgement to produce and deliver products or services - that enables business entities to offer unique value to their customers.

*Process:* The procedural steps taken by the actors to deploy technology, personnel and management attention to produce, deliver or tailor the products and services that offer unique value to their customers and shareholders constitute the process. Some processes may be explicitly identifiable while some others will be implicit. Any dynamic behaviour that alters the situation has the potential of being a process.

In real life, it is difficult to identify all the factors of a given situation in the first place. Processes can hardly be defined unless the situation and strategies are clear. No meaningful actions are possible without mapping of the situation and deciding the supporting processes that would alter the situation. Actors cannot initiate any rational actions to alter the situation in favour of the company without knowing the cause and effect relationships. The cause and effect relationships can only be learnt by observing the performance of the past in conjunction with the analysis of the situation and processes. Ironically, no actor will possibly

know all the factors of the environment that significantly influence the performance of company's actions. Actors control the internal processes and actions with their knowledge and understanding plus assumptions about the future. Positive assumptions earn rich dividends. Negative assumptions results losses. Therefore actors take calculated risks.

The environmental factors are dynamic and changing as a result of cumulative effects of other players' actions. Conversely, created processes that have defined inputs, throughputs and outputs, and is static in nature. However, these static processes become partially dynamic when the cycle time of static processes get reduced to a great extent. This implies that one can start with certain logical assumptions; observe the steps carefully, analyse the processes and performances and learn more about the system; and make necessary corrections in the processes and do it again. In this process the static processes also become dynamic. The key of this conversion is continuous observation and learning.

Therefore the next logical step of SAP analysis is LAP synthesis. LAP has three components, i.e. learning issues, actions and performance. SAP-LAP framework is shown in Figure 2. Figure 2 shows the linkage of SAP-LAP and emphasise that

*Internet and eBusiness technology provide opportunities for car makers to create integrated business processes to lower transaction costs across the value chain, increase company's responsiveness, decrease inventories, increase rate and pace of introduction new models of cars or service and increase quality of customer services to enhance customers' satisfaction.*

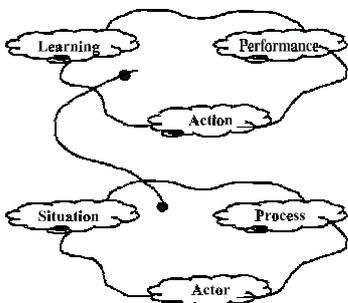


Figure 2 : SAP-LAP Framework

every business operates on dynamic and continuous basis. Actors consistently evaluate situation, follow process, take actions, learn from their performances and depending on the results of performances either the processes are modified or same process followed for repeat performance. Therefore live organizations, which are in the process of adaptation of new and complex technology, the SAP-LAP framework provides one of the most useful methodology of analysis and synthesis.

The case studies were prepared by collecting data from both primary and secondary sources. Structured interviews of IT executives and business executives of the rank of Assistant General Manager (AGM) and above of the select carmakers were arranged. Total sixteen officers were interviewed. Nine respondents are senior level officers with experience of 20 years and more, while other seven

respondents are middle level officers with 10-15 years experience. The focus of the interview was to understand the level of equipping, attitudes and practices of three select carmakers towards Internet and eBusiness technologies. The profiles, performances plus their marketing, production and eBusiness technology adoption scenarios have been presented. To supplement the findings, data were also collected from annual reports, printed documents, press release and websites of the organizations. Preceding to the presentation of the case studies a brief background of Indian car market scenario is given in the following section.

### Indian Car Market

The macroeconomic force that has transformed the domestic Indian car market into a global market is liberalization. The process of globalization is rewriting the norms, forms and the structure of Indian car manufacturing business for good. Market is flooded with variety of models and cars are available off the shelf like any other consumer goods with multiple options to select the right model to suit individual customers' taste and budget. In the process of globalization

the installed production capacity of Indian cars has gone up from 0.6 million in 1998 to 1.13 million in 2001, while the capacity utilization has

dropped from 66.8% to below 44% for the same period. Table 1 indicates the capacity utilization and consumption statistics of last four years.

Table 1: Trends in Capacity Utilization and Consumption #

	FY 97-98	FY 98-99	FY 99-00	FY 00-01*
Installed Capacity (Units/Year)	600,000	600,000	727,000	1,129,000
Production (Units Produced)	401,002	390,709	577,243	455,163*
Capacity Utilisation (%)	66.8%	65.1%	79.4%	44.0%*
Units Sold	417,935	409,951	638,815	525,540*
Capacity Consumption (%)	69.66%	68.33%	87.87%	50.78%*
Increase/Decrease in Unit Sold (+ ; -)	+6,560	-7,984	+228,864	-40,163*
%Swing in Sales	+ 1.6%	- 1.9%	+55.8%	-7.1%*

# Derived from Flash Report of SIAM; \* April - February 2001  
FY - Financial year

The excess built-in-supply potential is compelling the Indian as well as global carmakers to listen their customers and generating pressure to increase the volume of sales and to develop value adding customized products and customers services. The availability of variety of models pushed the volume of car sales to a new height in the FY 2000. The growth of sales of new variety of cars encouraged the

carmakers to enhance their production capacity and product portfolios and pushed the overall capacity utilization to a lower level. This market dynamics follows the trends of global automotive market. The Second Automotive Century report of PriceWaterhouseCoopers (2001) indicates that the global excess production capacity of vehicles is in tune of 24 millions units per year. Producing value adding customised vehicles and services requires effective mechanisms of capturing and interpreting customers needs and expectations plus flexible production, delivery and customer servicing systems. To have responsive and resilient manufacturing and delivery systems requires the support of agile information system and seamless integration of entire value chain. The system must be such that once change in demand specification is visualised, it should be instantly transmitted across the processes and entities that are responsible for manufacturing and delivering the vehicles at customer's doorstep and their servicing. In sum, to have an effective demand driven production system needs seamless integration of flow of information and materials from suppliers to end customers, compression of lead times, flexible manufacturing processes and cost-effective delivery system.

***The global car companies like Ford, GM and Chrysler harnessing the power of Internet have created global arm to collaborate, communicate and conduct business transactions with their partners, suppliers, dealers and customers.***

Case studies of selected car companies are presented here in order to understand to what extent Indian car manufactures are deploying Internet and eBusiness technology to create what eBusiness processes (Internet enabled business processes) to gain what competitive advantage and what they have accomplished so far. Confronted by the challenges of global competition, Indian carmakers are compelled to focus on their attention towards customers and attempting to adapt eBusiness technologies either to retain their market share or to be close to their customers. The technologies of eBusiness being very new the questions that are concerning the senior executives of Indian car industry are:

- How to deploy eBusiness technology to gain access to customers' preferences?
- How to deploy eBusiness technologies to retain the old loyal customers?
- What strategic deployment of eBusiness technologies would ascertain reduction in procurement, production and distribution costs and ensure maximum revenue?
- What deployment of eBusiness technologies would add unique capability to deliver quality services to customers at reduced costs and time?
- What changes are necessary to be in business and beat the competition?

These questions are generic for any industry. The case studies presented here to elicit information about the profiles, business processes and management's activities of three

Indian carmakers (case samples) namely: Maruti Udyog Limited, Daewoo Motors India Limited and Toyota Kirloskar Motors. These three case samples were selected on the ground of their physical proximity from the place of research and the uniqueness of their approaches. The methodology of the case development and analysis is discussed first before the presentation of the results of case analysis.

### **Case Study-I Maruti Udyog Limited**

Maruti Udyog Ltd (MUL), is the largest car manufacturer of India. In the year 1982, the government signed a joint venture agreement with Suzuki Motors Corporation of Japan and set up the first joint venture of Government of India in car manufacturing. In the year 1992, Suzuki's stake increased from 40% to 50.25%. As a result, Maruti changed from a government company to a non-government company. On 14th

December 1983, Maruti rolled out the first car, Maruti 800 for sale at its Gurgaon factory and marked the beginning of a revolution in the Indian automobile industry. In March 1994, Maruti reached a

total production of one million vehicles and became the first Indian car manufacturer to cross this milestone. Once again in 1997, it crossed the two million-mark. During the year 1997-98, Maruti produced over 350,000 vehicles, out of which 26,000 were exported. The turnover of Maruti touched US\$ 2.1 billion and US\$ 244 million of profit before tax.

#### *Sales Performance*

In the open market, the credential of a carmaker depends on its ability to deliver products and services, which has market demand. Table 2 indicates last five year's sales performance of Maruti, while Table 3 shows the overall behaviour of Indian car market for the same period. It shows that in the year 1997-98, Maruti emerged as uncontested market leader of Indian car industry having a market share of 82.6%. Incidentally, the same year also marked the beginning of erosion of Maruti's market dominance and the trend is still continuing. The year 2000-01 has ended up with a poor show. Overall demand of car has slipped by 7.5%. Maruti's sales declined by 17.11% and the market share has slipped to 55.8%, while Hyundai and Daewoo increased their market positions.

With the entry of Indian auto giant Telco and many other international automobile majors in the Indian market in late 1998, Maruti's market share started shrinking. In the year 1999-2000 Indian passenger car market experienced an extraordinary growth. It recorded a 56% growth than the previous year. Maruti's sales went up by 21.76%, but not in proportionate to the growth of the market. In fact, its market share dropped to 62.2%; while the three new entrants Hyundai, Telco and Daewoo together captured 26.9% of the

market share and made their presence felt in Indian car market. The very nature of Indian car market got changed forever. It became a buyer's market from seller's market. Tables 2 and 3 show that Maruti is the market leader of Indian passenger car manufacturing. From last two years sales

Table 2: Performance Statistics of Maruti Udyog Limited

Indicators	96-97	97-98	98-99	99-00	00-01
Installed Capacity (Units/Year)	250,000	250,000	250,000	350,000	400,000
Units Sold	282,856	345,303	326,523	397,586	329,542
Capacity utilisation (%)	113%	138%	131%	114%	82.39%
Increase/Decrease in Units Sold (+, -)		62447	-18,780	71063	-68044
% Swing in sales		22.07%	-5.44%	21.76%	-17.11%
Market Share (%)	68.85%	82.60%	79.65%	62.24%	55.79%

Table 3: Sales Statistics of Indian Passenger Cars

Indicators	96-97	97-98	98-99	99-00	00-01
Total Units of Cars Sold	410,806	417,935	409,951	638,815	590,647
Increase/Decrease in Units Sold (+, -)		7,129	-7,984	228,864	48,168
% Swing in sales		1.74%	-1.90%	55.83%	-7.54%

Source: SIAM

statistics it is evident that probably the total demand of Indian passenger cars is around 0.6 million and Maruti's installed capacity is around 0.4 million vehicles. Thus under the given situation Maruti could not have targeted to achieve a market share more than 66.7% and the actual achievement is 55.8% - a success rate of 83.7%. Therefore the better index of judging the performance would be capacity utilisation rather than market share. In capacity utilization front Maruti's accomplishment is 82.3% against world average of 69% (www.pwcglobal.com/auto, 2001). The only other important point that is to be noted that this is the first time Maruti's capacity utilization has touched below 100%. At the same in hyper competitive situation tittle bit of extra-capacity is quite natural. Therefore it can be commented Maruti can only hope to have around 60% of market share. Maruti needs to focus on balanced marketing and production strategies to better their performances in terms of opportunity seizing and capacity utilization.

### Marketing Strategy

Introducing the kinds of model that eliminate discomfort of existing models, improve quality, cut costs and provide

superior value to customers at regular interval is the right car marketing strategy. Table 4 indicates that customers had to wait till 1993 to have another choice other than Maruti 800. Zen and Esteem were introduced in 1993 and 1994, respectively, and Maruti emerged as the uncontested leader of the Indian car market. Interestingly, in between 1994 and 1999 Maruti did not introduce any new model. Maruti's product line was concentrated in the small and economic segment of car market. It is only recently, that the new entrants made their presence and the competition has become hot. Maruti within a span of a year (between 1999-2000) introduced whole range of new models. This time the focus is more towards the mid-size and luxury cars. This reveals that now Maruti has positioned nearly for the full segments from Economy car to Luxury cars. There are more models in Mid-Economy range than Economic range.

Sales figure of the year 2000-01 shows (Table 2) that the

Table 4: Product Range of Maruti Udyog Limited

Model	Year of Introduction	Variants	Remarks
Maruti 800	1983	Standard, EX, DX	Economy Car
Omni	1984	5 & 8 Seats	Van
Gypsy	1985	Hard & Soft Top	MUV
Maruti 1000	1990	Not in Production	Luxury Car
Zen	1993	LX, VX, VXI, Diesel, AT	Mid-Economy
Esteem	1994	LX, AX, VX	Luxury Car
Wagon R	1999	LX, LXi, VXi, WAX & Anniversary	Economic Mid size
Baleno	1999	Sedan & Altura	Luxury Car
Alto	2000	ALX (796 CC), VXI (1081 CC)	Small Economic & Mid-economic

introduction of new models failed to arrest the sliding of volume of sales. The new marketing strategy has covered the total spectrum of cars and slightly more focused towards the higher income segment (Mid-size and Luxury categories) rather than concentrating on the economic car segment only. Time and other actions of Maruti will tell how long it would take for Maruti to regain the confidence of their customers and what percentage of the market share, would be considered as the fair share of Maruti.

### Management of Supply and Retailing Chains

Manufacturing and distribution of cars is a process of creation and delivery of superior quality of vehicles to its customers at an affordable price. The very nature of the business demands high degree of collaboration and coordination. The success of car manufacturing business depends not only on the effective management of its production processes, but also intelligent management of supply, distribution and service

***Almost all the indigenous e-business transactions that have started with respect to Indian car industry are business-to-business transactions. Business-to-customer transactions are negligible in India with respect to car Industry.***

chains. Maruti has been very efficient in managing the supply, distribution and servicing chains. Maruti's dealer network is the largest for any car manufacturer in India. Over the years Maruti has build a very strong dealership and service network consisting of 260 showrooms and 277 dealer workshops, besides 1329 Maruti Authorised Service Stations covering 656 cities. Maruti's vehicles are now available in Australia, Europe and America.

Maruti has a very strong supplier network. It has established chain of dedicated suppliers near to its production base, which gives them unique cost and delivery time advantages. Maruti has implemented "Just in Time" (JIT) supply for some of its major suppliers. Maruti's large production capacity offers scale economies in procurement, production and distribution. The high volume of production has provided Maruti unique bargaining power over its suppliers. Finally, Maruti has trained and skilled workforce for rapid improvement in quality and enjoys supplier's credibility in the industry. It has earned the reputation of delivering quality vehicles, services and value for money.

#### *Deployment of Internet and e-Business Technologies*

The mission of Maruti is to provide maximum value for money to their customers through continuous improvement of its products and services. According to Rajesh Uppal, GM (IT) - "Maruti is committed to make good use of eBusiness tool for keeping in touch with their business associates and customers".

An interview was conducted with Mr. Rajesh Uppal, GM, IT to gather information about Maruti's state of deployment of Internet and eBusiness technologies. The structured interview collected data on the determinants of company's Internet Culture, eBusiness practices and commitments for eBusiness. Synthesis of the data revealed Maruti's spectrum of deployment of Internet and eBusiness technologies. Information about initiated eBusiness projects and future plan provided clues to assess level of Maruti's commitment towards eBusiness.

#### *IT and Internet Culture*

Maruti is an IT and Internet savvy company. It extensively uses IT and Internet technologies for planning, scheduling and monitoring the procurement, production and distribution processes. It spends nearly 0.15% of its turnover on IT, which is approximately 12 crores.

Maruti extensively uses ERP for procurement and management of workflow. Internet is the mail channel of their communication. Internet is not only being used for communication with business and other professional community, but also being used for handing customers', suppliers and distributors' enquires. Maruti's 2MB leased line from VSNL keeps all the key employees connected.

Maruti has two Websites-www.marutiudyog.com and www.marutibaleno.com. The Websites are quite informative and attractive. It displays exact price and product information. It also has kept provisions for customers' query through email. However, one of the visible drawbacks of Maruti's Website is that it is quite static and not interactive business-enabled Website. The two web-sites for one company create more confusion rather than adding any extra value. In sum, Maruti is a heavy user of IT and Internet. The Internet has been ingrained into the business culture of Maruti.

#### *Implementation of eBusiness Technologies*

Maruti is a forward-looking Indian car company. It is making conscious efforts to adopt eBusiness technologies to improve the business performance of the company. It is cautiously optimistic in its approach. It has a dedicated eBusiness team headed by Mr. Rajesh Uppal, GM (IT). It is following an incremental approach of technology adaptation. First it introduced ERP systems of material handing, then Internet as the vehicle of business communication and community connection, and now stepping towards online business.

Maruti is an extensive user of Intranet technology. It uses Intranet for management of workflow and keeping in touch with their global business partners and regional sales offices. Integrated Intranet-enabled management information systems keep the geographically separated offices unified. To improve coordination, cutting costs of transactions and to reduce cycle time, Maruti has started using Extranet technology for business to business online transactions. Today, 80% of Maruti's 8000 crores worth of business with 160 dealers is done through electronic ordering systems. The company's 2MB dedicated VSNL line provides the digital connectivity. Dealers' Extranet keeps Maruti updated about the status of finished vehicle stock at each and every dealer's outlet plus to synchronise the production and despatch schedule of vehicles. Rajesh says that Maruti has managed to reduce the time and cost of distribution and to improve the quality of vehicle delivery services once they have started using the Extranet for dealers. Another major advantage of dealers' Extranet is the improved flow of information about the stocks of vehicles and helping Maruti to finalize the production schedule of various variant of model according the pattern of demand. Dealers use the Extranet for online order placing and monitoring vehicle delivery status. Observing the success of dealers' Net, Maruti is planning to extend similar facility for its suppliers and also create online payment gateways.

Maruti and seven other automotive industry majors—Hindustan Motors, Bajaj Auto, Ashok Leyland, Hero Group, Mahindra & Mahindra, Tata Engineering and TVS Suzuki—formed an alliance and came together to launch a vertical portal for eProcurement for better supply chain management and reduction in material procurement costs. Maruti's B2B

***Case studies developed are analyzed by selecting typicalness rather than uniqueness of the situation. Focus on typicalness leads to meaningful generalizations and scientific abstraction whereas uniqueness would preclude these.***

system is operational, and the eBusiness team is getting ready to go for B2C.

As far as customer's care is concerned, Maruti has launched a pilot Customer Information Centre for the Delhi and Gurgaon customers through an outsourced Call Centre Partner (GE Capital). GE's Call Centre provides a technology where the customer has the facility of calling up the Service Provider (Maruti) through a unique number called the 'toll free number'. This is in line with today's approach to customer relationships, which demands personalized customer interactions through new technologies that primarily focus on needs of customers throughout the lifecycle of the products and services. Maruti has plans to open this service throughout the country after gaining adequate experience from the pilot project for customers in Delhi and Gurgaon.

#### *Management's Commitments to eBusiness*

Management of Maruti acknowledge that Maruti's mission is to produce 'People's Car' and they cannot avoid the people factor. The top management feels that the technology that will help them to keep in touch with people and their needs is eBusiness technology. Rajesh firmly believes that eBusiness provides ample opportunities to improve service quality, reduce cycle time and improve relationships. Maruti's eBusiness alliance and appointment of AT Kearney as eBusiness consultant are indications of its level of commitment. The positive results of eBusiness projects have reinforced top management's faith in eBusiness technology. However, all of Maruti's eBusiness efforts are focused towards the improvements of operational efficiency and very little toward customers servicing and preferences.

#### *SAP-LAP Analysis*

The case is analysed applying Situation - Actor - Process, Learning - Action - Performance (SAP - LAP) framework to understand the business process dynamics of Maruti's eBusiness practices. The situation is assessed as opportunities and threats that Maruti is confronted with. The competitive strengths and weaknesses that Maruti has and the key actors who are instigating actions on behalf of Maruti have been addressed. Learning issues are explored action are recommended. Finally, the impact of suggested actions on situation, actor and process is highlighted.

#### *Situation*

- Maruti's mission is to be leader of manufacturing vehicles that proves maximum value for money and keep their customers and share holders delighted.
- Maruti is the leader of Indian car manufacturing industry.
- Maruti has the largest dealer and service network in India.
- Maruti has very strong supply networks.

- High volume of production offers Maruti unique benefit of scale of economies in procurement, production and distribution.
- Maruti has created a brand image of quality and cost effect manufacturer vehicles.
- Many global players have entered in Indian market and are offering variety of models to Indian customers.
- The new entrants are threatening Maruti's leadership in terms of capacity utilization and market share. Capacity utilization has dropped to 82.3% from 100% and market share has fallen to 55.8% from 62.2% in year 2001 from previous year' position.
- Maruti is more popular in manufacturing economic cars than luxury cars.
- Demand for higher car segments is increasing, while the demand for lower segment is declining.
- Maruti introduced three new models for the entire (Economic, Mid and Luxury) segments of Indian car market.
- Maruti is an Internet amiable company. It has 2MB leased line connectivity.
- Maruti is committed to use eBusiness technology to enhance cost competitiveness of its products and services.

#### *Actor*

- CEO of Maruti has delegated full support to GM (IT) for planning and implementation eBusiness technologies
- GM (IT) has a dedicated team and AT Kearney as its consultant for implementation of eBusiness technologies.
- Marketing and Sales department is quite enthusiastic to use eBusiness technology to increase the efficiency of sales forecasting and delivery systems.
- Production department is interested to have online production planning, scheduling and controlling systems.
- Members of eBusiness implementation are putting united efforts.

#### *Process*

- Maruti's eBusiness activities cut the intermediaries and link the doers with the receivers to enhance the productivity plus cost competitiveness of in-house and downstream activities of its value chain.
- Internet keeps Maruti in touch with business community of automobile industry.
- Intranet links all intra-office activities (reports, schedules, notes, instructions, minutes, etc.) of Maruti with the activity heads and their operators to ease coordination and flow of work.
- Dedicated dealers' Extranet links the dealers with their activity-in-charge at Maruti and provides facilities for online order processing plus tracking the status of order

***In the process of globalization the installed production capacity of Indian cars has gone up from 0.6 million in 1998 to 1.13 million in 2001, while the capacity utilization has dropped from 66.8% to below 44% for the same period.***

fulfilment and transfer of funds.

- Pilot Call-Centre provides 24 hours customer service for the entire national capital region.

#### Learning Issues

- Intranet helped Maruti to improve in-house productivity and responsiveness.
- Dealers' Extranet reduced the time and costs of transactions and tracking as well as improved the quality of vehicle delivery systems.
- Major competitive advantage of Maruti is its ability to manufacture and deliver quality vehicles and services at a low cost.
- Rising demand for upper class cars, urges Maruti to redefine its strategic thrust.
- The focus of Maruti's eBusiness strategy remained towards improvement of operational efficiency of in-house and down stream activities.
- Maruti is yet to deploy eBusiness technologies for realization of full opportunities of eBusiness for the entire value chain of Maruti.
- Maruti has not yet deployed eBusiness technologies to such areas and processes where it could come out with products and services that are distinctly different from others and difficult to imitate.
- Globalization is compelling carmakers to switch over customer centric production system from "made-for-sale" to "build-what-I-order" - where customers are decision-makers and car manufacturers are consultants and process coordinators.

#### Suggested Actions

- Deploy eBusiness technology for online management of entire value chain (i.e. the supply as well as retain chain) to maintain its leadership in delivering value for money to its customers and shareholders.
- Apply eBusiness technologies to renovate suppliers' processes and development of such components, which will create unique differences in the features of cars at less time and costs.
- Use eBusiness technologies to create many alternative intermediary processes and to reduce switching time.
- Deploy eBusiness technologies to converse accessory services like car finance, car insurance and supply of accessories to create a one stop shop for car purchase.
- Utilize eBusiness technologies to involve customer and component suppliers to improve product design and innovation of technology plus ways of improving efficiency, speed, style and safety features of cars.

- Make use of eBusiness technologies to introduce and promote mid-size and luxury at competitive price with many added services.
- Finally, customer should be given options to choose the configuration of their cars, mode of payment plus place and time of collecting the key.
- Form strategic alliance with eBusiness technology solution providing company to improve the processes and security of eBusiness systems.

#### Performances

- Deployment of eBusiness technologies and processes across the value chain will enhance Maruti's ability to deliver value for money to its customers.
- Increase competition will create homogeneous look-alike vehicles. The factors that will finally differentiate one car from another are price and the brand. Therefore the cost competitiveness of Maruti will provide unique advantage of maintaining its volume production plus utilisation of capacity.

- Deployment of eBusiness technologies for design, process innovation and customer servicing will promote technology innovation and flexibility. With improved flexibility cost competitiveness and development of unique product delivering capability, Maruti should be able to accelerate its leadership.

- Providing one-stop a-to-z services for car buyers will attract more customers to Maruti and will improve customers' satisfactions.
- Allowing customers to configure their cars, place and time of delivery will inflate Maruti's brand image and will improve customers' satisfactions.
- Synchronization of online business with traditional physical services and retailing network will inculcate win-win scenario for every stakeholder of the value chain.
- Online systems will provide updated information about products and services that customers, retailers and suppliers often need. The retail-outlets and service stations will provide all services that are required. Customers get the benefits of information plus services they need. Retailers keep on servicing the customers rather than answering customers' queries and keep customers delighted.

***Case studies of selected car companies are presented here in order to understand to what extent Indian car manufactures are deploying Internet and eBusiness technology to create what eBusiness processes (Internet enabled business processes) to gain what competitive advantage and what they have accomplished so far.***

#### Case Study-II

##### Daewoo Motors India Limited (DMIL)

DMIL was incorporated as DCM Toyota Limited in the mid-80s and started with manufacturing light commercial vehicle (LCV) in India. In 1995, Korea's Daewoo Corporation bought over Toyota's equity and increased its holdings further to over 90% in 1997. Daewoo Motors India Limited, started

manufacturing world class cars in its state of the art plant at Surajpur, Uttar Pradesh, near Delhi. Daewoo commenced its operations in India with the production of Cielo in July 1995 and expanded its product range to Matiz in small car segment, and Cielo and Nexia in mid-size segment. Daewoo introduced the 1500cc ‘Cielo’ at a high price then slashed its price to gain volumes. The group is on a restructuring course with its stake in DMIL getting transferred to Daewoo Motors. Finally, the management of DMIL has come out with products, which have been received well in the market. The Korea’s Daewoo Corporation is under liquidation. The DMIL is trying to keep its operation floating. The chances of merger and acquisition cannot be ruled out.

*Sales Performance*

Table 5 indicates five year’s sales performance of DMIL. It shows that DMIL had setbacks in 1997-98, and there after it is making consistent progress. In the boom year of 2000, its sales went up by nearly 300%. In the last financial year (2000-01) when many top performers lost there

*The case study presented here to elicit information about the profiles, business processes and management’s activities of three Indian carmakers (case samples) namely: Maruti Udyog Limited, Daewoo Motors India Limited and Toyota Kirloskar Motors.*

Table 5: Performance Statistics of Daewoo Motors India Limited

Indicators	96-97	97-98	98-99	99-00	00-01
Production Capacity (units/Year)	72,000	72,000	72,000	72,000	130,000
Unit Sold	16,866	10,108	10,121	40,217	42,960
Capacity Utilization (%)	23.43%	14.03%	14.05%	55.86%	33.05%
Increase/Decrease in Unit Sold (+, -)	-6758	13	30,096	2743	
% Swing in sales	-40.07%	0.13%	297%	6.80%	
Market Share (%)	4.10%	2.42%	2.45%	6.30%	7.27%

edge, Daewoo sold nearly 43,000 cars; the sales went up by 6.8%. This indicates that its products have been well received by the Indian market. However, the capacity utilization is still very low. This means that something more is required to be done to have the economy of scale.

*Marketing Strategy*

Table 6 shows that in the beginning Daewoo focused on higher segment than the economic segment, while Maruti concentrated on economic segment. After three years of introduction of ‘Cielo’, it entered into the small car segment. Even in the small car segment, its entry was ill planned. In October 1998, it launched ‘Matiz’ in a single variant and at the highest price (INR 3,67,000) in its class. In May 1999, it introduced new variants, including stripped down, non-AC Matiz SS. Finally, the announcement of the Euro-II norms helped DMIL to grab the image of small car with the best technology. With the introduction of a new more powerful

Table 6: Product Range of Daewoo Motors India Limited

Model	Year of Intoduction	Variants	Remarks
Cielo	1995	PS, CNG & CNS PS	Luxury Car
Matiz	1998	SS, SD, SG &SA	Small Car
Nexia	1999	Standard & Deluxe	Luxury Car

engine, the Matiz has become a popular small car. Extending its presence in the higher reaches of the passenger car segment, DMIL has introduced Nexia, which has also been well received by the market. It is planning four new models–Nubira-II, Lanes-II, Tacuma and Magnus–in the forthcoming financial years.

Two facts emerged from Daewoo’s experience that Indian car market is still price sensitive. Customers do care for technological excellence, but they are not always aware about it. The price variant and technology equations are the critical factors for market acceptance.

*Management of Supply and Retailing Chains*

Consumer servicing has been the top priority of the company. Daewoo has 121 dealers and over 100 authorised service centers to cover the entire country. The company also has more than 200 vendors (component suppliers) across the country.

Daewoo Motors for the first time in India introduced the concept of help-line. A Daewoo car owner can dial the 24 hours Help-line number for assistance in case of breakdowns. The specially trained service personnel would attend the problem within 30 minutes of receiving a call. Through additional services such as ‘The Happy Call Centre’ and Express Part Service (speedy delivery of any part all over the country) the company is dedicated to provide the customers with the best possible service network.

*Deployment of Internet and E-Business Technologies*

The mission of Daewoo is to provide ‘world-class car’ at an affordable price to their customers through continuous improvement of its products and services. Daewoo is interested in using of Internet and eBusiness tool for keeping in touch with their business associates and customers. An interview was conducted with Mr. Anil Garg, AGM (MIS) on DMIL’s to collect information about the mission, business processes and the state of deployment of IT and eBusiness technologies at MMIL. The structured interview collected data on the current state of deployment of Internet, Intranet, Extranet and Virtualnet technologies plus future plans. The analysis of the results of the interview revealed the sate of IT and Internet culture, eBusiness practices Daewoo’s and Top Management’s commitments for eBusiness.

### IT and Internet Culture

The results of the interview show that Daewoo is a moderate user of Internet. It uses the Internet mainly to reach customers, international business partners and dealers/distributors. Daewoo uses customized ERP package for planning and controlling its material requirements. It has a well-designed web site -www.daewoindia.com. The web site is quite informative and very fast and contains exact information about product features, services and price and also provides links to car-finance providers. Daewoo's Website is a static and not interactive business-enabled web site.

### Implementation of eBusiness Technologies

Daewoo's eBusiness strategies are significantly different from Maruti. The company has established a communication by way of leased link to Internet through VSNL plus all regional sales offices are connected through V-SAT link and use this link for interoffice co-ordination. Daewoo does not have any dedicated Extranet. However, it is first to introduce Tele-customer servicing and Express Parts delivery services system helped Daewoo to built better customers service networks with smaller teams and to provide better quality of after sales service to its customers. However, DGM (IT), Mr. Garg, did mention that Daewoo would like to introduce more advanced features like on-line automart, on-line order processing, billing facilities and on-line shipping and tracking systems, but nothing has happened since then.

### Management's Commitment to eBusiness

Despite being an independent Indian company, Daewoo's Management is caught in the financial crisis. Its strategy is to manufacture superior vehicles and best customers' service at less cost. Mr. Garg feels that eBusiness can help in global dissemination of product information and increase market share, but present financial conditions does not permit Daewoo to commit any extra-resources for eBusiness projects.

### SAP-LAP Analysis

The case is analysed applying the SAP - LAP framework to understand the process dynamics of Daewoo's eBusiness practices. Prevalent market situation is the opportunities and threats that Daewoo is confronted with. The competitive strengths and weaknesses that Daewoo has and the key actors who are instigating actions on behalf of Daewoo have been addressed. Learning issues are explored and actions are recommended. Finally, the impact of suggested actions on situation, actor and process is highlighted.

### Situation

- Daewoo has received the recognition as manufacturer of high quality technically superior cars. It provides four years of unlimited mileage warranty.

- The production capacity of Daewoo has increased from 7,200 thousand to 1,30,000 per annum during the last financial year (2000-2001).
- Daewoo cars have achieved a very high level (70-80%) of indigenization
- Daewoo has fairly strong dealer and supply network.
- Despite of heavy competition Daewoo's market share is increasing, while others lost their edge.
- Demands for higher variety of car is increasing.
- Daewoo has plans to introduce four new models in the mid-range for the financial year (2001-2002).
- VSNL leased line and V-SAT provide Daewoo's connectivity.
- Daewoo has earned it's credit as the first provider of Tele-customer servicing facility in India
- Daewoo's management is undecided about eBusiness strategy.

### Actor

- CEO of Daewoo has delegated full support to GM (IT) for planning and implementation eBusiness technologies
- DGM (IT) has a dedicated team for implementation of eBusiness technologies.

**Maruti and seven other automotive industry majors - Hindustan Motors, Bajaj Auto, Ashok Leyland, Hero Group, Mahindra & Mahindra Tata Engineering and TVS Suzuki- formed an alliance and came together to launch a vertical portal for eProcurement for better supply chain management and reduction in material procurement costs.**

- Marketing and Sales department is quite enthusiastic to use eBusiness technology to increase the efficiency of sales forecasting and delivery systems.

### ● P r o d u c t i o n

- Production department is interested to have online production planning, scheduling and controlling systems.
- Members of eBusiness implementation are putting united efforts.

### Process

- Daewoo's strategy is to use eBusiness technology as global communication channel.
- Internet keeps Daewoo connected with the business community of world automobile industry.
- V-SAT empowered Intranet connects all regional sales offices.
- Tele disaster recovery facility plus and happy call centre maintain the 24 hrs connectivity with customers.

### Learning issues

- Tele-customer service facilities of Daewoo provided a cost-effective customer-care system.
- Daewoo's eBusiness strategy was focused towards speedy supply of parts and handling customers complain using the V-SAT connectivity.
- Indian market is price sensitive.

- Indian customers are interested in paying, if the quality of the car is extraordinary.
- Indian customer were not aware about the technical excellence of “Matiz” until being told by international experts or being directed by Hon’ble supreme court of India to follow the Euro - II norms.
- Major competitive advantage of Daewoo is its ability to deliver high quality car.
- Rising demand for higher segment of cars puts Daewoo in advantage position.
- Daewoo is not taking the advantages of eBusiness technology for improvement of in-house productivity nor for the management of supply and retailing chains.
- Daewoo is not paying enough attention to customers’ preferences. Its manufacturing strategy is -”we-know-what-you-need”. But when a competitor will position a similar product next to it, it might create puzzles for the customers. Therefore it’s better to keep tapping the preferences of customers.

*Suggested Action*

- Form an alliance with a dot com company for promoting a dedicated Virtualnet to reach the customer and for speedy delivery of parts and services.
- Utilize eBusiness technology for management of supply and retailing chain and reduction of operational costs.
- Install a GroupWare for seamless management of information and workflow.

***Maruti has succeeded in improving quality and productivity of vehicle delivery systems by creating a dealer Extranet. Daewoo’s Tele-customer servicing has become the role model of customer care. Toyota’s market entry has created history of instant success in a crowded market.***

*Performance*

- Since Daewoo has a good product, it requires the reach to customers. The Virtualnet will provide the reach plus customers support.
- If a dot.com company joins hands with Daewoo and create Virtualnet for Daewoo. Dot.com will get the business; Daewoo will get the reach to customers.
- Daewoo should apply eBusiness technology to attain cost competitiveness across the entire value chain.
- Use of GroupWare based Internet will improve in house productivity. The Intranet should connect the doers with the receivers.
- Daewoo has good products what is required is a good push to gain the volume. The down streams eBusiness applications will provide that push.

**Case Study-III  
Toyota Kirloskar Motors**

After eighteen months of market research, Japanese giant Toyota decided to enter the Indian market. Instead of launching a premium or small car, Toyota Kirloskar Motors rolled out the “Qualis” a multipurpose vehicle, which could

be used in both urban and rural areas in 1999 with an initial production capacity of 50,000 vehicles. The factory is located in the industrial estate of Bidadi on the outskirts of Bangalore. The interiors of the “Qualis” are comfortable as that of any car. With power steering and excellent engine, it is easier to drive and manoeuvre than a small car. Toyota addressed a market hitherto untouched and made received instant market acceptance. Toyota’s entire sale is coming from big cities and towns.

Table7: Performance Statistics of Toyota Kiloskar Motors

Indicators	99-00	00-01
Production Capacity ( units /Year)	50,000	50,000
Units Sold	3,519	25,375
Capacity Utilization (%)	7%	50.75%
Increase/Decrease in Unit Sold (+, -)		21856
% Swing in sales		621%
Market Share (%)		20.14%

*Sales Performance*

Introduction of “Qualis” is an instant success. Table 7 shows that within a year’s time it has captured 20% market share of MUV and reached 51% utilization of its capacity. It is felt that “Qualis” success is an eye opener

to many of its competitors.

*Marketing Strategy*

Before entering into the Market, Toyota did a thorough market research about the characteristics of the Indian market. It found that while there is a need, but no utility vehicle offered the comfort and the ease that an urban driver required. Secondly, research also found that most cars did not fit into the requirement of large or extended family. Therefore, Toyota decided to offere a multi-utility vehicle, that can accommodate a large family, can be used anywhere in the country, fits into the budget, and meets the quality, comfort and the ease of driving.

*Management of Supply and Retailing Chains*

Utmost attention was paid while selecting the component suppliers to ensure timely supply. Effective networking of supply and distribution links is ensured through periodical reviews of procurement processes and performances. There are no plans for reengineering the strategies and goals of the business. The dealership network is fairly strong. The suppliers’ network for Toyota is predominantly regional and close to production unit in terms of distance. Toyota is world leader in rolling quality vehicle and “Just in Time” management of its supplier chains.

### Deployment of Internet and E-Business Technologies

A detailed interview with Dr. S Bhat, DGM, corporate communication informed the eBusiness practices of Toyota. It was revealed that except Internet Toyota has not used any eBusiness technology. The company is yet to have a web site, however it is planning to have one. It does not even use any EDI, ERP package. Toyota does use the Internet quite frequently to reach out to customers, international business partners and dealers/ distributors.

The message that emerges from the Toyota's case is that correct identification of customers' needs and expectations plus development of quality vehicle that fits within the pockets and tests of customers are the keys of running successful vehicle manufacturing business. Secondly, senior executives of Toyota believe that India's telecommunication infrastructure is not wide enough to cover "Qualis" rural and urban customers. Currently, Toyota is not thinking about eBusiness. It prefers to wait and observe.

### SAP-LAP Analysis

The case is analyzed applying the SAP - LAP framework to understand the process dynamics of Toyota's eBusiness practices. Prevalent market situation is assessed in terms of opportunities and threats that Toyota is confronted with. The competitive strengths and weakness that Toyota has and the key actors who are instigating actions on behalf of Toyota have been addressed. Learning issues are explored and actions are recommended. Finally, the impact of suggested actions on situation, actor and Process is highlighted.

#### Situation

- Toyota made instant success in introducing a multi utility vehicle for the first time of it's kind in India.
- Other competitors are planning to follow the footsteps of Toyota.
- Toyota is the third largest global automotive company.
- Toyota has implemented JIT supply system without using an ERP package
- Toyota's customers are from cities and from rural areas.
- Toyota has not pressed any eBusiness technology for its business in India. Though it has technical expertise and the required financial resources.

#### Actor

- There is no actor for implementation of eBusiness Technology.
- Marketing and Sales department use Internet to keep in touch with the customers, suppliers and other members of automobile business community.
- Production department would be interested to have online production planning, scheduling and controlling systems.

#### Process

- Internet keeps Toyota connected with the business community and to a limited extent with its customers, dealers and suppliers.
- Hot line links keeps dealers and regional sales offices connected.
- Tight operational control and strict quality management practices are in operation.

#### Learning issues

- Market research is the critical success for entering in a new market.
- The vehicles that are bigger, versatile and can run through any terrain with smooth and comfortable drive have a special place in Indian market.
- Demand for vehicles in rural sector is increasing.
- Ability of matching customers need is the key of success.

#### Suggested Actions

- Deploy eBusiness technology for the entire value chain.
- Create a broad band (cable plus Internet) Virtualnet.
- Apply eBusiness technology to create Extranets for the dealers and suppliers as well as Intranet connecting sales offices and show rooms.

#### Performance

- The broad-band Virtualnet would connect Toyota with rural and urban customers.
  - Application of eBusiness technology to core business processes and for the management of supply and distribution chain will help Toyota to gain and maintain competitiveness.
  - Usage of Intranet will enhance in house productivity.

***The applications of Internet and eBusiness technology will enable the car makers to converge procurement, production, marketing and servicing systems into a flexible-customer-caring-system to deliver vehicles and services according to the preferences of customers at a negotiable price.***

### A Synthesis of Case Studies

Previous sections presented the case studies of three carmakers narrating their situations, process they followed and results they have achieved and learning issues, suggested actions and would be on performances. This section presents the results of combined analysis and synthesis of the learning that one could possibly draw from these cases. First, it presents the SAP-LAP synthesis followed by the recommended eBusiness strategies.

#### SAP-LAP Synthesis

Analysis of the Indian car market (Tables 1 and Table 3) indicates that in the year 2001 Indian passenger car market observed a negative growth of 7.5% and the average growth (last five years' average) of the Indian passenger car market is 8.75% as compared to predicted 20% growth. Conversely the average growth of installed production capacity per annum is 22%. Thus, the average supply potential of passenger car

has been growing 2.5 times faster than its demand. And the average utilization of capacity has dropped from 66.8% to 44% for the same period. This means that the pressure of competition went 2.5 times higher than the market can absorb. Concurrently, eBusiness opens opportunities to increase width and depth of quality of customers' services, cut costs of procurement (process + material), reduce cycle time, increase the power of bargaining, increase the efficiency of communication and co-ordination, help to develop one-to-one relationship and create better customer relationship. However, Introduction of eBusiness processes requires lot of preparatory work and management's commitment. Preparatory works are of three types: organizational level preparedness, community (associates and business partners) level preparedness and the customer's acceptance of the eBusiness processes.

The production and marketing managers of Maruti,

Table 8: Synthesis of the Three Cases

	Maruti Udyog India.	Daewoo Motor	Toyota Kirloskar Motors
Common Situation	Global competition; Supply Potential is 2.5 times higher than the Demand; Internet technology offers opportunities to improve relationship, reduce cycle time, to cut cost of distribution and procurement, but required preparatory work and organisational commitment		
Differentiated Challenges	Retain leadership in economic car production plus capture a slice of the new growth segments	Increase market position by offering superior cars and customer services at an affordable cost.	Find gaps in the market and develop vehicle(s) that fills customers aspiration & needs
Actors	Production & Marketing Managers	Production & Marketing Managers	Production & Marketing Managers
Processes	Use Internet, Intranet, Extranet for Business Communication; Workflow Management, Retail & Supply Chain Management and Call Centre for customers servicing	Use Internet for Business Communication; Retail & Supply Chain Management and Call Centre for customers servicing	Conduct market research to identify opportunity and use proven processes to develop superior vehicles for Indian roads
Learning	Process focused, improvement of operation efficiency of supply and distribution chains	Customer focused, improvement of customer relationship	Product focused, identification of vehicle, which customers wanted but were not available
Actions	Introduced Dealers' Extranet for online ordering, billing and monitoring vehicle delivery status	Introduced the concept of 24 hours Help-line for customer servicing	Introduced multi-utility vehicle that can accommodate large family and can be used anywhere in the country.
Performance	Managed to reduce the time and cost of distribution and to enhance the quality of vehicle delivery services.	Tele-Customer Servicing helped Daewoo to provide better after sales services at low costs	Product received instant acceptance by the customers

Daewoo and Toyota were under the same competitive situation, but due to their differences in strengths and weaknesses, they were confronted with different kinds of challenges. As a result, they created different eBusiness processes for attaining different management objectives. The strategic focuses of the three carmakers' eBusiness technology deployment strategy were completely different. The levels of successes attained were also limited to the abilities of their strategic focus plus the correctness of the actions followed by each carmaker. The results of SAP-LAP analysis are summarized in Table 8. Table 8 shows that Maruti managed to increase productivity and quality and cut cost of their vehicle delivery systems. The Maruti's strategic focus was improvement of operational efficiency and thereby to reduce time and costs, so that they can offer value for money to their customers. The positive experience encouraged Maruti to implement similar Extranet for the component suppliers and to be a part of grand alliance to create a vertical portal to cut cost of procurement and improve supply chain management. While Daewoo's strategic focus was to provide quality customer service at less costs and to win the confidence of their customers. It introduced the concept of 24-hours Call Centre to improve after sales services. The others are now following the same concept to cut the costs of after sales service. Interestingly, Toyota's strategy was quite different, its strategic focus was selection of right product for the right market. It did market research, identified the gap, and introduced a vehicle, which was so long missing in Indian market and made instant success. It did not use any eBusiness process nor it has any future plan. The reason being that substantial section of its customers is from rural sector. The three carmakers require three different eBusiness strategies to gain competitive advantage in their domain.

#### Recommended eBusiness Strategies

The success of eBusiness is accomplished not by copying rival's eBusiness strategy but by careful tailoring of the eBusiness technology applications to company's overall business strategy in a way that extend its competitive advantage and make them more sustainable. Hence the eBusiness strategies of three cases have to be different. The following sections present the recommendations that emerged from the SAP-LAP analysis.

#### Strategy for Maruti

The eBusiness strategy of Maruti should align with its overall business strategies. The application of eBusiness technology must accelerate Maruti's cost competitiveness in vehicle manufacturing, delivery and customer servicing. The recommended eBusiness strategies are:

- Apply eBusiness technology for management of supply, and distribution chain.
- Use common eBusiness resource pool to renovate business processes, reduce response time, and create alternative business processes.
- Create Virtualnet to delight customers and provide cost-effective services.

### Strategy for Daewoo

Daewoo's eBusiness strategy must support its core competency of providing best technology and customer services at an affordable cost. The recommended eBusiness strategies are:

- Form an alliance with a competent dot.com company to create market reach for Daewoo's products.
- Develop close circuit B2B exchange for integrating the supply and distribution chain to cut the cost of transaction of supply and delivery to gain cost competitiveness of operational processes.
- Connect the activity heads and their operators with the receivers of the work by deploying a shareware across the value chain of the organization.

### Strategy for Toyota

The eBusiness strategy must support overall business strategy of Toyota. The recommended eBusiness strategies are:

- Apply the expertise, resources and recent market experience to develop a broad band Virtual marketing channel for rural and urban customers
- Use eBusiness technology to integrate the traditional business processes for all the activities of value chain to enhance operational efficiency.
- Deploy Intranet and the GroupWare for harmonious integration of working across the global offices of Toyota.

The learning that emerges from the above case analysis that eBusiness enhances quality, productivity of services, but the quantum of success depends on the strategic focus of the eBusiness processes. The strategy of implementation would also vary according to the strategic advantage that company possess. The full benefits of eBusiness opportunities spectrum cannot be realized if the eBusiness strategy does not cover the entire value chain of the organization and does not include the core physical business processes. The sustainable competitive advantage can only be created by focusing the deployment of eBusiness technology on those processes where it will generate unique differences and which are deeply ingrained in to the physical processes of the company that are difficult to replicate.

### Concluding Remarks

This paper analyzes the business scenario of the Indian car industry. It reveals that the average supply potential of passenger car has been growing 2.5 times faster than its demand for last five years. The case studies revealed that all the car manufacturers were quite successful in their efforts, while used different actions and processes to meet different ends. SAP-LAP analysis unveiled those eBusiness technology strategies of three different carmakers, which attained different level of success in different directions. Maruti has succeeded in improving quality and productivity of vehicle delivery systems by creating a dealer Extranet. Daewoo's Tele-customer servicing has become the role model of customer care. Toyota's market entry has created history of instant success in a crowded market. Toyota used market research

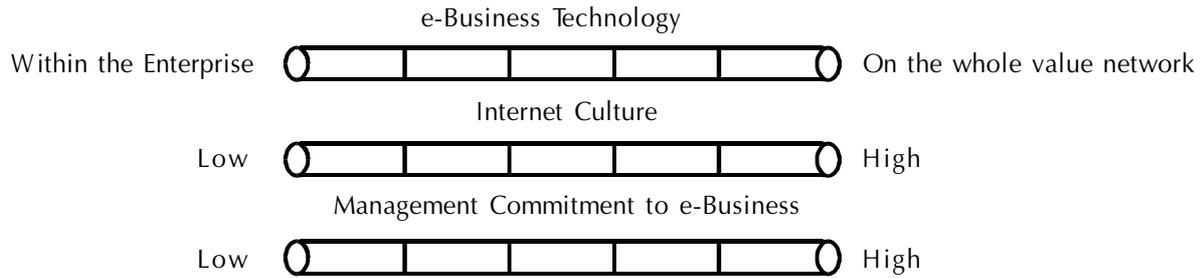
as the key tool in identifying the market opportunities, and addressed an untouched market, thus making that particular project as an instant success. Toyota gained 22% of utility vehicle market within a year by careful planning and market research and has no plan for eBusiness now. The findings of this study reveal that the overall eBusiness prospect of Indian car retailing business is in a mid-way. The study indicates that eBusiness will not replace the traditional car sales channels, but will make it more efficient, flexible and customer centric. The market competition and collaborative ability of eBusiness technology will compel the carmakers to enhance their core competency and extend the boundary of their responsibility across the value chain. The applications of Internet and eBusiness technology will enable the car makers to converge procurement, production, marketing and servicing systems into a flexible-customer-caring-systems to deliver vehicles and services according to the preferences of customers at a negotiable price.

### References

- ATKearney (2000) E-tailing Strategies for Automakers and Dealers, *White Paper on E-Business Solution*, www.atkearney.com.
- Bakos J.Y. (1991) A Strategic Analysis of Electronic Marketplaces, *MIS Quarterly*, 15 (3), 295-310.
- Bakos J.Y. (1991) Information Links and Electronic Marketplaces: The Role of Interorganizational Information Systems in Vertical Markets, *Journal of Management Information Systems*, 8 (2), 31-52.
- Benbasat I., Goldstein D.K. and Mead M. (1987) The Case Research Strategy in Studies of Information Systems, *MIS Quarterly* (11:3) 369-386.
- Cash J.I. and Konsynski B.R. (1985) IS redraws Competitive Boundaries. *Harvard Business Review*, 63 (2), 134-142.
- Dawar N and Frost T (1999) Competing with Giants: Survival Strategy for Local Companies in Emerging Markets, *Harvard Business Review*, 77(2), 119-129.
- Dubey R. and M. Anand M. (2000) It's Rush Hour Traffic on the Cyber Highway, *Business World*, 22 May.
- Kekre S. and Mudhopadhyay T. (1992) Impact of Electronic Data Interchange Technology on Quality Improvement and Inventory Reduction Programs: A Field Study. *International Journal of Production Economics*, 28 (3), 265-282.
- Klein H.K. and Myers M.D. (1999) A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems, *MIS Q*, 23 (1), 67-94.
- PriceWaterhouseCoopers (2001) Measuring the Automotive Retail Revolution, *White Paper*, www.pwcglobal.com.
- Porter, M E (2001) Strategy and the Internet, *Harvard Business Review*, 79(2), 63-78.
- Porter M.E. and Millar V.E. (1985) How Information gives you Competitive Advantage. *Harvard Business Review*, 63 (4), 149-160.
- Roberts B. and Mackay M. (1998). IT Supporting Supplier Relationship: The role of Electronic Commerce. *European Journal of Purchasing & Supply Management*, 4 (2), 175-184.
- Sawhney M. and Zabin J. (2001) *Seven Steps to Nirvana: Strategic Insights into eBusiness Transformation*, Tata McGraw Hill, New Delhi.
- Sushil (2000) SAP-LAP Models of Enquiry, *Management Decision*, 38(5), 347-353.
- SIIAM (2001) Flash Report of the Society of *Indian Automobile Manufacturers*, April.

**Flexibility Mapping : Practitioner's Perspective**

1. What types of flexibilities you see in the practical situation of "E-Business Strategy" on the following points:
  - Flexibility in terms of "options"
  - Flexibility in terms of "change mechanisms"
  - Flexibility in terms of "freedom of choice" to participating actors.
2. Identify and describe the types of flexibilities in e-Business strategy that are relevant for your own organizational context? On which dimensions, flexibility should be enhanced?
3. Try to map your own organization on following continua. (Please tick mark in the appropriate box(es)).



4. Develop a SAP-LAP (Situation Actor Process-Learning Action Performance) model of "E-Business Strategy" relevant to your organization.

**Reflecting Applicability in Real Life**

1. Analyze the case of your own organization for e-Business strategy as the case studies presented in this paper.
2. What findings of this paper on e-Business strategy are relevant for your organization?

# Emergence of Flexible Distribution Channels for Financial Products: Electronic Banking as Competitive Strategy for Banks in India

**Partha De Sarkar**

General Manager, Deloitte Consulting, Hyderabad

**Surendra S. Yadav**

Dalmia Chair Associate Professor  
Department of Management Studies  
Indian Institute of Technology, Hauz Khas, New Delhi

**D.K. Banwet**

Professor, Department of Management Studies  
Indian Institute of Technology, Hauz Khas, New Delhi

## Abstract

*In India, with competition heating up in the banking industry and the increase in the number of private and foreign banks in the post liberalization era, all players in this market are gearing up their supply chain management processes for better customer acquisition and retention. Most of these new private sector banks and the foreign banks are handicapped by the lack of a strong branch network as compared to their public sector counterparts to distribute their products or services. In the absence of such a network, the market place has seen the emergence of a lot of innovative services by the players to increase their market share and reduce their cost of service delivery through direct distribution strategies of Non-Branch Delivery. All these are using "homebanking" as a the key "pull" factor to wean customers away from the well-entrenched public sector banks.*

*Technology is enabling banks to provide the convenience of "anytime-anywhere" banking to increasingly demanding customers. Banks are now reengineering the way in which their services can be "distributed" to their customers. The earlier brick-and-mortar branch is no longer sufficient, technology is now taking banks to the homes and offices, 24 hours a day, 365 days a year through ATMs, phone banking and PC banking. Therefore, the financial supply chain is undergoing a fundamental strategic change. In this paper, the four major category of players, in the Indian banking sector; i.e. Public Sector Banks, Private Sector Banks, Financial Institutions like ICICI and IDBI, and Foreign Banks have been studied to identify competitive strategies followed by each to get into the Non-Branch Delivery Business. Developmental Banks, Rural Banks and Co-operative Banks have been left out of the scope of this study, since this is not their area of focus.*

**Keywords:** electronic banking, financial products, flexible distribution channels

## Introduction

In India, from the early 1990's, electronic banking is gaining in popularity as an important distribution channel to provide banking services. This direction is being taken by the banks to differentiate their services to the consumers to gain their loyalty. The strategies adopted by the Indian banks to survive the increased competition is the focus of this study.

Technology is enabling banks to provide the convenience of anytime-anywhere-banking. Banks are now reengineering the way in which their services can be reached to their customers by bringing in flexibility in their "distribution channels". The earlier brick-and-mortar branch is no longer sufficient; technology is now taking banks to the homes or offices, 24 hours a day, 365 days a year through ATMs, phone banking and PC banking. The financial supply chain is undergoing a fundamental strategic change.

## What is Non-Branch-Banking

Traditionally, consumers could do their banking only by coming to the bank branch. The brick-and-mortar building of the bank branch defined the periphery of service delivery of banking products.

The trend of Non-Branch-Service Delivery in banking started with the growing popularity of electronic payment services. It started with Electronic Funds Transfers (EFT). Then came credit cards. ATMs and smart cards were next in the evolutionary history. Gradually, with the advance of computing technology, telephone banking and Computer Telephony Integration (CTI) became a powerful medium of delivering banking services. The latest product is Internet banking, where the technology and other issues are still under evolution.

These new technologies have broken the paradigm of branch banking. Customers, whether individual consumers or business corporates, no longer have to go to the bank to do their business. It can be done from home, using the PC or the telephone, or at the shopping markets, using plastic money.

Some banks have now also started door to door delivery of services. As a result, it is now possible to order cash or demand drafts to be delivered at home. Consumers wishing to open accounts with banks or to apply for durable loans can call up Direct Sales Associates (DSAs) of banks and their representatives will complete the necessary documentation at the customer's convenience, at his desired

place and time. These are the elements of the new flexible financial supply chain.

### Objective, Scope and Methodology

The objective of this paper is to identify competitive supply chain management practices that are being used by the banking industry in India. More specifically, the paper attempts to answer the following questions:

- Why are banks in India adopting non-branch-banking?
- What are the differences in their approach to harness the technology?
- What are the issues that the Banking Industry faces in implementing non-branch-banking — legal issues, techno-managerial issues, consumer behavior issues etc.?

This paper presents the competitive behavior across the commercial banks in India, i.e. the Public Sector Banks, the Private Sector Banks, the Financial Institutions like IDBI and ICICI and the Foreign Banks operating in India to identify innovative technology strategies employed by them to acquire and service their customers in a flexible mode.

This paper has used a mix of academic literature review, business press reviews, and research on the Internet and expert opinion surveys. Specifically, the following sources have been studied:

- Writings in the business press to gather market information on the industry
- Media advertisements by banks of their electronic banking services
- Internet based research on the websites of the banks offering electronic banking services
- Case studies of some prominent banks in the area on non-branch delivery
- Literature survey to unearth the issues which need to be resolved to make electronic banking a reality in India.
- Interviews with experienced bankers to get their views on the issue

### How Electronic Banking Gained in Popularity

To get a holistic picture of how the technology and its public acceptance has evolved over the years, it becomes necessary to trace the development of electronic payments through time. In its evolutionary history Electronic banking had started in the 1920's. But this technology or this form of banking did not get much of a widespread acceptance till the 1960s. This is true for both electronic funds transfers (EFT) and for credit cards. It required almost a complete generation before this form of banking found popularity with a sizable group of consumers and bankers who are comfortable with technology as a part of their day-to-day lives. The reason for this is explained by Welch (1993). He says that in the early days, the effectiveness of electronic banking systems was inhibited by four main factors:

- communication technology was in its infancy and inadequate for local or global coverage - banks and customers could not communicate internationally within their own organizations or with each other
- most companies and banks had incompatible systems - sometimes even different branches of the same bank had different systems
- computer manufacturers were unable to agree on the development of technology standards which would permit data exchange directly between computer systems
- computer hardware and software were expensive in comparison to the efficiency savings available through automation.

After the 1960s, electronic banking and its use recorded a quantum jump. To explain this, Kalakota and Whinston (1996) say that recently, several innovations helped to simplify consumer payments. These can be broadly classified into:

- Innovations affecting consumers: credit and debit cards, automated teller machines(ATMs), stored value cards and electronic banking.
- Innovations enabling electronic commerce: digital cash, electronic cheques, smart cards (also called electronic wallets) and encrypted credit cards and EDI and Internet technologies
- Innovations affecting companies: such as interbank transfers through automated clearing houses that allow companies to pay dividends to their shareholders directly, or utility companies to debit their customer's accounts electronically through standing instructions.

Rohlwick (1991) explains how this form of banking is becoming a competitive advantage. According to him, "distribution channel strategies are particularly important because many new types of channel for financial services are emerging and rapidly gaining importance. For example, technological advances have made home, office and telephone banking more effective and efficient as a means of selling and delivering products, and these channels are gradually gaining more acceptance among customers. At the same time, the rapidly rising costs of operating a physical branch network, particularly in terms of staff and premises, are making this traditional channel less attractive. Such developments are changing the relative competitive advantage of various distribution channels. They can thus pose a major threat to established competitors with extensive branch networks while creating specific opportunities for new entrants to improve their competitive position with respect to this key success factor."

According to the leading management consultants PriceWaterhouse Coopers (1999) "...with the advent of ATMs, "Anytime Banking" has come into the picture. Satellites and

*Technology is now taking banks to the homes or offices, 24 hours a day, 365 days a year through ATMs, phone banking and PC banking. The financial supply chain is undergoing a fundamental strategic change.*

telecom networks across the world have made “Anywhere Banking” possible. Now it is the turn of “Anyhow Banking”, and the leading bank of the next century will be the one which has all the three A’s...”

## Electronic Banking in India

In India, Electronic Banking is of fairly recent origin. The traditional model for growth has been through branch banking. Only in the early 1990’s has there been a start in the non-branch banking services. The new private sector banks and the foreign banks are handicapped by the lack of a strong branch network in comparison with the public sector banks. In the absence of such networks, the market place has seen the emergence of a lot of innovative services by the non-public sector players to increase their market share and reduce their cost of service delivery through direct distribution strategies of Non-Branch-Delivery. All these banks are using “homebanking” as a key “pull” factor to wean customers away from the well entrenched public sector banks. Some relevant facts are given below:

*With the advent of ATMs, “Anytime Banking” has come into the picture. Satellites and telecom networks across the world have made “Anywhere Banking” possible. Now it is the turn of Anyhow Banking”, and the leading bank of the next century will be the one which has all the three A’s.*

- ATMs made their first appearance in the early nineties, started by foreign banks like Citibank and Hong Kong Bank. By the end nineties, even private banks and public sector banks have come up with their own ATM networks, the private sector banks being more aggressive of the two to adopt the new technology.
- Under the initiative of the Indian Banks Association (IBA), in Mumbai, a pilot project to link up 156 ATMs of 31 member banks has come up in the form of SWADHAN, a shared payment network system, which boasts of a cardbase of 1,000,000 cards and 30,000 transactions per month. Mastercard and VISA are also following suit to offer shared ATM networks.
- Credit cards have found widespread acceptance in the metros and big cities. The major players in the credit card market are the foreign banks and some big public sector banks like SBI and Bank of Baroda. India now has about three million credit cards in circulation.
- Debit cards have also now started becoming popular in the last 2 years only with Mastercard and VISA tying up with Indian and foreign banks .
- Telephone banking is available with a few foreign and private banks offering this service through the technology called Interactive Voice Response Service (IVRS). It has moved into the domain of mobile phones as well, in a service that is being marketed as mobile commerce (M-commerce).
- Internet banking has made its debut with ICICI bank’s product called Infiniti and Citibank being the pioneers in this field. It is now being offered by some select other banks as well. This seems to be the latest growth area.

There are interesting contrasts in the approach followed by the each of the four categories of players in the study. This has been described in detail in subsequent paragraphs.

### Foreign Banks operating in India

Most foreign banks, especially the American Banks like Citibank, Bank of America, American Express and ABN AMRO have followed the strategy of having one branch per city and reaching the customers geographically through non-branch-delivery mechanisms (Bank of America has subsequently sold its consumer banking business to ABN AMRO).

On the other hand, banks like ANZ Grindlays Bank and Standard Chartered Bank, which have historically had a large number of branches in some cities like Calcutta are in the process of closing and consolidating them into fewer numbers. All these foreign banks have embraced electronic banking in a big way and

are investing heavily in computerization and setting up ATM networks. But because they require licenses from the Reserve Bank of India(RBI) before they can set up branches, they have utilized the licenses granted to them to set up new branches in new cities where they had no presence, rather than opening more branches in the same cities. HSBC Bank on the other hand, is an exception to this trend amongst foreign banks, and has set up branches in the same cities where they were already present.

The products offered by most of the banks are state-of-the-art products on electronic banking like ATMs, credit cards, debit cards, phone banking, internet banking etc.

### Indian Private Sector Banks

In the 1990s, the private sector banks have been aggressively following a mixed approach to enhancing their reach. They have no restrictions in opening branches. This explains the reason why Timesbank, Centurion Bank, Global Trust Bank and HDFC Bank have been setting up new branches at a fast pace. Very recently, HDFC Bank and Timesbank have merged and created India’s largest private bank under the umbrella of HDFC Bank. These branches are very small and operate as Front Office Sales and Service points only. No backroom accounting or processing activity happen here. Backrooms of these branches are centralized in regional locations, and serve multiple branches. Therefore, the approach of these private banks has been the best mixture of ATM driven electronic banking and sales and service driven branches as distribution points. Other smaller private banks like Bank of Madura, Bank of Rajasthan or Vyasa Bank have not got into electronic banking in any big way.

### Indian Financial Institutions

A very interesting study is the approach followed by the traditional Developmental Financial Institutions like ICICI,

IDBI and UTI. All these organizations have expanded their scope of operations from being the traditional developmental financial institutions or mutual fund organizations to full function commercial banks with consumer and corporate banking functions.

In-effect, ICICI Bank in particular, has become one of the most aggressive players in the consumer banking field, emerging as very strong competitor to the foreign banks in this arena. The approach of IDBI and UTI has been more relaxed. All these financial institutions have opened many branches, and most of the branches have ATMs associated with them. IDBI has also tied up with American Express, as a result of which American Express Cards can be used in their ATMs.

Thus, we see that these traditional financial institutions have also reinvented themselves and are trying to become players in the consumer banking arena through electronic banking as one of the prominent service delivery mechanisms.

*Indian Public Sector Banks*

In terms of sheer geographical spread, the public sector banking system is probably the largest in the world. The statistics are as follows: a network of 64,000 branches - one branch for every 14,000 Indians with over 46 crore customers. This labour intensive network has built-in costs which make the public sector banks inherently uncompetitive. Therefore, reduction of branches to achieve cost savings has not received as much thrust as it should. The other factor inhibiting this process is that all these banks have a huge unionized workforce, which is difficult to relocate or retrain. An attempt is being made to reduce manpower through the launch of "Voluntary Retirement Schemes (VRS)".

***The customers want flexible and conveniently situated distribution channels available at times and places that suit them and not the bank.***

Despite the compelling business case for restructuring their distribution channels, the public sector banks have not given too much priority to non branch delivery. Also, the customer profile for the public sector bank is probably not the right fit for electronic banking services, because of their social obligations to provide banking services for the masses as well. Electronic banking products require a certain sophistication that may prove to be a hurdle on the way of smooth absorption of the technology by the client profile of the public sector banks. Therefore, there is not much focus on electronic banking services here, even though exceptions are there like Bank of Baroda and State Bank of India, who have aggressively pushed their credit cards. Bank of Baroda has a credit card brand of its own called the BOBCard, which is India's one and only propreitory card. SBI has tied up with the multinational GE Capital to provide its VISA credit cards. It has already become the second highest issuer of credit cards in India within just 3 years.

Many of the other banks like Allahabad Bank, Vijaya Bank, Central Bank and Andhra Bank etc. have issued credit cards as well, in collaboration with either Visa or Mastercard, but they are not actively promoting these cards. Some of these banks also have ATMs, which are mostly attached to their branches, and can be used by customers of that particular branch only. Some of them have also gone to the extent of having a homepage on the net, which, by and large, is just for the purpose of information dissemination to prospective customers, primarily NRIs. Though they have plans of networking them in future, it becomes evident while talking to their personnel that it is not a key area of focus yet.

**The Flexible Distribution Model**

If we look at the direction in which the successful banks seem to be growing their business, it becomes very clear that even in India, the traditional model of branch based banking is slowly changing. This is primarily because of the fact that over the years, the consumer profile has changed. The fast pace of modern lifestyle has started putting a premium on the consumer's time. They want flexible and conveniently situated distribution channels available at times and places that suit them and not the bank. They no longer have the time to find a separate time slot to do their banking. Instead, they prefer banks which come to their doorsteps to enable them to do their banking.

Traditionally, banks had built branches closer to the customer habitation in an effort to distribute their services. This approach had seen the mushrooming of branches at residential and commercial centres. While this distribution model has had a fair degree of success so long, it has also been an expensive route, because of the real estate costs and the manpower costs that this has entailed for banks. More branches mean more rentals, renovation, maintenance, administration and salary costs. But even after spending so much, distributed branches have not been able to fully address the consumer's need for anytime-anywhere banking. The consumers still need to come to the bank to withdraw or deposit cash or for other banking services like overdrafts or payment instruments. A comparative table of costs of servicing through the different channels is given in Table 1:

Table 1: Cost per Transaction through Different Channels

Channel type	Retated costs (HDFC Bank)	Related Costs (ICICI Bank)
Branches	Rs. 30 to 40	Rs. 5 to 40
ATMs	Rs. 18-20	Rs. 18-20
Callcentres	Rs. 10-15	Rs. 6-8
Internet	Rs. 2-3	Rs. 2-3

Source: *Business India*, August 7-20, 2000, Pg 92.

The problem with this model is that it confines the payment mechanism, by and large, to the four walls of the branch. It does not make funds available at the point of sale, which is the ultimate convenience that the customer is seeking.

The ideal scenario for both the buyer and the seller would be a system where the payment settlement happens at the point of sale itself, when the goods or services are exchanging hands. This is what electronic banking has achieved. Through electronic data networks, it makes the payment on-line, at the same time as the actual exchange of goods or services is taking place. As a distribution model, it brings the bank closer to the consumer - either at his doorstep or at a telephone call or at his PC or in his wallet, wherever he goes.

It is this need that non-branch banking is serving, which is the route taken by the foreign banks and the private banks to attract their customers. They have successfully extended the reach of the target market for client account acquisition and service delivery capabilities beyond the branch network by using alternative delivery channels for sales and servicing of their customers.

***The ideal scenario for both the buyer and the seller would be a system where the payment settlement happens at the point of sale itself, when the goods or services are exchanging hands.***

The re-engineered supply chain of these banks has six main components as follows:

- Branch Acquisition
- Remote Acquisition
- Branch Servicing
- Remote Servicing
- Centralized Operations Facility
- Vendors and suppliers

The new distribution model therefore can be graphically represented as a 5 Star model as shown in Figure 1:

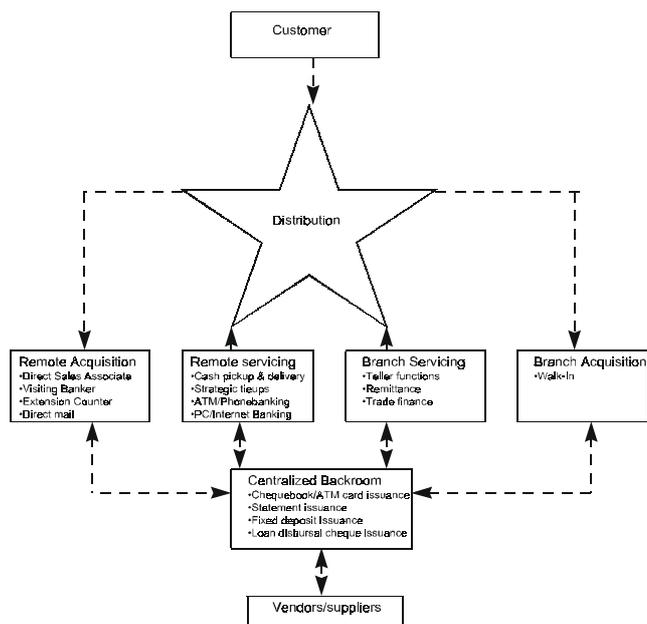


Figure 1: The 5 Star Model of Distribution Channel Mix for Anytime-Anywhere-Anyhow-Banking

### Branch Acquisition

Branch acquisition or sales are restricted to customers who walk-in to the branch to open an account or apply for a loan. Such customers are serviced by Customer Service Stations manned by Front-office staff. They facilitate the process of explaining the different products and helping the customer fill up the necessary forms. Once the customer interaction is over, the documentation for setting up a new account or disbursing a new loan moves to the centralized processing site, which takes over the rest of the processing.

### Remote Acquisition

To augment the capacity of the branches to act as catchment areas, banks have set up outsourcing channels, alliances and franchisees to reconfigure the distribution network and improve the variable/fixed cost ratio. These include deploying new sales channel by Direct Selling Agents (DSA's), who are mobile franchise agents (like insurance agents) selling the products of the bank door-to-door. These mobile franchise agents source business on a commission basis,

depending on the volume of business they are able to generate. These days, for a few select banks, it is possible to open a bank account or apply for an automobile loan or credit card, by just calling up any of these agents on the phone, without having to ever step into a branch. In this fashion, it is possible to achieve greater penetration at a fraction of the cost of setting up an extensive branch network by outsourcing the sales force. Most of these agents work on a retainer basis, and are cheaper in the long run than having own sales employees on the bank's rolls. The emphasis therefore needs to shift from waiting to get business in the branches to aggressively going out and acquiring business at a much reduced cost.

### Branch Servicing

The branches maintain some infrastructure to service customers to transact on their account. Only the following activities require a large amount of customer interaction, for which the branch needs to provide teller stations:

- encash/deposit cheques
- request for payorders/remittances
- opening/closing of accounts and fixed deposits
- loans and overdrafts
- trade finance transactions

All other transactions, which do not require customer interaction, are shifted to a centralized facility, which can service multiple branches.

### Remote Servicing

This is the area where technology is playing a big role in reducing transaction costs and giving customer convenience

at the same time. ATMs at shopping centres, airports, railway stations, busy office localities, full service phone banking (either automated or operator assisted) and PC/Internet banking are revolutionizing the way customers are using banking services and accessing their money while saving time. Many banks are also having strategic alliances with other banks to distribute products or services, by leveraging each other's infrastructure. Thus, they are sharing ATM networks, allowing cash advances on credit cards of member banks of Mastercard/VISA. Apart from technology driven products, banks are also offering customers the convenience of being able to order for cash pickup/delivery, dial-a-draft through courier services, so that these items are delivered at their doorsteps, without their having to move.

*Centralized Operations*

This centralized operations facility services multiple branches and does all back-room driven processing activities, which do not require direct customer face-to-face interaction. It issues chequebooks, ATM cards, fixed deposit receipts or loan disbursement payments, processes clearing checks and trade finance or treasury operations, reconciliation/accounting etc. The branches thus reduce the floor space required by eliminating duplicate infrastructure at each branch therefore cut down on unnecessary rentals. These centralized backrooms are never on prime real estate, but at remote locations with low rental costs, so that further economies are available to the bank.

*Vendors and suppliers*

This facility in turn outsources processing work to cheap data processing agencies, either on-site or off-site. Most of low value added activities like statement printing and mailing, chequebook printing and mailing, ATM card embossing, even some low risk data entry jobs are outsourced to external vendors and suppliers, thus further bringing costs down.

The prerequisite of such an operation is bank computerization, which can link

branches and the central processing unit through wide area networks to make distributed processing possible. The encouraging sign is that bank computerization has acquired a substantial momentum in banks in India.

- The foreign banks operating in India have computerized from the 1980's onwards. Most of them have branches which are connected to each other.
- The private banks are fairly new, and most have started their operations with computerized networks.
- Even in the public sector banks, bank computerization has come a long way since the days of manual operations. Following the Rangarajan Committee recommendations, the unions of these banks have reluctantly agreed to the

***The re-engineered supply chain of these banks has six main components as follows:***

- ***Branch Acquisition***
- ***Branch Servicing***
- ***Centralized Operations Facility***
- ***Remote Acquisition***
- ***Remote Servicing***
- ***Vendors and suppliers***

introduction of electronic funds transfers, computerization of major clearing houses, setting up of communications networks to connect the far flung branches. PCs are therefore becoming increasingly a common site in bank branches. But distributed processing is still a far way off.

The operations of banks are increasingly resembling the picture shown in Figure 2:

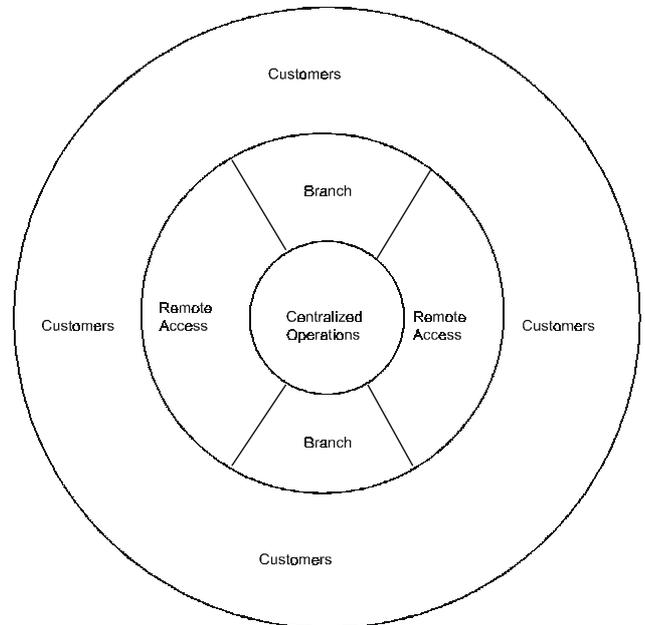


Figure 2: The "Direct Bank" with very few branches servicing customers primarily through remote access

**Case Studies**

In this section, we present two case studies to highlight how banks are adopting non-branch service delivery in varying degrees.

*ICICI Bank*

The Industrial Credit and Investment Corporation of India Limited (ICICI) was founded by the World Bank, the Government

of India and representatives of private industry on January 5, 1955 to encourage and assist industrial development and investment in India. Over the years, ICICI has evolved into a diversified financial institution, which is into medium-term and long-term project financing for the infrastructure and manufacturing sectors, corporate finance, lease finance etc.

The liberalization of the Indian economy in the 1990s offered ICICI an opportunity to provide a wider range of financial services. ICICI then set up specialized subsidiaries in the areas of commercial banking, investment banking, non-banking finance, investor servicing, broking, venture capital financing and state-level infrastructure financing.

ICICI Bank is a commercial banking outfit set up by the ICICI Group. The Bank was registered as a banking company on January 5, 1994 and received its banking license from the Reserve Bank of India on May 17, 1994. The first ICICI Bank branch was started in Madras in June 1994. For the last two years, ICICI Bank has been in the forefront as a provider of state-of-the-art electronic banking services.

As of July 2000, it has opened 102 branches. These branches are a judicious mix of full service branches and partial service branches. The full service branches offer the entire range of product and services under the ICICI umbrella, while the partial branches offer a restricted range of services. The branches are fully computerized with state-of-the-art technology and systems. All of them are fully networked through V-SAT (Satellite) technology. The Bank is connected to the international SWIFT network since March 1995. Currently the Bank has around 150,000 customers.

It also has a centralized backroom in Mumbai, which does all the backroom processing activities like opening of accounts, issuance of chequebooks, statements, various types of cards like ATM cards, Credit Cards, Debit Cards and PINs.

In electronic banking, ICICI has launched a total of 227 ATMs, with ambitious plans to add many more to the network. Amongst all banks operating in India, it has the biggest ATM network, most of which was added in the last two years only. Clearly, a very successful implementation of an aggressive growth plan.

It was the first bank in India to launch Internet banking services through its product branded as "Infinity", much before the other foreign banks could do so. It calls itself the "virtual universal bank", which is a reflection of the fact that most of its products are available in the net as well. These include account views and reconciliations, funds transfers, bill payments, mutual funds and bond applications, e-shopping and loan applications.

In the last six months, ICICI has also started offering phone banking and mobile banking through cell phones. Its latest ventures is into credit cards and debit cards, where it has tied up with VISA to provide its services.

For its consumer finance operations, its subsidiary, ICICI Personal Financial Services Limited (ICICI PFS), formerly ICICI-Credit, was one of the first four companies to obtain registration as a Non-Banking Financial Company (NBFC) from the Reserve Bank of India (RBI) on September 10, 1997 under the new section 45 IA of the Reserve Bank of India Act, 1934.

During the year 1998-99, there was a significant shift in ICICI PFS's operations from leasing and hire purchase to distribution and servicing of all retail products for the ICICI Group. It is now a focal point for marketing and distribution

of all retail asset products for ICICI, including auto loans, consumer durable finance and other financial products. This subsidiary has thus become a critical part of ICICI's retail strategy aimed at offering a comprehensive range of products and services to retail customers. It uses Direct Selling Agents(DSAs) to source asset products from the markets, very similar to the approach followed by the foreign banks and private banks.

ICICI Capital Services Ltd. is another wholly owned subsidiary of ICICI effective from April 1,1996. It carries out retail resource raising activities and provides front office services related to all retail and semi retail liability products of ICICI. The Company also operates the network of ICICI Centres being set up by ICICI. As on date the company has set up 91 centers across the country.

This subsidiary was earlier involved in distribution of bond product (in the brand name of Safety Bonds) and private placement treasury products from ICICI. However, from December 1999 onwards the Company has focused on being a provider of a comprehensive range of financial products

and services like ICICI Bonds, ICICI Fixed deposits, Mutual Funds, IPOS, e - invest accounts, Depository services, select IPOS, investment consulting and is all set for the

forthcoming foray into insurance, with a joint venture with Prudential Insurance.

The widespread geographical locations of centres, which are well equipped with the necessary infrastructure, have provided the Company with strategic distribution initiatives so as to become one of the top distribution houses in the country. The company has also strengthened its distribution network by effectively managing over 11000 agents.

This is the story of the transformation of one of India's premier infrastructure financing institutions into a universal provider of financial services. In its revised vision of becoming the one-stop-shop for providing the entire suite of financial services, it has re-engineered its business model completely. Its revamped business model now looks very similar to the model proposed in Figure 2. All the elements of the new flexible supply chain - the judicious mix of direct branch acquisition and remote acquisitions through channel partners or DSA's, a strong centralized backroom, robust electronic banking infrastructure and products are very visible.

A clear vision and strategy, backed with excellent implementation, has made ICICI Bank one of the best providers of consumer financial services in India in a short span of just two years. It is proven itself to be a strong competitor to the more established foreign banks like Citibank, American Express Bank and ABN AMRO Bank, all of whom have lost substantial market share to the homegrown Indian financial powerhouse.

***All the elements of the new flexible supply chain - the judicious mix of direct branch acquisition and remote acquisitions through channel partners or DSA's, a strong centralized backroom, robust electronic banking infrastructure and products are very visible.***

### *Bank of America/ABN AMRO Bank*

Bank of America (BofA) started its operations in India in 1962, with the opening of its first branch in Delhi. After that, it extended its operations in the other metros of Mumbai, Calcutta and Chennai by opening a branch each in these three cities. Till the 1980's, BofA in India was by and large a Corporate Bank. It dealt primarily with the American multinationals operating in India and other large Indian and foreign corporate houses. On the Consumer banking side, it dealt only with the high net worth individuals and Non-Resident Indians (NRIs). This was in contrast to its global operations. In the US it is the largest middle-market consumer bank in the west coast, primarily in California.

Of all the foreign banks that were operating in India at that time, Citibank was the first to start Consumer Banking in a big way in the 1980s. Citibank and Hong Kong Bank were the first to start with ATMs in early 1990s. Citibank went into electronic banking as a deliberate strategy of technological leadership to widen its consumer banking operations. Like BofA, it had only one branch in the cities that it operated in. Therefore, to broaden its distribution network, it followed up the launch of the ATMs with other electronic banking products like credit cards, phone banking, net banking and debit cards, one after the other. The others like Hong Kong Bank, Grindlays Bank and Standard Chartered Bank were more sedate in their approach to non-branch banking, because they already had a large branch network as well. These banks therefore were more sedate in their approach to introduce electronic banking for their customers.

In 1990, BofA too changed its strategy to enter into the consumer banking area. By 1994, it came out with its first consumer loan products in the form of loans against shares and car loans. In 1996, it pioneered the concept of the 7 days - 10 to 7 banking in India.

But BofA's approach in consumer banking was very different from the other banks in the area of remote banking. Rather than getting into technology-driven investment-intensive electronic banking products like Credit Cards, Debit Cards and Net Banking, it chose to use a wide network of Direct Sales Agents to distribute its products and services to its customers. These agents would go from door-to-door and offer BofA's products and services. This was in sharp contrast to the other banks, who depended on technology to increase their reach to consumers.

Being a foreign bank, BofA required licenses from the Reserve Bank of India to open new branches. It had one branch each in all the four metro cities that it operated in. So long as it was into corporate banking only, these few branches were sufficient for BofA to service its few corporate clientele. But, when it entered consumer banking, these branches located at the heart of the city were inadequate to offer consumer banking on a mass scale, since the consumers were located all over the city. To BofA's credit, it overcame this limitation in a very innovative fashion. In 1996, it brought about a paradigm change in the concept of banking by being the first bank to offer cash delivery to its customers at their

homes and offices. It used the services of local couriers and direct sales agents to deliver cash and pay-orders, pick up cheques, complete account opening documentation etc. In this manner, it was able to overcome the limitations of branch banking to provide banking services way beyond the geographical reaches of its only branch. It also centralized its backroom in Delhi to service its branches economically in the four other cities and linked up the operations through Satellite communications and leased telephone lines.

This was a big success, because it targeted the middle market segment of consumers that was not very technology-savvy. Its doorstep banking brought the cherished human touch right to the consumer's doorstep. This was a concept that the electronic banking products clearly could not match. With one phone call, consumers could open accounts, get cash delivered, cheques picked up for deposit into their accounts, as well as overdrafts and loans for purchase of cars with the aid of an agent of the bank who would come to their homes and offices. All this was designed in a manner that consumers would not have to visit a bank branch at all to avail of its services. Following this innovative approach, within two years of its launch, BofA by 1998 had increased its market share in the consumer banking business to become a market leader in consumer loans, ahead of its well-entrenched competitor Citibank. This distribution model soon became the industry practice, when other banks also started offering the same service.

To compare the approach of ICICI Bank with BofA, one realizes that there are many similarities as well as dissimilarities. While both of them aggressively promoted non-branch distribution through direct sales agents, ICICI Bank pursued the strategy of state-of-the-art electronic banking as well - by offering an entire range of ATMs, Credit Cards, Debit Cards, Phone Banking, Net Banking etc. BofA on the other hand just offered a few ATMs in a very few locations. Apart from that it had no other electronic banking product to talk about. But, in its own way, it was just as successful in acquiring market share. The contrast becomes clearer from Table 2:

After Bank of America merged with Nations Bank in the US in the year 1998, it sold off its highly successful consumer banking business in India to ABN AMRO Bank, a Dutch bank. ABN AMRO Bank thus gained entry into the consumer banking business in India through this strategic purchase. While retaining the approach of non-branch banking through its agents network, ABN AMRO does plan to get into electronic banking as well. Its first offering is likely to be credit cards.

### **Issues in Electronic Banking**

This is not to suggest that banks need to close down all branches and go completely into the direct distribution route. The key is in being able to do a judicious mix of both direct distribution and indirect distribution to increase breadth of geographical coverage while keeping the costs low. This is more so, because while consumers' comfort with technology is increasing, it is yet to reach a critical mass in India, which

Table 2: Comparison Between the Non-branch Delivery Strategies of Bank of America and ICICI Bank

Product/Service	Bank of America	ICICI Bank
ATMs	Few ATMs in select locations in the cities that it operates in	The largest network of ATMs by a single bank in the country
Branches	One branch each in Delhi, Calcutta, Mumbai and Chennai	Large number of full service branches, complemented by smaller restricted-service branches which act as distribution points.
Phone Banking	The single channel that BofA concentrated on to service its customers	Not given much importance initially. However, as of March, 2001, ICICI Bank has also started phone banking in a limited manner
Direct Sales Agents	Widely used to distribute its products and services	Widely used to distribute its products and services
Net Banking	Not offered	ICICI Bank was the first bank in India to start Net banking through its service called Infinity
Credit Cards	Was being actively considered	Launched in 2000
Debit Cards	Not offered	Launched in 2001

still has a large proportion of the population which does not understand technology at all, and would get alienated if the human face of the bank goes totally away, to be replaced by machines to which they cannot relate easily.

*The key is in being able to do a judicious mix of both direct distribution and indirect distribution to increase breadth of geographical coverage while keeping the costs low.*

While electronic banking and the Internet does offer exciting possibilities for payment mechanisms, there are many open questions that have still not been satisfactorily addressed, without which this form of banking cannot make significant progress.

On-line banking will meet its full potential when the following key consumer issues are addressed:

- Consumer protection from fraud  
Electronic fraud is a scourge in the west and is on the rise even in India. Unless electronic message transmission can be safeguarded from unauthorized access through hacking, people will continue to be hesitant about using electronic banking for fear of fraud.
- Transaction privacy  
In India, cash transactions are popular because of the anonymity it provides, because of the absence of any paper trail. A substantial part of Indian economy is the black economy, where transactions are in cash and there are no audit trails. This will be a factor that will continue to hinder wider acceptance of electronic banking, because electronic payments always leave a paper trail.
- Infrastructural issues of telecommunication and bandwidth  
This form of banking thrives only when telecommunication infrastructure is robust, since it requires large scale wide

area network connectivity. India still has a long way to go.

- Comfort with technology and proliferation of PCs  
The average Indian consumer is still PC illiterate and prefers the human touch over technology driven service. It is still a long way off when PCs become like TVs in every household. The consumer behavior towards technology will also take some time to change. Till such time, electronic banking will remain restricted to the younger, upwardly mobile consumer only.
- Legal recognition of electronic contracts  
Is an electronic contract a valid contract? Negotiable Instruments Act covers payment in writing only, what about electronic instruments? When will digital signature get legal validity? These are some of the crucial questions that stand in the way of electronic banking gaining momentum. Some progress has been made with the passing of the Cyberlaws in the IT Act by the Indian Parliament recently. It is now a question of successful implementation.

### Concluding Remarks

Despite the low diffusion of technology in India, the momentum of on-line banking has picked up recently, led by the Foreign Banks and the Indian Private banks. It is expected to accelerate in future for three reasons:

- Banks now have a variety of technological means to initiate on-line banking programs without incurring the investments needed to develop their own systems. The reach and delivery capability of computer networks such as the Internet far exceeds any proprietary bank network ever built, and makes it continuously easier for customers to manage their money anytime, anywhere.
- Internet and mobile phone usage has been growing at a very fast pace, which would remove the last stumbling block in the way of the popular acceptance of electronic banking.
- Banks need to separate the content(financial product) from the distribution channel(the branch). Attempting to provide both is similar to movie companies(content producers) owning their own theatres(distribution channels). Clearly, the traditional model of integrated delivery has outlived its usefulness and needs to be thought of again.
- Though the Indian consumer at large is still not completely comfortable with technology as a way to do banking, the affluent middle class is becoming more familiar. The younger generations have started using computers from a very early age, and this would be the generation which would be the consumer of the future. But, it is going to be a long time before this technology becomes the technology for the masses in India.

On-line banking will realize its full potential when the following key elements fall in place:

- Internet access becomes more widespread in the country.
- The emergence of low cost interactive access terminals for home as well as interactive home information services, e.g. set top boxes to convert TV sets into computer terminals
- Security aspects of transactions over the Internet improves
- Cyber Laws are implemented to give legal sanction and validity to electronic signatures.

*References*

Kalakota R and Whinston A B (1996) *Electronic Commerce: A Manager's Guide 2nd Edition* Addison Wesley Pub. Co., New York

Price Waterhouse Coopers Study (1999) *Tomorrow's Leading Retail Bank*-ICFAI Reader, April

Rohlwink, A (1991) *Strategic Positioning for Financial Institutions*, Woodhead Faulkner Ltd., Simon & Schuster Int. Group, London

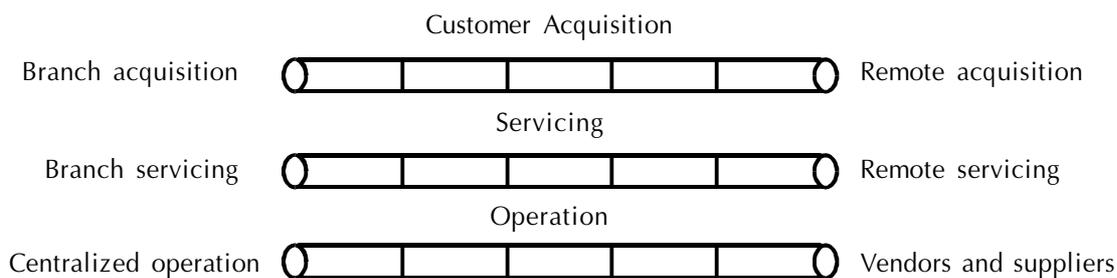
Welch, B, (1993) *Electronic Banking & Security: A Guide for Corporate & Financial Managers*, Oxford

*Websites:*

- www.hdfcbank.com
- www.icicibank.com
- www.citibank.com/india
- www.utibank.com
- www.globaltrustbank.com
- www.centurianbank.com
- www.indusind.com
- www.bankofbaroda.com
- www.corpbank.com
- www.denabank.com
- www.indian-bank.com
- www.iob.com
- www.punjabandsindbank.com
- www.sbi.co.in
- www.syndicatebank.com
- www.ucobank.com
- www.vysbank.com
- www.swadhan.com
- www.indianbanksassociation.org

**Flexibility Mapping : Practitioner's Perspective**

1. What types of flexibilities you see in the practical situation of "Electronic Banking" on the following points:
  - Flexibility in terms of "options"
  - Flexibility in terms of "change mechanisms"
  - Flexibility in terms of "freedom of choice" to participating actors.
2. Identify and describe the types of flexibilities in *Electronic Banking* that are relevant for your own organizational context. On which dimensions, flexibility should be enhanced ?
3. Try to map your own organizational technological system on following on continua. (Please tick mark in the appropriate box(es)).



4. Develop a SAP-LAP (Situation Actor Process-Learning Action Performance) model of "Electronic Banking" relevant to your organization.

**Reflecting Applicability in Real Life**

1. Which flexible distribution channels in electronic banking are more relevant for your organization?
2. Compare the case of your official bank with the cases presented in this paper.

# Flexibility in Estimating Air Quality Index : A Case Study of Delhi

P. Goyal

Centre for Atmospheric Sciences, Indian Institute of Technology Delhi  
New Delhi, India

## Abstract

*In the present study, Air Quality Index (AQI) of Delhi is studied in order to provide the information about air quality of the region. Delhi is one of the most polluted capital cities of the world. The three pollutants included in the AQI are sulphur dioxide (SO<sub>2</sub>), suspended particulate matter (SPM) and nitrogen dioxide (NO<sub>2</sub>). The flexibility in different methods developed in developing countries are used for estimation of Delhi's AQI. Subindices are calculated for all pollutants and the highest subindex becomes the AQI. SPM is the critical pollutant in Delhi. Overall analysis of AQI of Delhi indicates that air pollution in Delhi has grown from bad to worse, often to alarmingly high levels as compared with National Ambient Air Quality Standards (NAAQS). The AQI maps of Delhi are prepared which are an indicator of air quality of Delhi.*

**Keywords:** air pollution, air quality, air quality index, pollutants.

## Introduction

AQI is a flexible approach based on detailed air quality data of the concerned region. AQI is an important task for general public to understand easily that how bad or good the air quality is and to assist in data interpretation for decision-making processes related to pollution mitigation measures and environmental management. It is primarily a health related index with the following descriptor words: "Good (0–100)", "Moderate (101–200)", "Poor (201–300)", "Very Poor (301–400)" and "Severe (401–500)". It is perhaps the simplest and effective way to convey information on air quality in a clear and lucid manner.

Several AQI's, developed and used in many developing countries, include PINDEX (Babcock, 1970), Bobcock and Nagda (1972), Ott and Thons (1976) Oak Ridge Air Quality Index (ORAQI). Most of them classified the indices based on number of pollution parameters, calculation method and description category. Recently few studies of AQI have been made by Trozzi et. al. (1999), Hamkoski (1998) and Sengupta et. al. (1996). The aggregation form in most of the studies invoked the additive form and thus suffered from the problems of ambiguity and eclipsing.

AQI has become a very well understood tool in last few years. None of the countries use a simple numerical index to present air quality information. The U.S. AQI is based on the pollutant with the highest index value. It does not account for the effects associated with exposure to multiple pollutants. By using the highest calculated index value for the AQI, one can believe that the index is sufficiently precautionary.

Delhi, the capital city of India has been chosen for a case study because it is one of the most polluted city of the world. The three pollutants SO<sub>2</sub>, SPM and NO<sub>x</sub>, recognized as major pollutants of various sources in Delhi, have been included in

the present study. It is estimated that about 3,000 MT of air pollutants are emitted every day in Delhi. The sources of air pollution in Delhi are: emissions from vehicles (67 %), coal based thermal power plants (13 %), industrial units (12%) and domestic (8 %). In 1995 the air pollutants emitted daily were 2890 MT. There has been a rising trend 1995 onwards.

Unplanned urbanization and industrialization in Delhi are causing deterioration of the environment and quality of life. It is essential to assess the spatial distribution of air quality and its impact on human beings in the urban region of Delhi. Thus, a vast amount of ambient air quality data is to be generated to know the quality of air environment and to take appropriate corrective actions wherever necessary. Such an endeavor would result in large volumes of data which may neither give a clear picture to the decision-maker nor to a common man who simply wants to know how good or bad the air quality is. One way to describe the air quality is to report the concentrations of all the pollutants with acceptable levels, i.e. National Ambient Air Quality Standards (NAAQS) set by Central Pollution Control Board (CPCB) to protect public health. Rating of the air quality into broad descriptive groups or using numerals to denote the quality of air are the most commonly used methods across the world and are known as air quality indices. Relative to air quality conditions in developed countries, the pollution levels in Delhi are 1-2 orders of magnitude higher and the pollutant mix is not dominated by a single pollutant, but rather by the presence of several pollutants at high levels. Since all the pollutants are not measured under the National Ambient Air Quality Monitoring Program in Delhi, it is proposed that a minimum three pollutants (SO<sub>2</sub>, SPM and NO<sub>2</sub>) concentrations must be available to calculate and report the AQI. Thus, the main objective of the present work is to estimate AQI of Delhi as a case study.

### Methodology

There are several types of AQIs cited in the literature having different criteria and mathematical formulations, at times, leading to confusion. This confusion is caused by the assignment of similar sounding qualitative terminology. There is no single universal AQI. Air quality data analysis using various indices showed a large variations in the description of air quality for the same air quality data set, one index system may refer the air quality as acceptable and the other system as very poor. Thus, it is necessary to develop methods to communicate air quality data in a commonly understood classifications systems. Different countries have devised different methods of rating the air quality. The three different methods that emerge from the literature, taken up for application in the present study of Delhi, whose geographical area has been divided into 169 grids of size 5.5 km x 5.5 km (Fig. 1 ), are as follows :

#### Indian AQI

In India, the Central Pollution Control Board (CPCB) has simply divided the cities into different zones based on the extent of the annual average level of pollutant being low, moderate, high or critical based on level of air quality standards. Moreover, levels of each pollutant are categorized separately and no overall air quality index has been formulated as yet.

Practically all the air quality indices around the world consider the classical pollutants like SO<sub>2</sub>, NO<sub>2</sub>, RSPM, CO and O<sub>3</sub>. Sub-indices for toxic pollutants like benzene, poly aromatic hydrocarbons, lead and PM<sub>2.5</sub> have not been considered for this purpose. India too does not have any air quality standards for these air toxins.

In the Indian context, since only three pollutants (SO<sub>2</sub>, SPM and NO<sub>2</sub>) are being monitored under the Air Quality

*Air quality data analysis using various indices showed a large variations in the description of air quality for the same air quality data set, one index system may refer the air quality as acceptable and the other system as very poor.*

Monitoring Programme, information on at least all the three pollutants must be available to calculate the index. The ambient air quality, monitored by CPCB at 10 places in Delhi for years 1995 - 1997, has been undertaken in the present study. The investigation into seasonal ambient air quality data for Delhi has shown that the air quality worsen (very poor to severe) in winter months like December, January and February. The pre-monsoon months like March, April and May are characterized by the dusty winds resulting in high SPM concentrations but lesser than those in winter. The air quality is better (good to moderate) in monsoon (June, July

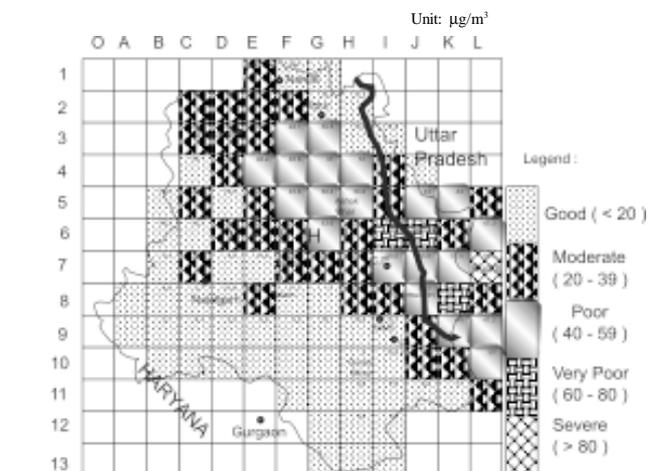


Figure 1 : SO<sub>2</sub> Levels in Delhi Averaged over the Years 1995-1997

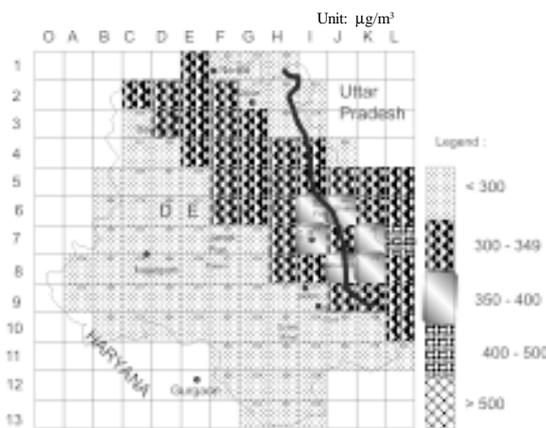


Figure 2 : SPM Levels in Delhi Averaged over the Year s : 1995-1997.

and August) and post monsoon (September, October and November). Thus, the air quality data of SO<sub>2</sub>, SPM and NO<sub>2</sub>, averaged over 1995-1997, has been interpolated all over the city of Delhi and has been shown in Figs. 1 to 3.

One way to describe the air quality is to compare the concentrations of all the pollutants with ambient air quality (AAQ) standards (Acceptable levels). The air is considered to be good when pollutants' concentration is within the AAQ standard; bad, when pollutants exceed the standard.

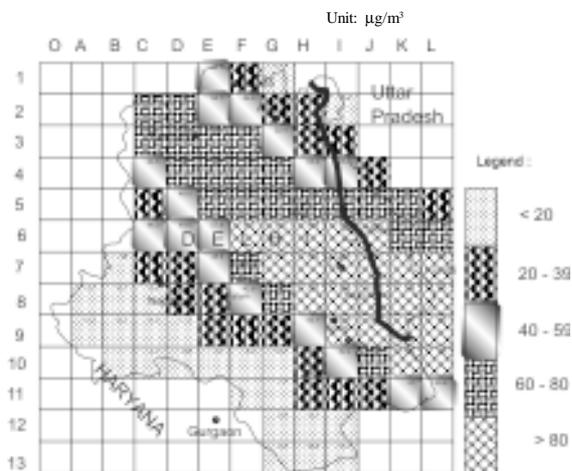


Figure 3 : NO<sub>2</sub> Levels in Delhi Averaged over the Years 1995-1997

**Oak Ridge Air Quality Index (ORAQI)**

The second method adopted to describe the air quality of Delhi is through the application of Oak Ridge Air Quality Index ( 1976 ) formula (Appendix I).

The air is considered to be excellent when AQI is less than 20; good, when AQI is between 20 to 39; satisfactory, when it is between 40 - 59; poor, when it is between 60 - 79; bad when it is between 80 - 100, dangerous when its value is above 100. The Oak Ridge Air Quality Index (ORAQI) of Delhi, based on additive function of sub indices, is shown in Fig. 4, which indicates that most of the locations in Delhi either fall under dangerous (AQI > 100) or bad (AQI = 80 - 100) and poor (60 - 79) categories representing poor air quality.

The limitation of ORAQI is its inherent problem of eclipsing (eclipsing is a situation when the index underestimates the pollution level), which on most of the time, showed a better Air Quality than the actual air pollution level. The problem of eclipsing is most undesirable characteristics of additive indices.

**US EPA AQI**

The way air quality index is calculated by US EPA, has also been attempted in the present study. The U.S. EPA established a nationally uniform air quality index, which assigns colours and brief description to ranges of ambient concentrations of pollutants as follows: green for “good”, yellow for

pollutants, the highest among them is declared as the overall air quality index. The index values are reported as a scale ranging from 0 to 500 Appendix III (B). This represents a very broad range of air quality from pristine imminent and substantial health threats to the public Appendix III (C).

The air quality index is calculated by using the formula given in Appendix II.

The AQI of Delhi has been calculated by using above method and shown in Fig. 5. Which interprets that most of the region of Delhi has unhealthy AQI. Few grids in the centre of the city, e.g. Cunnought place, Red fort, ITO, Janakpuri etc. have very unhealthy AQI. Very few grids at the boundary of the city have good AQI, whereas grids at opposite boundary have unhealthy AQI for sensitive areas.

**Flexible methods**

These methods of estimating Air Quality Index are mainly based on two approaches :

- (i) Multiple,
- (ii) Overall.

The multiple approach includes each pollutant individually, i.e. concentration of each pollutant is compared

with National Ambient Air Quality Standards (NAAQ) and assessment of air quality is made for each pollutant individually.

***In Indian context, since only three pollutants (SO<sub>2</sub>, SPM and NO<sub>2</sub>) are being monitored under the Air Quality Monitoring Programme, information on at least three pollutants must be available to calculate the index.***

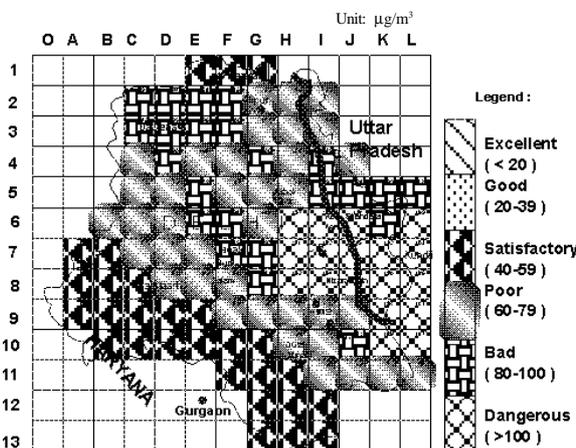


Figure 4 : Oak Ridge Air quality Index (ORAQI) : Delhi (Years : 1995-1997)

“moderate”, orange for “unhealthy”, purple for “very unhealthy” and maroon for “hazardous” (Anon, 1998).

The overall air quality index of Delhi is determined on the basis of sub-indices of three pollutants. These pollutants are particulate matter, sulphur dioxide (SO<sub>2</sub>) and nitrogen dioxide (NO<sub>2</sub>). For each pollutant, the sub-index is calculated on the basis of actual ambient concentrations (Figs. 1 to 3) in relation to the National Air Quality Standard Appendix III (A). After sub-indices are calculated for all the

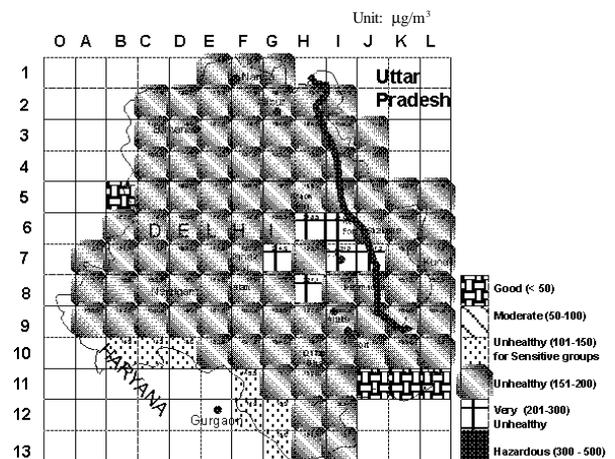


Figure 5 : Air Quality Index (US EPA) of Delhi (Years : 1995-1997)

The overall approach includes two different approaches.

- (a) One approach is based on the mean values of concentrations of SO<sub>2</sub>, SPM and NO<sub>x</sub>. Combination of three pollutants determine the AQI.
- (b) The other approach, based on sparse data, determines the sub-indices of three pollutants (SO<sub>2</sub>, SPM and NO<sub>x</sub>) individually and highest indices is declared as AQI. Thus one can say that there is flexibility in different methods based on flexible data.

## Results and Discussions

In Indian context, the approach of maximum indices has been adopted for AQI. The pollutants included in the AQI were SO<sub>2</sub>, SPM and NO<sub>2</sub> only, since only these three pollutants are being monitored under the Air Quality Monitoring Programme throughout the year.

The investigations into 1995–1997 data interpretation vis-a-vis the air quality index for Delhi have shown that air quality worsen (very poor to severe) in winter months and bad in pre-monsoon or summer season. Monsoon and post-monsoon showing improvement in ambient air quality (i.e. good to moderate).

It may also be noted that SPM is the critical pollutant (having highest value of subindex) in Delhi according to the data analysis of years 1995 to 1997. The air quality levels of SO<sub>2</sub> and NO<sub>2</sub> are within the standards. The SPM is the responsible pollutant for index value over 95 % of time. Thus, for Delhi the critical pollutant may be SPM but the information on the other pollutants is also required for a proper representation of air quality through AQI. It is, therefore, recommended that there is a need to measure additional pollutants e.g. CO, PM<sub>10</sub>, O<sub>3</sub> at all the monitoring locations with greater frequency throughout the year.

This AQI study of Delhi indicates that there is a significant increase in emission causing much alarm, imposing more stringent control requirements on sources of air pollution than ever before. Hence, it is necessary to characterize air pollutant emission sources and the best technology available to control them. Air pollution control strategy provides the guidelines needed to comply with the most recent air pollution standards and regulations for preservation of safe and better environment for future generations. It aims at maximizing the control of gases and particulates emissions.

## Conclusion

Ambient air quality (AAQ) is attractive as the starting point for an urban air pollution index because it lies along the environmental pathway between sources/emissions, which are the points of control and people's treating zones, which are

the locations to be protected. Thus, AAQ both responds to change in control for a particular source and is indicator of ill health from that source, seemingly ideal characteristics.

Rating of the air quality into broad descriptive groups or using numerals to denote the quality of air are the most commonly used methods across the world and are known as air quality indices.

Flexibility in estimating AQI is useful technique for its application to any urban city. It is mainly based on sparse of ambient air quality data and national ambient air quality standards of a particular region. It is a very useful tool for defining the state of air environment and drawing air quality management strategies. Overall analysis of flexible methods of estimating Air Quality Index of Delhi results that air pollution in Delhi has grown from bad to worse, often to alarmingly high levels beyond prescribed limits.

## Acknowledgement

The author would like to thank to the Central Pollution Control Board, New Delhi for providing the relevant ambient air quality data and Mr. Sidhartha for his valuable suggestions.

## References

- Anon (1998) 40 Code of Federal Regulations, Part 58, in Federal Register, United States Environmental Protection Agency, Vol. 63, 236.
- Babcock L.R. (1970) Combined Pollution Index for Measurement of Total Air Pollution, *Journal of Air Pollution Control Association*, 20 (10), 653 - 659.
- Babcock, L.R. Nagda (1972) *Indices of Air Quality, In Indicators of Environment Quality* (Ed) W. A. Thomas, Plenum Press, New York.
- Hamekoski, K. (1998) Use of a Simple Air Quality Index in the Helsinki Area, Finland, *Environmental Management*, 22, (4), 517 - 520.
- Ott WR. and Thons GC (1976), Oak Ridge Air Quality Index: *Air Pollution Indices, A Compendium and Assessment of Indices used in the United States and Canada*, Ann Arbor Science, 43-46.
- Sengupta S., Patil R. S. and Venkatachala P. (1996) Assessment of Population Exposure and Risk Zone due to Air Pollution using the Geographical Information System, *Computers Environment and Urban Systems*, 20 (3), 191 - 199.
- Trozzi C., Vaccaro R. and Crocetti S. (1999) Air Quality Index and its use in Italy's Management Plan, *The Science of the Total Environment*, 235 (1 - 3 ), 387 - 389.

## Appendix I

The Oak Ridge Air Quality Index (1976) formula is given by

$$AQI = \left[ 39.02 \left\{ \left( \frac{SPM}{200} \right) + \left( \frac{SO_2}{80} \right) + \left( \frac{NO_2}{80} \right) \right\} \right]$$

The quality of air is considered to be excellent when AQI is less than 20; good, when AQI is between 20 to 39; satisfactory, when it is between 40 - 59; poor, when it is between 60 - 79; bad when it is between 80 - 100, dangerous when its value is above 100.

## Appendix II

The U.S. EPA air quality index is calculated by using the following formula

$$I_p = \left[ \frac{I_{Hi} - I_{Lo}}{BP_{Hi} - BP_{Lo}} \right] (C_p - BP_{Lo}) + I_{Lo}$$

where  $I_p$  = the air quality index for pollutant 'p',  
 $C_p$  = actual ambient concentrations of the pollutant 'p',  
 $BP_{Hi}$  = the breakpoint in Table 2 that is greater than or equal to  $C_p$ ,  
 $BP_{Lo}$  = the breakpoint in Table 2 that is less than or equal to  $C_p$ ,  
 $I_{Lo}$  = the sub-index value corresponding to  $BP_{Lo}$ ,  
 $I_{Hi}$  = the sub-index value corresponding to  $BP_{Hi}$ .

## Appendix III : (A) National Air Quality Standards

Pollutants	Time-weighted average	Concentration in Ambient Air			Method of measurement
		Sensitive Area	Industrial Area	Residential, Rural & other areas	
Sulphur Dioxide (SO <sub>2</sub> )	Annual average	15 µg m <sup>-3</sup>	80 µg m <sup>-3</sup>	60 µg m <sup>-3</sup>	Improved West and Geake Method
	24 hour	30 µg m <sup>-3</sup>	120 µg m <sup>-3</sup>	80 µg m <sup>-3</sup>	
Oxides of Nitrogen (NO <sub>2</sub> )	Annual	15 µg m <sup>-3</sup>	80 µg m <sup>-3</sup>	60 µg m <sup>-3</sup>	Jacob & Hochheiser Modified (Na-Arsenite) Method
	24 hour	30 µg m <sup>-3</sup>	120 µg m <sup>-3</sup>	80 µg m <sup>-3</sup>	
Suspended Particulate Matter (SPM)	Annual	70µg m <sup>-3</sup>	360µg m <sup>-3</sup>	140µg m <sup>-3</sup>	High Volume Sampling (average flow rate not less than 1.1 m <sup>3</sup> /minute)
	24 hour	100µg m <sup>-3</sup>	500 µgm <sup>-3</sup>	200µgm <sup>-3</sup>	
Respirable Particulate matter (RPM), (size less than 10 µm)	Annual	50µg m <sup>-3</sup>	120µg m <sup>-3</sup>	60µg m <sup>-3</sup>	Respirable particulate matter sampler
	24 hour	75µg m <sup>-3</sup>	150 µgm <sup>-3</sup>	100µgm <sup>-3</sup>	
Lead (Pb)	Annual	0.5µg m <sup>-3</sup>	1 µg m <sup>-3</sup>	0.75µgm <sup>-3</sup>	ASS method after sampling using EPM 2000 or equivalent Filter paper
	24 hour	0.75µg m <sup>-3</sup>	1µgm <sup>-3</sup>	1µgm <sup>-3</sup>	
Carbon Monoxide (CO)	8 hour	1 mg m <sup>-3</sup>	5 mg m <sup>-3</sup>	2 mg m <sup>-3</sup>	Non dispersive infrared spectroscopy
	1 hour	2 mg m <sup>-3</sup>	10 gm <sup>-3</sup>	4 mg m <sup>-3</sup>	

(B) The US EPA Developed Sub-indices for different Levels of Pollutant Concentrations based on which the Overall Air Quality Index is Calculated

These sub-indices	Correspond to these breakpoints						
	O <sub>3</sub> (ppm) 8 - hour	O <sub>3</sub> (ppm) 1 - hour	PM <sub>2.5</sub> (µgm <sup>-3</sup> )	PM <sub>10</sub> (µgm <sup>-3</sup> )	CO (ppm)	SO <sub>2</sub> (ppm)	NO <sub>2</sub> (ppm)
0-50	0.000-0.064	None	0.0-15.4	0-54	0.0-4.4	0.000-0.034	*
51-100	0.065-0.084	None	15.5-40.4	55-154	4.5-9.4	0.035-0.144	*
101-150	0.085-0.104	0.125-0.164	40.5-65.4	155-254	9.5-12.4	0.145-0.224	*
151-200	0.105-0.124	0.165-0.204	65.5-150.4	255-354	12.5-15.4	0.225-0.304	*
201-300	0.125-0.374	0.205-0.404	150.5-250.4	355-424	15.5-30.4	0.305-0.604	0.65-1.24
301-400	None	0.405-0.504	250.5-350.4	425-504	30.5-40.4	0.605-0.804	1.25-1.64
401-500	None	0.505-0.604	350.5-500.4	505-604	40.5-50.4	0.805-1.004	1.65-2.04

Note : \* indicates that no index value reported at these concentration levels, because there is no short-term NAAQS.

(C) The Air Quality Index Categories and the Colours used to Describe them in US

Index values	Descriptors	Colour
0 - 50	Good	Green
51 - 100	Moderate	Yellow
101 - 150	Unhealthy for sensitive groups	Orange
151 - 200	Unhealthy	Red
201 - 300	Very unhealthy	Purple
301 - 500	Hazardous	Maroon

### Flexibility Mapping : Practitioner's Perspective

1. What types of flexibilities you see in the practical situation of "Estimating Air quality Index" on the following points:
  - Flexibility in terms of "options"
  - Flexibility in terms of "change mechanisms"
  - Flexibility in terms of "freedom of choice" to participating actors.
2. Try to map your Air Quality Index on following continua.  
(Please tick mark in the appropriate box(es)).

Assessment Approach		
Multiple pollutants		Overall index
Overall Index		
Combination of meanvalues of concentration		Highest sub index for individual pollutant

### Reflecting Applicability in Real Life

1. Implement the Air Quality Indexes presented in this paper for your own city and compare the results.
2. Which Air quality Index do you find more representative and why?

# Flexsy Tools

Sushil

IIT Delhi

*Flexsy tools are required to assess and enhance flexibility at various levels*

## Introduction

Flexible systems management is based on the concept of systemic flexibility discussed in Learning Lesson L1 in Vol. 1, No.1. The systemic flexibility is defined in terms of three keywords, viz. options, change and freedom of choice. In order to achieve systemic flexibility in an enterprise, it is essential to identify and define the types of flexibility required, assess or measure the various types of flexibility, and generate ideas and solutions to enhance the flexibility at various levels, which would require certain tools. Flexible Systems Management is colloquially called as Flexsy Management, and thus, its tools are named as flexsy tools.

The manager may or may not use tools for Flexible Systems Management. Along with the whole kit of tools and techniques of management and systems, ranging from hard to soft, quantitative to qualitative, analytic to synthetic, empirical to simulation, and analytical to creative some specific tools for understanding the interplay of situation, actor and process are developed which are outlined here.

## Continuum

*Continuum can be used to identify role space or domain of flexibility in terms of thesis and antithesis*

This is the basic tool, which should be used to identify the role space or domain of flexibility. For example, in case of organization, it could have

Centralization ○————○ Decentralization  
Stability ○————○ Dynamism

The left-hand side of the continuum gives the thesis and the right-hand side gives the antithesis. The thesis is comparatively traditional and rigid. The range from thesis to antithesis would give the scope or potential of flexibility.

## Mapping

*The current status can be mapped on various continua which indicates potential for improvement*

This is a simple tool that can be used to map the situation, actor and process variables on various continua. The present position of the organization can be mapped, as illustrated in the case of 3M in Exhibit 1. This tool is used to assess the current status and the potential for improvement. This can also be used to develop a measure of flexibility.

## Archetypes of Interplay

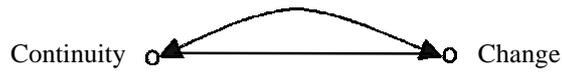
*Archetypes or generic structures act as guidelines to study the pattern of interplay and depict the nature of change*

The concept of systemic flexibility dwells on the dynamic interplay on the continuum, which is the basis of flexible systems management. In order to understand and apply the concept of dynamic interplay, it is important to identify some basic archetypes or generic structures of interplay. These archetypes can be used as guidelines to study the existing pattern of interplay, as well as to evolve the suitable interplay on the required continua. The following archetypes have been identified which depict the interplay on the continuum with differing levels of flexibility, as shown in Exhibit 2. These archetypes depict the nature of change through which a is undergoing.

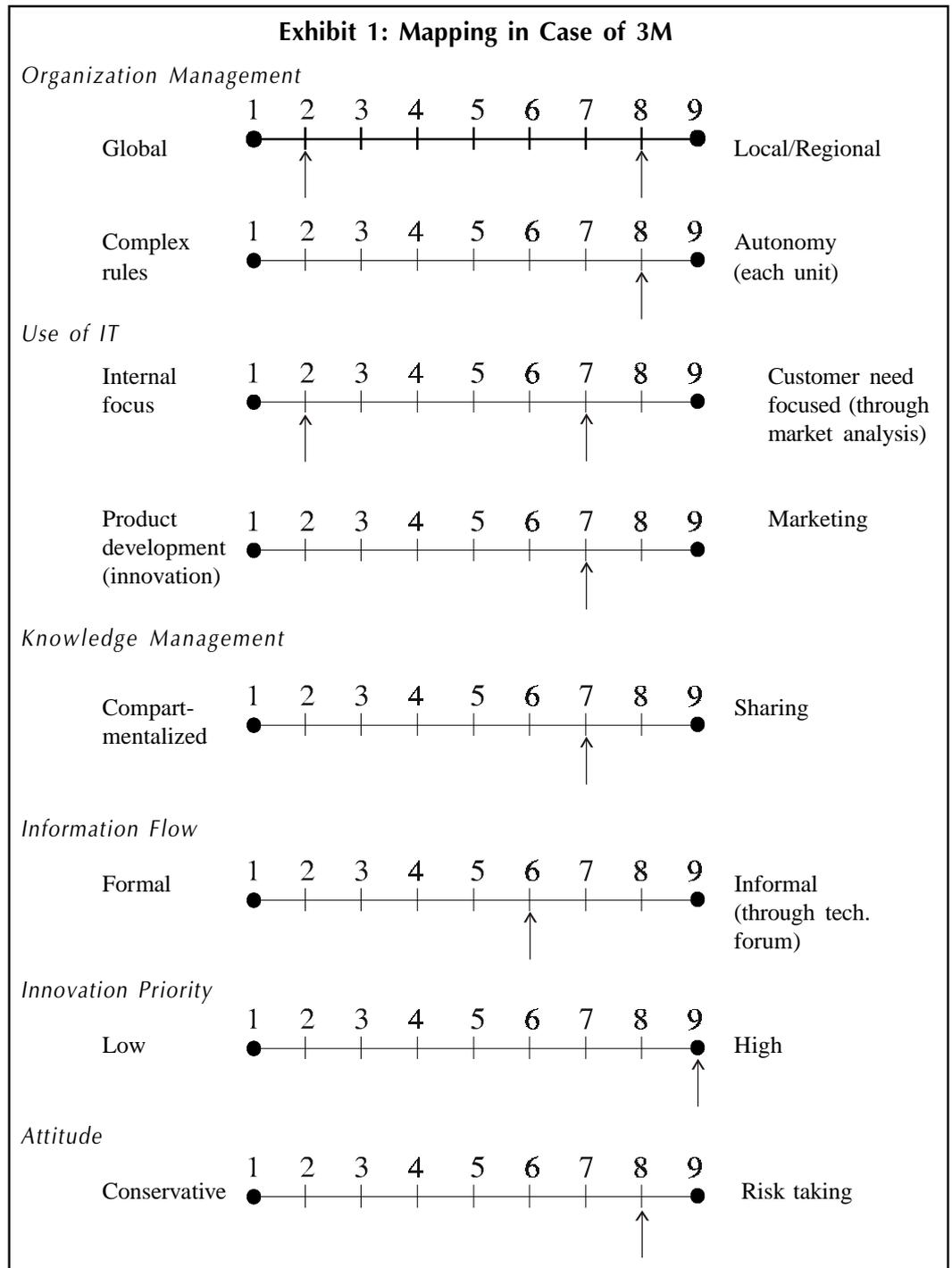
### Co-existence

*Both the extremes may co-exist as in the case of bimodal organizations*

This is the most widely used form of interplay of polar opposites, i.e. both the extremes (thesis and antithesis) exist side by side. Behrami (1992) termed it as bimodal organization while discussing the emerging flexible organization. The organization could have centralization and decentralization, or continuity and change at the same time.



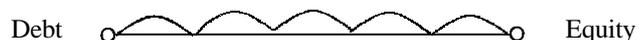
The case of 3M is mapped on the planes of organization management, use of IT, knowledge management, information flow, innovation priority, and attitude

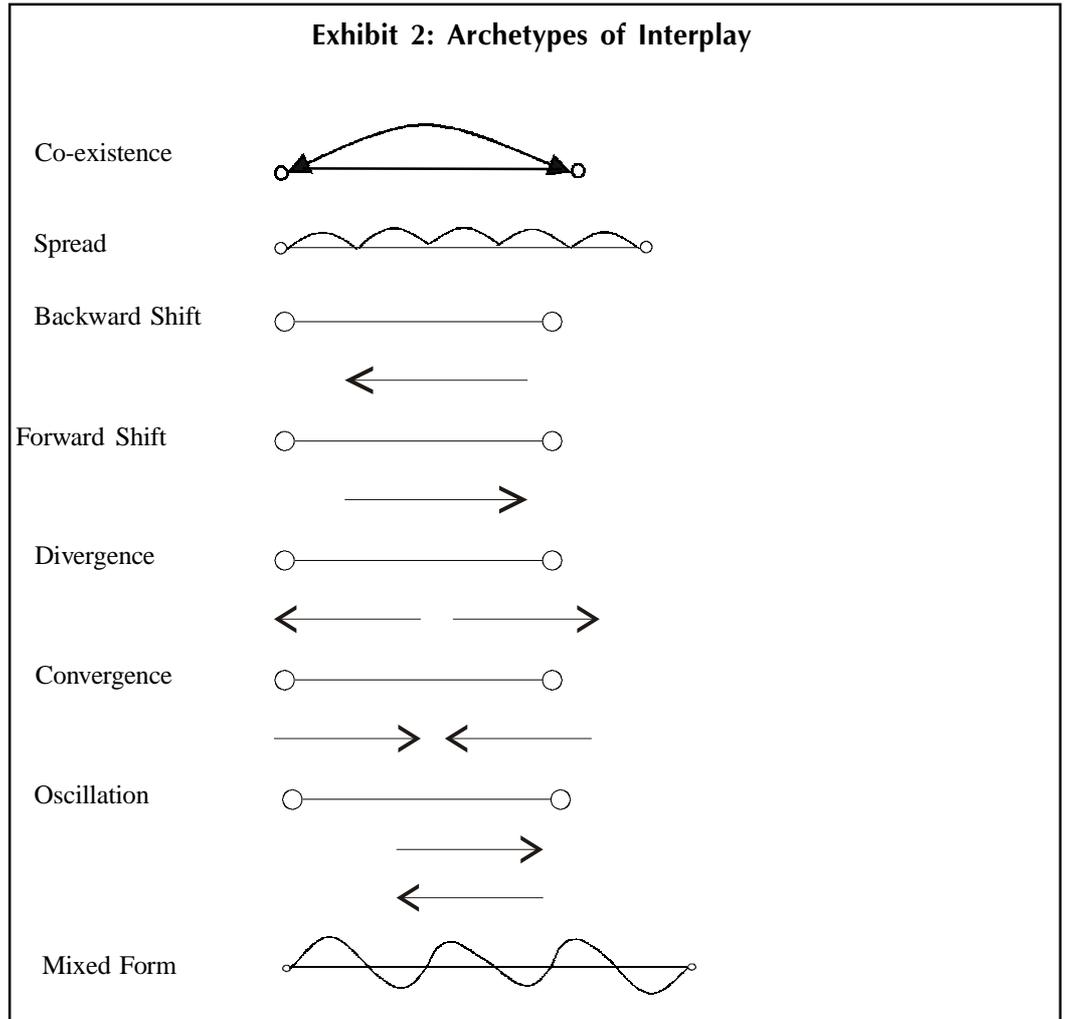


**Spread**

Different combinations of thesis and antithesis may be present at the same time, e.g. various financial instruments

There may exist different combinations on the continuum at the same time giving a whole range of alternatives. For example, an organization might be using various financial instruments such as shares, debentures, loans, deposits, etc. which have different proportion of debt and equity giving flexibility in the financing pattern.





People in an organization may be, at the same time, unitary on some issues, some limited plurality on certain others, high plurality in some, and may be in conflict on certain other issues.



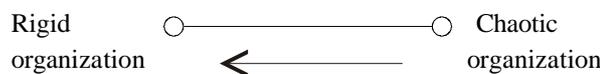
*Backward Shift*

*There can be a shift from the antithesis towards thesis, such as routinization of entrepreneurial firms*

Usually the thesis on a continuum connotes rigidity. In certain areas, there might be a gradual shift from the antithesis to the thesis. For example, in case of unstructured problems one might start with learning approaches, and gradually as the clarity develops and structure enumerates, the approach may shift towards “hard system” thinking or optimizing. Similarly, there could be shift from qualitative to quantitative approaches.



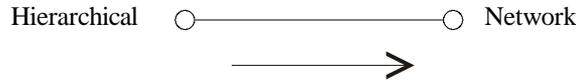
According to Volberda (1998), the backward shift can be witnessed in routinization of entrepreneurial firms under decreasing level of competition. These firms go through a most likely trajectory, that is a transition from a chaotic state, to flexible, planned and rigid forms.



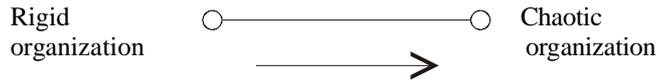
There can be a dynamic shift from thesis to antithesis, such as revitalization of large established firms

*Forward Shift*

There may be a dynamic shift taking place from the thesis to the antithesis. This is a common phenomenon observed in the changes taking place in different spheres of management. For example, shift from hierarchical to network organizations, from simple to complex systems, from mechanistic to organismic view point, etc.



Volberda (1998) has presented such a forward shift in the form of revitalization of large established firms under escalating levels of competition. The most likely trajectory is to move from a rigid form to planned, flexible and ultimately to a chaotic form.



*Divergence*

There can be divergence from any point on the continuum towards ends, such as moving from mixed approach to pure ones

On a plane we might be existing anywhere on the continuum and observe a simultaneous shift towards both the ends, i.e. diverging from the existing position. For example, we might be having a mixed orientation towards the task as well as the people, and gradually becoming more task oriented on certain issues, and more people oriented on certain others.



*Convergence*

Convergence means moving towards the middle from the ends, e.g. shifting from pure strategies to mixed strategies

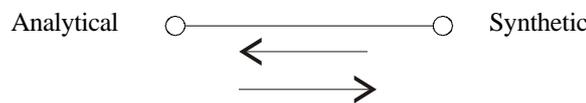
This archetype is more integrative and exhibits a gradual shift from the ends of the continuum towards the middle converging and bridging the gap. For example, we generate more mixed or hybrid approaches by integrating or innovating the “hard and soft systems” based approaches so as to deal with semi-structured problems more effectively. Similarly, the convergence could be observed by gradually shifting from pure strategies on the end to mixed strategies.



*Oscillation*

The change pattern could be in the form of oscillation across the continuum such as change in financial ratios overtime

There might be a shift observed from one end of the continuum to the other and back. Such oscillations could take place on the entire continuum or part of the continuum. For example, the approach initially could be synthetic, gradually shifting to be analytical, then synthetic and such cycles may be repeated.



Similarly, there can be oscillation in terms of various financial ratios exhibiting flexibility in financial system. For example, the debt-equity ratio, current ratio and other ratios might fluctuate over time as has been depicted by an empirical study reported by Sushil (2000).

*Mixed Form*

The above mentioned archetypes of interplay might be mixed or combined at the same time or over the time.

**Critical Questioning**

This is an important tool to generate ideas about options for creating flexibility in management. Some sample critical questions are:

The change pattern could be a complex mix of many archetypes

*Critical questioning can be applied to generate ideas and carry out managerial inquiry in the framework of SAP-LAP models*

- Why flexibility is important?
- What are the crucial areas for flexibility development?
- Where to decentralize?
- Which values need to be adapted for flexibility?
- Are our rules and procedures very tight?
- Does the organization need to be restructured?
- How people can be motivated to practice flexibility?

Such critical questions should be developed in any domain, and we should evolve their answers creatively. This is a simple yet powerful tool to support any managerial inquiry or problem solving. The critical questions can be applied in SAP-LAP framework to develop SAP-LAP models (Learning Lesson L3).

### Idea Generating Tools

*Basic tools of idea generation can be used to generate ideas about external and internal flexibility*

Basic tools of idea generation, such as Brain Storming, Norminal Group Technique, and Idea Engineering can be used for generating ideas about What, Why, and How, of flexibility. These tools can be used to generate ideas about the ways and means of creating flexibility in a particular setting.

For example, following ideas can be generated to create external and internal flexibility.

#### *External Flexibility*

*External flexibility is concerned about enhancing options outside the firm*

- Increasing the number of suppliers
- Increasing the distribution intermediaries
- Increasing the product-market combinations
- Switching to other components temporarily
- Contracting out activities in the form of co-makership or co-design.
- Influencing customers through advertising and promotions

#### *Internal Flexibility*

*Internal flexibility is linked with the options inside the firm*

- Multi skilled personnel
- Safety inventories
- Variable delivery times
- Variable production capacity
- Tailor-made products and services
- Multipurpose machinery

The ideas generated can be evaluated in terms of key performance indicators.

### Fuzzy Clustering

*An initial set of possible methods should be identified for problem solving which can be investigated in detail*

The problem solving methods can be clustered in a fuzzy manner to select the methods with high possibility of application in a problem situation. Out of the list of methods available the most relevant ones are clustered as an initial set of possible methods to be examined for detailed investigation.

### Reflections

*Flexsy tools are simple yet powerful to generate ideas about flexibility*

Flexibility in any situation needs to be identified, defined, assessed/ measured, created and enhanced. This would require some tools to facilitate process of flexibility management. A set of flexsy tools are presented in this lesson, which are very simple yet powerful to generate ideas about flexibility of various types. There are some advanced tools and models also available which can be used with some training, which will be presented subsequently in this series of learning lessons.

## References

Behrami H. (1992) The Emerging Flexible Organization: Perspectives from Silicon Valley, *California Management Review*, Summer.

Sushil (2000) *Cornerstones of Enterprise Flexibility*, Global Institute of Flexible Systems Management, Vikas Publishing House, New Delhi.

Volberda H.W. (1998) *Building the Flexible Firm: How to Remain Competitive*, Oxford University Press, Oxford.

### Reflecting Applicability in Real Life

- Identify and define a particular type of flexibility using the tool of continuum.
- Assess the current status of flexibility by mapping on various relevant continua for your organization.
- Generate ideas about the manner in which flexibility is to be created in your own context.
- Understand the change process in your organization in the form of an archetype of interplay.



## New Marketing Strategies: Evolving Flexible Processes to Fit Market Circumstance

*Ian Chaston, Response Books 2000  
(A division of Sage Publications)*

*Keywords:* flexible, strategy, market

Management has undergone a lot of changes in the past few decades. The world of marketing started with Kotler and McCarty defining components of the marketing process. The birth of Pacific Tigers in the 70s led to the growth of competitive strategic management paradigm. The focus in the 80s moved from market to customer and emphasized on building customer relationship. The later part of the 20th century saw the emergence of concepts like the TQM, JIT and Process Re-Engineering as the international competition heated up.

The marketer has been rigidly following the concepts already defined. This book induces the reader to use concepts relevant to his situation.

The book begins with various marketing philosophies and models. The first few chapters are on topics related to the strategic management where in the author explains in aspects. Then it moves on to marketing aspects like understanding the market and making of marketing plans. The author also looks buyer behaviour in a different way by exploring buyer-seller relationship orientation using a customer adoption model. Attempt has also been made to understand all kinds of markets, like institutional and service marketing. The book makes one familiar with all marketing concepts. By the time one is through with the new product development aspect, the majority of the concepts are clear in the reader's mind.

Promotion, pricing and distribution play major role in actual implementation of the marketing. This book looks

minutely into these from a practical standpoint and has introduced various concepts of flexi-Promotion, Flexi-Pricing and Distribution considering the product life-cycle, market structure and situation, circumstances surrounding the customer, companies, and the industry.

As Chaston reaches the concluding chapter, he brings into focus the changing international scenario, the happening of the inevitable, that is the shift from international marketing to marketing in a borderless world.

Before going through the book some basic understanding of marketing would be useful as the concepts used in the book are advanced and a lot of models are provided in diagrammatic form. Prior understanding of various marketing concepts can further induce the reader to generate more models of marketing relevant to his situation and requirement.

This book is almost complete to the extent of aiding understanding of a business as a whole, except perhaps, from the financial aspect of it. This book will trigger the thought process in understanding flexibility and its essence in the current and future situations, which is, perhaps, more important than just delving into theoretical aspects.

*G. Ganesh Das  
Sr. manager-Marketing  
LML Limited.*

## Event Diary

This section will contain events related to flexibility. Only highlights and important dates are provided. For more details, please visit the web page or contact the organizers. If you are planning any major flexibility related event (global conference/workshop/seminar), please submit the details ( Event title, Dates, Place, Theme, Deadlines, Contact Info, Email, Web page, etc.) to Dr. K. Momaya at email momaya@dms.iitd.ernet.in with Subject: giftjourn@1, Event Submission

- Event** : **The R & D Management Conference 2002**
- Dates** : July 8-9, 2002
- Place** : Leuven, Belgium
- Theme** : Strategy, policy and performance - impact on R&D activities
- Submission of Abstract** : 28 February, 2002
- Acceptance of Abstract** : 15 March 2002
- Submission of Paper** : 17 May 2002
- Notification of Acceptance** : 15 May 2002
- Camera-Ready Copy** : 15 July 2002
- For more info, please visit** : [www.kuleuven.ac.be](http://www.kuleuven.ac.be) / [www.leuveninc.com](http://www.leuveninc.com) / [www.radma.org](http://www.radma.org)
- Event** : **ICMIT'02 & ISMOT'02**  
**The International Conference on Management of Innovation and Technology**
- Dates** : October 18 - 20, 2002
- Place** : Hangzhou City, China
- Theme** : Management of Technology and Innovation in the 21st Century
- The deadlines** :
- Submission of Paper** : 31 March 2002
- Notification of Acceptance** : 15 May 2002
- Camera-Ready Copy** : 15 July 2002
- Contact** : Prof. Chen Jin  
Conference Coordinator for ISMOT'02 & ICMIT'02  
Research Center for Innovation & Development,  
Zhejiang University, Hangzhou, 310027, P.R. China.  
Phone: 86-571-87951886  
Fax: 86-571-87951886, 86-571-87951358  
Email: [cjhd@cma.zju.edu.cn](mailto:cjhd@cma.zju.edu.cn) / [icmit02@sohu.com](mailto:icmit02@sohu.com) / [cj@sba.zju.edu.cn](mailto:cj@sba.zju.edu.cn)
- Conference Web Site** : <http://www.cma.zju.edu.cn/ISMOT'02&ICMIT'02>
- Registration Fee** :
- Regular Fee** : 380 US\$ (before June 30, 2002),  
Students or Delegates from LDCs : 200 US\$
- Event** : **Eleventh International Conference on Information and Knowledge Management**
- Dates** : November 4-9, 2002
- Place** : McLean, VA (near Washington, DC)
- Theme** : Information and Knowledge Management
- Important Dates** : May 20, 2002 Electronic abstract due  
May 27, 2002 Full paper submission due  
Aug. 5, 2002 Notification of acceptance  
Sept. 3, 2002 Camera ready copy due
- Contact** : PC Co-Chair for DBMS  
Konstantinos Kalpakis, CSEE Department  
UMBC, 1000 Hilltop Circle, Baltimore, MD 21250  
Email: [kalpakis@csee.umbc.edu](mailto:kalpakis@csee.umbc.edu)  
PC Co-Chair for IR  
David Grossman  
Department of Computer Science,  
Illinois Institute of Technology  
10 W. 31st Street, Chicago, IL 60616  
Email: [grossman@iit.edu](mailto:grossman@iit.edu) Conference Web Site: <http://www.cikm.org/2002>



## Call for Papers

### *Special issue of Global Journal of Flexible Systems Management on “Organizational Strategy Formulation and Flexibility”*

The formulation and implementation of organizational strategy are recognized as key aspects of the management of all modern successful organizations. However, it has become a daunting task to cope up with changes in today's hyper competitive market place. With increasingly more global competition and the infusion of the Internet in the business world, flexibility in the strategy formulation and strategy's implementation process has become a requirement to survive and develop new business. Many researchers over time have stressed the importance of incorporating flexibility in the formulation of business strategy, as it may help achieve better business performance. In such an environment, traditional strategic planning methods do not suffice. To keep organizations competitive, policy makers will have to overhaul the process of formulating and implementing strategic initiatives to explicitly consider flexibility at various levels in the organization. Many challenges await companies as they formulate their organizational strategy and create flexibility in business processes. Thus, organizations are obliged to continuously explore new and innovative strategies, and to seek powerful methodologies that will confer competitive advantage.

The purpose of this special issue is to group together high-quality papers that lie at the intersection of flexibility and organizational strategy issues. The term flexibility is adapted in its most generic sense and includes both the service and manufacturing environments. Examples of the subject matter of the papers suitable for this special issue include, but are not limited to, the following:

- Recent developments in strategy formulation that consider the issues related to flexibility that can help practitioners, and their integration with information technology and management sciences tools and techniques.
- Development of appropriate concepts to understand the role and significance of flexibility in organizational strategy formulation.
- Empirical research in understanding the practice of organizational strategy formulation that includes flexibility and the types and levels of flexibility possible in organizations.
- Impact of e-commerce and the Internet on organizational strategy formulation and the consideration of flexibility.

- Strategy formulations to achieve effective and flexible supply chain solutions for extended multi-national enterprises.
- Strategy formulations to create and manage virtual enterprises of the future.
- Identification of critical success factors to ensure flexibility in organizations.
- Description and evaluation of information technology and software packages available to help include flexibility in organizational strategy formulation.
- Application papers of specific interest to the business community.

All manuscripts will be promptly and carefully refereed. Authors should follow the Instructions to Authors for the Global Journal of Flexible Systems Management (available from the guest editors) when preparing their manuscripts. Please submit five copies in English, in a machine readable form as an attachment to an e-mail, by no later than January 31, 2002, to one of the following guest editors:

**Dr. Jatinder N.D. Gupta**, Guest Editor  
Department of Management  
Ball State University  
Muncie, Indiana 47306, U.S.A.  
Tel: 1-765-285-5301  
FAX: 1-765-285-8024  
e-mail: [jgupta@bsu.edu](mailto:jgupta@bsu.edu)

**Dr. Sushil K. Sharma**, Guest Associate Editor  
Department of Management  
Ball State University  
Muncie, Indiana 47306, U.S.A.  
Tel: 1-765-285-5315  
FAX: 1-765-285-8024  
e-mail: [ssharma@bsu.edu](mailto:ssharma@bsu.edu)

**Dr. Michael G. Goldsby**, Guest Associate Editor  
Department of Management  
Ball State University  
Muncie, Indiana 47306, U.S.A.  
Tel: 1-765-285-5320  
FAX: 1-765-285-8024  
e-mail: [mgoldsby@gw.bsu.edu](mailto:mgoldsby@gw.bsu.edu)

## About GIFT

GIFT (Global Institute of Flexible Systems Management) is a professional society to enhance "flexibility" in business and management.

### Mission

To evolve and enrich the flexible systems management paradigm for the new millennium.

### Vision

Evolving as a global forum for interaction of all interested professionals and organizations in a truly flexible mode so as to help them create more options, faster change mechanisms and greater freedom of choice in their own settings.

### Schools

The Institute comprises of various schools, which are autonomous bodies, dealing with contemporary areas at the cutting edge contributing to the flexible systems management paradigm. At any point of time, each member can opt for an association with any two of the following schools in the respective thrust areas:

- \* GIFT School of Global Management
- \* GIFT School of Technology and Innovation Management
- \* GIFT School of Information Technology & Knowledge Management
- \* GIFT School of E-Commerce and E-Governance
- \* GIFT School of Learning Organization and Strategic Transformation
- \* GIFT School of Quality, Productivity and Wastivity Management
- \* GIFT School of Environment Management and Sustainable Development
- \* GIFT School of Human Values and Management Ethos

### Publications

- Book Series on Flexible Systems Management
- Quarterly Journal - "Global Journal of Flexible Systems Management" *giftjourn@l*
- Newsletter - "Flexibility"

### Membership

The membership fees for different types of members, unless changed/revised by the Governing Council from time to time, will be as given under:

	With in India	Overseas
<b>Student (Annual)</b>	<b>Rs. 500.00</b>	<b>US\$ 25.00</b>
<b>Annual</b>	<b>Rs. 1,000.00</b>	<b>US\$ 50.00</b>
<b>Life</b>	<b>Rs. 10,000.00</b>	<b>US\$ 500.00</b>
<b>Corporate/ Institutional</b>	<b>(a) for corporate bodies having turnover has less than Rs 20 Crore and for non-business/non-profit making organizations/institutions:</b>	
	<b>Rs. 50,000.00</b>	<b>US\$ 5,000.00</b>
	<b>(b) for corporate bodies having turnover more than Rs 20 Crore:</b>	
	<b>Rs. 1,00,000.00</b>	<b>US\$ 5,000.00</b>

- All individual members will get one complimentary copy of the *giftjourn@l*.
- All corporate/institutional members will get three complimentary copies of the *giftjourn@l*, one for library and two for nominees.

#### Correspondence :

All correspondence and membership applications may be addressed to the Manager GIFT at the following address:

#### Ashish Jain

B-1, Irrigation Colony  
Shastri Nagar, Ghaziabad - 201002  
E-mail : [admin@giftsociety.org](mailto:admin@giftsociety.org)  
Website: [www.giftsociety.org](http://www.giftsociety.org)

## Executive Committee of GIFT Schools

### **GIFT School of Technology & Innovation Management**

*Director* : Mr M.K. Mittal  
*Secretary* : Dr K. Momaya  
*Treasurer* : Mr B.K. Chakravarthy  
*Executive Members* : Mr Narender Singh  
: Mr Vimal Kumar  
: Mr Ajitabh

### **GIFT School of Global Management**

*Director* : Prof. Rajat K. Baisya  
*Jt. Director* : Mr Shyam S. Sethi  
*Secretary* : Mr Ganesh Das  
*Treasurer* : Mr Ajitabh  
*Executive Members* : Dr J. Chatterjee  
: Dr S.K. Jain  
: Mr Ashish Jain

### **GIFT School of Learning Organization & Strategic Transformation**

*Director* : Dr Y. V. Verma  
*Secretary* : Dr Abid Haleem  
*Treasurer* : Mr Ashish Jain  
*Executive Members* : Dr Vinnie Jauhari  
: Dr Neeraj  
: Mr Kapil Mittal

### **GIFT School of Human Values and Management Ethos**

*Director* : Dr K.M. Mital  
*Secretary* : Mr Rajan Johree  
*Treasurer* : Mr Deepak Garg  
*Executive Members* : Dr Kanika T. Bhal  
: Dr Neeraj  
: Dr S. Karunes

### **GIFT School of Environment Management and Sustainable Development**

*Director* : Mr A.K. Agrawal  
*Secretary* : Dr P. Goyal  
*Treasurer* : Mr Sanjeev Kr Manocha  
*Executive Members* : Dr Surinder Batra

### **GIFT School of Quality, Productivity and Wastivity Management**

*Director* : Mr Vipin Mittal  
*Secretary* : Prof. O.P. Sharma  
*Treasurer* : Mr Rajiv Ranjan Bhatia  
*Executive Members* : Mr Sushil Kumar  
: Dr Abid Haleem

### **GIFT School of E-Commerce & E-Governance**

*Director* : Dr Jayanta Chatterjee  
*Secretary* : Dr M.P. Gupta  
*Treasurer* : Mr Naresh Raheja  
*Executive Members* : Mr Manmohan Rehsi  
: Dr S.K. Batra  
: Mr S.V. Ramanan  
: Mr Sunil Jain

### **GIFT School of Information Technology & Knowledge Management**

*Director* : Mr R.C. Gourh  
*Secretary* : Dr Ravi Shankar  
*Treasurer* : Mr Gurbans Chatwal  
*Executive Members* : Mr Sunil Jain  
: Mr S.R. Krishnaiah  
: Dr Parmeshwar P. Iyer



# Global Journal of Flexible Systems Management

## Guidelines for Authors

### Aim

The journal is intended to share concepts, researches and practical experiences to enable the organizations to become more flexible (adaptive, responsive, and agile) at the level of strategy, structure, systems, people, and culture. Flexibility relates to providing more options, quicker change mechanisms, and enhanced freedom-of-choice so as to respond to the changing situation with minimum time and efforts.

It is aimed to make the contributions in this direction to both the world of work and the world of knowledge so as to continuously evolve and enrich the flexible systems management paradigm at a generic level as well as specifically testing and innovating the use of SAP-LAP (Situation-Actor -Process-Learning-Action-Performance) framework in varied managerial situations to cope with the challenges of the new business models and frameworks.

### Scope

The Journal will include the papers relating to: conceptual frameworks, empirical studies, case experiences, insights, strategies, organizational frameworks, applications and systems, methodologies and models, tools and techniques, innovations, comparative practices, scenarios, and reviews.

The papers may be covering one or many of the following areas: Dimensions of enterprise flexibility, Connotations of flexibility, and Emerging managerial issues/approaches generating and demanding flexibility (details can be seen on the website - [www.giftsociety.org](http://www.giftsociety.org)).

### Coverage

The journal will be organized into various sections to include following types of contributions: Research papers, Short notes/correspondence, Applications and case studies, Book reviews, Book summaries, Interviews and round tables, Information about relevant conferences and seminars, Educational and learning experiments, and any other relevant information related with the theme of the Journal.

### Manuscript Submission

Four copies of manuscript should be submitted to the Editor-in-Chief at this address: Prof. Sushil, Department of Management Studies, Indian Institute of Technology, Hauz Khas, New Delhi - 110 016, Ph: 91-11-6591167, 91-11-6857787, Fax: 91-11-6591167, 91-11-6862620.

It is preferred to have **electronic submission** through web to avoid delays. Please submit the "word" file attached to email on the following address: [giftjournal@giftsociety.org](mailto:giftjournal@giftsociety.org) At the time of final submission, an autobiographical note and a passport size photograph of all the authors will be required.

### Copyright

The submission of paper to [giftjourn@l](mailto:giftjourn@l) implies that the paper is original and not submitted elsewhere for publication. Copyright for published papers will be vested in the publisher i.e. GIFT, and authors should complete a standard publishing agreement, which will be supplied with final proofs. It is the author's responsibility to obtain written permission to reproduce copyright material.

### Language

All papers will be published in English and manuscripts must be submitted in that language.

### Reviewing Process

Each paper is reviewed by the editor and if it is judged relevant for publication, it is then sent to referees for double blind peer review. The

papers are reviewed for relevance, focus on flexibility, innovation, practical considerations, quality of evidence, contribution, methodology, readability, and organization. Based on the recommendations of the referees, the editor then decides whether the paper should be accepted as it is, to be revised or rejected. The reviewing time will normally be 10-12 weeks.

### Manuscript Requirements

**Length:** No maximum length for a paper is prescribed, however, authors should write concisely.

**Title:** The title should be brief and typed on a separate sheet.

**Format:** The paper should have a cover page giving title, author's name, complete address, telephone number, fax number, and email of the author. In case of co-authors, these details should also be provided for each co-author. Correspondence will be sent to the first named author unless otherwise indicated.

The second page should contain the title and an abstract of 100-150

words. It should also include upto eight keywords about the paper. The authors may attach the category sheet to define the relevant categories to which the paper belongs (available on the website- [www.giftsociety.org](http://www.giftsociety.org)). The second page should not include the authors name. The paper should begin from the third page.

**Headings:** should be short clearly defined, and numbered.

**Footnotes:** should be used only when absolutely necessary and must be identified in the text by consecutive numbers placed as superscript.

**Text:** The main text should be more readable and mathematical models, if any, should be provided in Appendix. The ideas proposed should preferably be supported by real life case examples from

business situations.

**Tables and Figures:** All tables and figures should be kept to a minimum and numbered consecutively using arabic numerals. Each table should have a brief title written on the top of the table, and each figure should have a brief caption written on the bottom of the figure.

**Photos and Illustrations:** must be supplied as good quality black and white original with captions. Their position should be shown in the text by typing on a separate line the words "*take in Plate n*"

**References:** to other publications must be in standard style. That is shown within the text as the author's name followed by a comma and year of publication, all in round brackets, e.g. (Volberda, 1997). At the end of the paper a reference list in alphabetical order must be given as follows:

*For books:* Surname, initials, (year) *title*, publisher, place of publication.  
e.g. McKenzie J. (1996) *Paradox: The New Strategic Dimension*, McGraw-Hill, Berkshire.

*For journals:* surname, initials, (year) *title*, *journal*, volume (number), pages.  
e.g. Volberda H.W. (1997) Building Flexible Organization for Fast Moving Markets, *Long Range Planning*, 30 (2), 169-183.

### Proofs

Page proofs for correction of printer's errors only will be sent to the author specified on the typescript. Proofs should be returned to the printer within the specified time period.

### Offprints

Fifty offprints of each paper will be provided free of charge to the principal author. Additional copies may be purchased on an offprint order form, which will be sent to authors along with proofs.

### Checklist

- \* The paper is original, not submitted anywhere else.
- \* The length of the paper is commensurate with content.
- \* The title and headings are brief and catchy.
- \* The author(s) name and affiliation are given only on cover page.
- \* Abstract and keywords are provided.
- \* The category of the paper is specified as per standard list.
- \* Focus on flexibility in management is kept.
- \* The paper incorporates innovative ideas/models in a practical framework.
- \* Mathematical models, if any, are given in Appendix.
- \* Tables/Figures are properly placed and numbered with brief titles/captions.
- \* References are in standard style.
- \* Autobiographical notes and passport size photographs of all authors are provided (in case of final submission).

### Complementary Membership

All authors, whose papers will be published in [giftjourn@l](mailto:giftjourn@l), will be offered one year complementary membership of GIFT.

### GIFT Best Paper Award

Every year one best paper award will be conferred based on evaluation of referees which will consist of cash award of **US\$ 500** and **complementary life membership** of GIFT equivalent to US\$ 500.

