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International Journal of Applied Management Research

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- To promote empirical research in various functional areas of management
- To provide a platform to researchers/practitioners of management and its allied areas to disseminate new management models and theories.
- To develop and reorient management thought process from inter and trans- disciplinary perspective.
- To encourage research towards developing culture and nation specific management interventions.

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Performance of Mizoram Rural Bank: A study of Pre and Post Amalgamation Period

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Abstract

Regional Rural Banks were established under the provisions of an Ordinance promulgated on the 26th September 1975 and the RRB Act, 1976 with an objective to ensure sufficient institutional credit for agriculture and other rural sectors. The RRBs mobilized financial resources from rural / semi-urban areas and granted loans and advances mostly to small and marginal farmers, agricultural labourers and rural artisans.

As a part of the downsizing process of public sector organisations, the government of India in consultation with sponsor banks (mostly public sector banks) and the National Bank for Agriculture and Rural Development (NABARD) took a decision to amalgamate the 196 regional rural banks (RRBs). As a result of the amalgamation, 145 out of 196 RRBs were amalgamated to form 45 new RRBs by March 3, 2005. Several changes have taken place in the focus and operation of the Regional Rural Banks in the wake of financial sector reforms in India and various measures have been taken by the Government to improve the commercial viability of RRBs since 1994-95. Since Mizoram has only one RRB i.e. Mizoram Rural Bank, there cannot be any amalgamation as such. But, the present paper shall try to study the performance of Mizoram Rural Bank in the pre and post amalgamation period. It is diagnostic and exploratory in nature and makes use of secondary data.

Key Words: *Rural Banks, Bank Performance, Amalgamation Period*

1.1 Introduction

Rural development in India is sine-qua-non of overall development. Scarcity of capital, shortage of investment opportunities, disguised unemployment, vicious circle of poverty are some generic issues calling for immediate steps to bring drastic changes in the usual picture of rural economy of India. In this series a need was also being felt to establish a credit agency that could combine the resource orientation of commercial banks and rural orientation of co-operatives. As a result of this, in 1975, five Regional Rural Banks (RRBs) came into existence through promulgation of Regional Rural Banks Ordinance (Sharma, Nishi: 2012).

Regional Rural Banks were established under the provisions of an Ordinance promulgated on the 26th September 1975 and the RRB Act, 1976 with an objective to ensure sufficient institutional credit for agriculture and other rural sectors. The RRBs mobilize financial resources from rural / semi-urban areas and grant loans and advances mostly to small and marginal farmers, agricultural labourers and rural artisans. The area of operation of RRBs is limited to the area as notified by Government of India covering one or more districts in the State.

1.2 Regional rural Banks in India Pre and Post amalgamation

As a part of the downsizing process of public sector organisations, the government of India in consultation with sponsor banks (mostly public sector banks) and the National Bank for Agriculture and Rural Development (NABARD) took a decision to amalgamate the 196 regional rural banks (RRBs). The process of amalgamation commenced in September 2005 and it is expected to be completed by March 2008. As a result of the amalgamation, the number of RRBs has been reduced from 196 as on 31 March 2005 to 92 as on 31 December 2007.

The proposals for amalgamating the remaining RRBs are still in the pipeline. The decision to amalgamate RRBs is a death blow to the credit-starved rural poor comprising scheduled castes, scheduled tribes, backward classes and other weaker sections. Most of these poor people are small farmers, marginal farmers, agricultural labourers, landless labourers, rural artisans, small business entrepreneurs, etc. The decision to amalgamate has been executed by the GOI by issuing a series of notifications in the *Gazette of India - Extraordinary* "in the public interest", "the development of the area served by the concerned RRBs" and "in the interests of RRBs themselves" (GOI: 2005).

The total number of Regional Rural Banks (RRBs) decreased from 92 to 82 at the end of March 2010. This reduction has resulted due to the amalgamation process of these banks which was introduced by RBI on 2005 (RBI: 2010). This total number is still the same till today.

Several changes have taken place in the focus and operation of the Regional Rural Banks in the wake of financial sector reforms in India and various measures have been taken by the Government to improve the commercial viability of RRBs since 1994-95. So it has been considered appropriate to study the performance after amalgamation which took place in the year 2006 (Ibrahim, Syed: 2010).

The central government had, in September 2009, constituted a committee (Chairman: Dr. K.C. Chakrabarty) to study the current level of CRAR of RRBs and to suggest a roadmap for enhancing the same to 9 per cent level by March 31, 2012. The committee submitted its report to the government on April 30, 2010. The committee has assessed that 40 RRBs (out of 82) will require capital infusion to the extent of ₹22 billion. The reports received from NABARD show that as on June 6, 2012, 16 RRBs have been recapitalised fully whereas in 11 RRBs, the recapitalisation process is underway. To complete the process, the recapitalisation scheme has been extended up to 2013-14 (Report of CBD on the working of RBI: 2012).

A study of the efficiency and its performance of the RRB are particularly important in the Indian context. Since, MRB is the only rural bank in the state of Mizoram. Even though

MRB is not included among the amalgamated RRBs by Government of India, by using the period of the amalgamation i.e., the year of 2005 the present study analyze the performance of Mizoram Rural Bank (MRB) during pre and post-amalgamation periods. The indicators selected during the last two decades from 2000-05 and 2005-10 of the Mizoram Rural Bank and its branches, deposits mobilization, loans outstanding and credit-deposit ratios.

1.3 Literature Review

The literature available in the working and performance MRB in Mizoram is very limited. The literature obtained by investigators in the form of research studies, articles of researchers and related books published reviewed in this part.

Abdul Hadi & Kanak Kanti Bagchi (2006), in their study on performance of regional rural banks in West Bengal finds that RRBs in the state have been participating actively in various programmes designed for providing credit assistance to priority sectors, and concluded that most of the RRBs in the state have performed well and improved their performance.

Arvinder Singh chawla (1986) has studies banking developments in Patiala district with special reference to branch expansion, deposit mobilization, credit deployment, priority sector lending and poverty alleviation programmes. It concluded that, although imbalance in banking presence continues to exist, a clear trend in reduction of inter-block disparities is observed.

Ibrahim, Syed, M (2010), in his study on the performance Evaluation of Regional rural banks in India and concluded that regional rural banks in India showed a remarkable performance in the post-merger period.

Vanlalkulhpuia and Nixon (2011), in their study on the topic of Role of Mizoram Rural Bank in Providing Financial Services highlights that performance of MRB on loan and advances disbursed to priority sector provide a good picture over study period and concluded that MRB still need to improve their performance in the state.

As none of these study conducted on the performance of MRB, during the pre and post- amalgamation period. There is need for carrying out the present study.

1.4 Methodology and Research Design

The present study is diagnostic and exploratory in nature and makes use of secondary data. Since the state of Mizoram having only one RRB i.e., MRB, then there is no amalgamation took place in the state but the transformation year is used to analyse the performance. The relevant secondary data have been collected mainly through the data bases of various reports published by Mizoram Rural Banks and various journals published. The study is confined only to the specific areas like number of branches, district coverage, deposits mobilized, credits and investments made by the Mizoram Rural Bank (MRB) for the ten years period starting from 2000-01 to the year 2009-10. The present study using only the period of amalgamation which is taken by government of India in the year 2005 like, pre (i.e.,2000-2005)

and post-amalgamation period (i.e., 2005-10). In order to analyze the data and draw conclusions in this study, various statistical tools like, t-test and F-test have been accomplished through EXCEL and SPSS Software.

1.5 Hypothesis

H₁: There is no significant difference in Loan and advances during the study period.

H₂: There is no significant difference in agricultural Sector lending in the pre and post amalgamation period.

H₃: There is no significant difference in Industrial Sector lending in the pre and post amalgamation period.

H₄: There is no significant difference in Services Sector lending in the pre and post amalgamation period.

1.6 Findings of the study

a. Performance of Mizoram Rural Bank (MRB)

Mizoram Rural Bank was set up on 27th September 1983 under the Regional Rural Bank Act 1975. It is perhaps the only RRB in the country to be spread out in all the districts and blocks of the State. It covers 8 districts and 25 RD blocks including 1 urban and 11 semi urban centers. The entire State populations are 8.89 lakhs as per 2001 census and the area is 21000. sq.km. About 66% of the state is covered by forests and the mainstay of occupation is agriculture. Mizoram became a State as late as in 1986 yet its literacy percentage is 85.50%, the second highest in the country.

MRB is the second largest bank in the State next to the State Bank of India which is also the sponsoring bank and more than 50% of the aggregate figures of all banks operating in the state. It has a market share of 8.55% in deposits and 17.64% in advances. (MRB Annual reports 2000-10). The paid up share capital of Rs 602.76 lakhs have been contributed by all the share holders, Government of India, Government of Mizoram and State Bank of India (Sponsor Bank) in the ratio of 50:35:15. In addition to this, an additional equity share capital of 301.06 lakhs towards equity support for the purpose of cleansing of the balance sheet has received from the share holders. The paid up share capital and equity support received from the share holders are as given below:

Table: 1 Contribution made by Sponsors (` In Lakhs Rs.)

Sl/no	Sponsors	% of Share	Paid up capital	Equity Support	Total
1	Govt. of India	50%	301.38	150.53	451.91
2	State Bank of India	35%	210.97	105.37	316.34
3	Govt. of Mizoram	15%	90.41	45.16	135.57
TOTAL		100%	602.76	301.06	903.82

Source: Mizoram Rural Bank 18th Annual Report 2000-2010

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Since its inception, the Bank is striving hard to achieve its set objectives by serving throughout the entire state of Mizoram covering all the 8 (eight) districts and 25 Rural Development Blocks. The Bank has now extended its coverage to 11 urban and 11 semi-urban centres. The Bank has a net-work of 61 branches covering all the eight districts of the state of Mizoram. The district-wise break-up of branch network as on 31.03.2010 are as under:

Table: 2 District - Wise No. of Branches in Mizoram as on 31.03.2010

Sl.No	No of Districts	Branches	Urban	Semi urban	Rural
1	Aizawl	22	11		11
2	Lunglei	8		3	5
3	Champhai	8		1	7
4	Kolasib	6		2	4
5	Mamit	6		1	5
6	Serchhip	6		2	4
7	Saiha	2		1	1
8	Lawngtlai	3		1	2
Total		61	11	11	39

Source: MRB Annual Reports 2000-2010

Mizoram Statistical Hand book Published by GoM 2010

The number of rural branches is much higher than the other commercial banks in the State that is why MRB plays an important role in the state. From the above table, it is evident that there is still need for setting up additional branches in the districts of *Saiha* and *Lawngtlai*. The following table no.3 displayed that the growth rate of branch expansion of MRB and then the simple linear regression function is used to find out the growth rate of branches from the established year (1983) to 2010 under follows:

Table-3 Branch Expansion by Mizoram Rural Bank (1983-2010)

Year	Number of branches opened during a year	Total Number of Branches
1983-86	31	31
1986-90	7	38
1990-94	4	42
1994-98	7	49
1998-02	0	49
2002-06	0	49
2006-10	12	61

Source: Annual Report of the MRB

The number of branches opened was nil in the years 1998-02 and 2002-06. Since 2006-10 the number of branches opened has shown a declining trend. But, MRB covered all the districts of the state and opened 39 branches in rural areas of the state. Branch expansion is generally topography, infrastructural facilities available, level of socio-economic development and attitude of people in the area concerned. The attitude of people is governed by the level of education (Kalkundrikar, A.B: 1990). The literacy ratio is high in the state of Mizoram with compared to other states of India-4.

Tale-4 Trends in the growth of Branches of MRB from 1983-2010

Year (X)	Variable (Y)	X=x-(1994-98) (Central Value)	Yx Product	X ²	Ŷ
1983-86	31	-3	-93	9	32.82142
1986-90	38	-2	-76	4	37.07142
1990-94	42	-1	-42	1	41.32142
1994-98	49	0	0	0	45.57142
1998-02	49	1	49	1	49.72142
2002-06	49	2	98	4	53.97142
2006-19	61	3	183	9	58.22142
n=7	319		119	28	Annual growth rate 4.25%

Since linear regression is indicated by;

$$Y = a + bx,$$

The normal equations are:

$$\sum Y = na + b\sum x \quad \dots\dots\dots (i)$$

$$\sum XY = a\sum x + b\sum x^2 \quad \dots\dots\dots (ii)$$

Substituting the values obtained, we get

$$\sum Y = na + b\sum x$$

$$144 = 7a + b\sum x$$

Therefore,

$$a = 319/7$$

$$= 45.57142 \quad \dots\dots\dots (iii)$$

$$\sum XY = a\sum x + b\sum x^2$$

$$144 = 0a + b28$$

Therefore,

$$b = 119/28$$

$$= 4.25 \text{ (Annual average rate of growth of MRB branches in the state)}$$

b. Credit Deposit Ratio of Mizoram Rural Bank (MRB)

A ratio of aggregate outstanding advances and aggregate outstanding deposits multiplied by hundred is called Credit-Deposit (CD) ratio. This ratio indicates the extent of deployment and utilization of resources by bank, and issued for evaluating the performance of a bank. According to Hasmoni (2002) "This measure acts as an indirect means of assessing the monetary management by the bank." Regional Rural Banks are required to deploy credit for the financial assistance to the weaker sections residing in their jurisdiction and to decrease the rural urban disparities. As can be seen from above, Mizoram Rural Bank serves the rural populace o the state much more than the other financial institutions in the state. Table-4 gives

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the scenario of credit-deposit ratios of total business of MRB during the financial years 2000-2001 to 2009-2010. The data revealed that the changing trends of MRB during the last decade in terms of increase in public deposits and credit availed by the public. CD ratio was maximum in 2006-2007 (65.38 percent) as compared to 2002-2003 (32.76 percent) which was the least in the period in this the present study.

Table-5 Aggregate Total Deposits and Credit as on 31.03.2000 and 31.03.2011

No. of Years	Deposits	Credits	C.D Ratio
2000-01	505177	175579	35%
2001-02	683434	230091	33.67%
2002-03	860809	281969	32.76%
2003-04	1007068	337272	33.49%
2004-05	1245462	502624	40.36%
2005-06	1471026	802074	54.52%
2006-07	1660182	184427	65.38%
2007-08	1988504	1283307	64.54%
2008-09	2831902	1610642	56.87%
2009-10	3262356	1771272	54.29%

Source: Mizoram Rural Bank Annual Reports 2000-2010

The bank achieved aggregate deposits of Rs 47676.33 lakhs as on 31st March 2010 against the budgeted level of Rs 40779.00 lakhs projected for the year ending. (*Reports 2009-2010*) in this situation the bank registered a positive growth of Rs 15052.77 lakhs over last year's level of Rs. 32623.56 lakhs which is a growth of 46%. The test result of the performance between pre and post amalgamation period of credit deposit ratio of Mizoram Rural Bank are given in the following table no 6.

Table-6 t-Test: Paired Two Sample for Means

	Pre- amalgamation	Post-amalgamation
Mean	0.35056	0.5912
Variance	0.000944513	0.002952885
Observations	5	5
Pearson Correlation	-0.643066394	
Hypothesized Mean Difference	0	
Df	4	
t Stat	-6.920606298	
P(T<=t) one-tail	0.0011439	
t Critical one-tail	2.131846782	
P(T<=t) two-tail	0.002287801	
t Critical two-tail	2.776445105	

Table-6 provides the result that there is strong evidence that (t is < 2.776445105), H_1 is accepted. Hence, there is no difference in performance of credit deposit between the pre and post amalgamation by the MRB.

c. Loans and advances disbursed to priority sectors

Introducing priority sector lending is the most successful and advantageous decision of the Government of India. India is an agricultural country with predominantly rural economy. Majority of industries are agro based. To make the agriculture sector more profitable and to increase the scope of rural industries, the government included the concept of priority sector and included those sectors by commercial banks (Ibrahim, Syed: 2012).

Table-7 Total Loans and Advances distribution to priority sectors as on 31.03.2000 and as on 31.03.2010` in Thousands Rs.

No. of Yrs	Agriculture	Industries	Services
2000-01	7174	4537	35722
2001-02	9364	5419	70659
2002-03	7617	4081	53049
2003-04	12249	8128	153314
2004-05	86989	20683	191283
2005-06	135680	39856	25526
2006-07	120830	96961	107545
2007-08	186178	163862	59190
2008-09	231822	42459	327990
2009-10	236158	60144	458580
Total	1034061	446130	1482858

Source: Mizoram Rural Bank Annual Reports (2000-2010)

To encourage banks to participate in agricultural and rural development, the government made priority sector loans as an important target for banks. Priority sector is a sector which is given priority in offering financial services by the banks. Reserve Bank of India prescribed guidelines and targets to all the banks operating in India with regard to priority sector services.

Table 7 shows that total loans and advances disbursed by MRB to different sectors like agriculture up to `1034061 thousands, industries up to `446130 thousands and services up to `1482858 thousands within last ten years (2000-2010). The increases of loans and advances from 2008-2009 in agricultural sector and Services are `4336 thousands and `130590 thousands. From this table we can assume that total loans and advances issued by the MRB gradually increases year by year. But agricultural sector is not giving much a priority than in service sector. This following is the analysis of MRB lending under different priority sectors:

i) Agricultural lending by MRB

Credit is a basic input for any development programme. This is particularly true for agricultural development, which has its goal to improve the standards of living of realties as well as to increase agricultural productivity. Unless sufficient credit is provided to the development programme for the weaker section of the society the goal of the development programmes cannot be achieved (Sivachithappa & Thimmaiya: 2010). Since the majority of the rural people are not able to meet their day to day requirements from their sources of income especially in agricultural sector. Regional rural banks are taking care of this sector by providing loan and advances. F-test two samples for variances was performed to determine whether the pre-amalgamation period performance significantly differs from the post-amalgamation period performance of MRB on agricultural sector:

Table-8 F-test two sample for variances, Performance of MRB on agriculture sector during the pre and post amalgamation period

	<i>pre- amalgamation</i>	<i>Post amalgamation</i>
Mean	24678.6	193747
Variance	1217281773	2874192399
Observations	5	4
df	4	3
F	0.423521325	
P(F<=f) one-tail	0.212490548	
F Critical one-tail	0.15171325	

As can be seen from Table-8, F-test two samples for variances clearly shows that the mean value during the pre amalgamation period is higher than the post amalgamation period. Then the F-value (0.423521325) is greater than F-critical (0.15171325) i.e., ($F > F-crit$). The year wise performance of MRB on loan and advances distributed to priority sectors like agriculture, statistical significantly different during the pre and post amalgamation period and then H_2 is Rejected.

ii) Lending to industrial sector by MRB

Industrialization is generally considered synonymous with economic progress and hence the developing countries give high priority to industrial development. In North Eastern state majority of industrial units are located in Assam. Mizoram and other states of the region are at nascent stage of industrialization (Kabra: 2008). Since, the state of Mizoram did not have more industries; Mizoram rural bank plays an important role in financing the industrial sector for their improvement for the future. F-test two samples for variances were performed to determine whether the pre-amalgamation period performance significantly differs from the post-amalgamation period performance of MRB on Industrial sector. The F-test result is under the following table:

Table-9 F-test two sample for variances, Performance of MRB on Industrial sector during the pre and post amalgamation period

	<i>Pre-amalgamation</i>	<i>Post-amalgamation</i>
Mean	9577.75	90856.5
Variance	57645938.25	2884214538
Observations	4	4
df	3	3
F	0.019986703	
P(F<=f) one-tail	0.004629128	
F Critical one-tail	0.107797789	

This *F-test* two sample for variances (Table-9), highlight that F-value (0.019986703) is greater than F-critical (0.107797789) i.e., ($F < F_{crit}$). The year wise performance of MRB on loan and advances distributed to priority sectors like industries, statistical significantly different during the pre and post amalgamation period and then H_3 is Accepted.

iii) Lending to service sector

As we have already highlighted in Table-7, loan and advances disbursed by Mizoram rural bank to service sector is much higher than the other sectors like agricultural sector and industrial sector. F-test two samples for variances was performed to determine whether the pre-amalgamation period performance significantly differs from the post-amalgamation period performance of MRB on services sector. As the hypotheses 4 was framed. The test result is follows under the table:

Table-10 F-test two sample for variances, Performance of MRB on Services sector during the pre and post amalgamation period

	<i>Pre-amalgamation</i>	<i>Post-amalgamation</i>
Mean	117076.25	238326.25
Variance	4357955370	35248277956
Observations	4	4
df	3	3
F	0.123635979	
P(F<=f) one-tail	0.059874962	
F Critical one-tail	0.107797789	

From Table-10, we can clearly assumed that F-value (0.123635979) is greater than F-critical (0.107797789) i.e., ($F > F_{crit}$). The year wise performance of MRB on Loan and Advances distributed to priority sectors like Services, statistical significantly different during the pre and post amalgamation period and then H_4 is rejected.

1.7 Conclusion and suggestions

In the present study, the performance of Mizoram Rural Bank, an attempt has been made to analyze the performance in terms of certain defined parameters like number of branches, district covered and mobilization of deposits, loans and investments made by these banks. The performance of MRB in the state shows a good picture and not makes any deference performance during the pre and post- amalgamation period. Even though number of RRBs in the state is only one i.e., MRB, the branch net work has been increased and covered all the districts in the state. Credit-deposit ratio has been increased over the years showing that a remarkable deployment of credit by this bank in rural areas.

However, it is the responsibility of the bank management and the sponsored bank to take the change for corrective steps to raise the credit-deposit ratio of the bank. The CD ratio of MRB needs to be increased. With a view to facilitate the seamless integration of MRB with the main payment system, there is a need to provide computerization support to them. MRB should extend its services in to un-banked areas and increase their credit-deposit ratio. The process of merger should not proceed beyond the level of sponsor bank in each state. The findings may be of considerable use to rural banking institutions and policy makers in the state.

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Mutual Funds and Market Turmoil – Role of Fund Managers

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Abstract

Mutual Funds family ensure retail investors' easy access to capital market, institutional investors parked funds in diversified schemes suitable to their investment objectives. The industry became anemic in view of global financial meltdown followed by low investors' confidence. Equity schemes are worst affected and lagged in attaining benchmark returns. Debt scheme witnessed fluctuation too as corporate giants using this route for their specific purposes. However, the fund managers being professionals have not added value to the unit holders. Jensen's alfa lies in the range of 0.03 – 0.61. This has warranted fund managers to evolve strategies for restructuring need based product with a differentiation hedging market risk and ensuring better return for investors.

Key words: *Mutual fund, performance, unit holders' value.*

1. Introduction:

Mutual Funds in the financial market have emerged as harbinger of opportunities to the investors adopting to diversified investment styles. There exists plethora of schemes in the MFs family to serve varied needs of investors of different strata. As on March 2013, MF family comprises 1178 number of schemes in the equity segment, Debt and balanced fund that is Hybrid besides sectoral funds like Banking, Pharma, FMCG. etc. MFs ensure small investors' access to the capital market at a comparatively low cost with legal protection, high level of transparency, liquidity and flexibility in investment. Since global meltdown the industry however turned to be anemic. Asset under management (AUM) gradually dissipated, schemes lagged to respective benchmarks in respect of returns and retail investors deserted equity schemes because of rampant market manipulation, poor performance and ingenious miss-selling, lethargic complaint redressal mechanism and so on. Under this backdrop, an endeavor has been made in the paragraphs hereafter to assess whether the fund houses are managing pool of funds on behalf of the investors for their benefit despite financial turmoil over the period. In this respect we have considered a study period fiscal 2008-12, a period of most financial market volatility, to reveal the suitability of fund houses in achieving the specific objective of the funds. Financial measures like Sharpe's Index, Treynor's ratio, Jensen's Alfa besides, statistical techniques were used to draw inferences.

2.1. Mutual Fund Industry in India - A Glimpse :

Mutual Fund industry has already traversed long way more than five decades since establishment of UTI in 1963. As on 31st March, 2013, 43 AMCs commanding with Average AUM (AAUM) of Rs.816,657 cr. operating in India under following three different categories :

- a) Bank sponsored MFs with AAUM of Rs. 150980 cr. comprising of (a) Joint Venture - Predominantly Indian (4 Nos.), Joint Venture - Predominantly Foreign (1 No.) and Others (2 Nos.).
- b) Institutions predominantly Indian consisting of only single fund house i.e. LIC Nomura Mutual Fund with AAUM Rs. 7185 cr. and
- c) Private Sector MFs covering 35 AMCs with AAUM Rs. 658,492 cr. comprising of Indian (17 Nos.) with AAUM Rs. 22,649 cr., Foreign (8 Nos.) with AAUM 1 Rs.57247 cr., Joint Venture-Predominantly Indian (6 Nos.) with AAUM of Rs. 343943 cr. and Joint Venture-Predominantly Foreign (4) with AAUM of Rs. 27653 cr.

The McKinsey report, 2012, (Report, 2012), exhibited stagnation in the growth of AUM (4% CAGR) during 2010-12, declined from Rs. 614546 cr in April 2010 to Rs.587658.7 cr in March 2012. The reasons of such retardation in its pace of growth may be attributed to shift of FIIs preference towards the debt instruments and redemption pressure in view of global financial crisis in their home country. Besides, the retail investors offloaded their stakes in equity scheme from Rs. 33298.4cr to Rs. 123548.5cr during end March 2010-12. Significantly, these disinvestment proceeds routed into balanced funds of MFs, Gold ETF and other ETF which had registered considerable escalation in the growth during the period under consideration. This indicates investors' confidence regarding equity schemes of MFs were tanked over the period in the context of global financial turmoil. On the contrary, liquid/money market MFs, being considered as better option for corporate investors than that of short term equity investment for cash management purposes, grew at CAGR 11.60 pc despite market doldrums. The other financial investors particularly banks have also booked their profit during 2010-12 as financial crisis still looms large resulting in market volatility. The HNI investors opted debt segment too which grew at 68.83pc in 2012 over 2010 from Rs. 62530.71 cr to Rs. 105572.4 cr in absolute term.

2.2. Growth of asset class of MF Family :

Fund managers' approach to asset allocation encompasses equities, fixed income instruments and a host of alternative investment class like real estate, ETFs, commodities based on objectives of specific funds. They enjoy a degree of flexibility in allocation of mobilized funds into different asset class of the portfolio for maximizing return. On the contrary, volume of flows of funds exclusively depends on investors' preferences towards the asset class of the funds; debt, equity and others. In view of global financial crisis and corresponding declining in commodity prices and low investors' confidence in equity market, there was reallocation of funds in favor of debt funds, gold ETF and money market mutual funds (MMMFs), Table -1. It is observed that equity segment witnessed outflow pressure (negative coefficient of variation) in the domestic market. However, investors irrespective of their nature turned towards Gilt edged securities for stable return. Skewness and Kurtosis

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also indicate the similar pattern of outflow of funds. Banks, Financial Institutions (FIs), and corporate sectors have contributed more than 95 percent of such assets of MFs. The corporate sectors generally use these avenues for short term cash management purposes which are considered as beneficial in comparison to holding equities for short term. Unlike equity funds the NAV of debts are subject to fluctuation to the interest rate. Investors prefer long term funds like; Fixed Maturity plan (FMP), long term bondsetc. in case of rising in interest rates.

Table 1: Classification of asset class (Figures in ` Cr.)

YEAR	2007	2008	2009	2010	2011	2012	CAGR	COV	SKEW NESS	KURT OSIS
Income	100894	764095	146712	-83470	-12165	56745	-43.757	188.726	2.058	4.609
Equity	-175781	80310	-81	-16179	6848	-	-91.9490	-424.699	-1.384	3.369
Balanced	4812	6588	-879	750	1319	14152	-107.439	146.865	0.831	-1.058
Liquid/Money market	6260	4450891	-302	6218	19643	36259	479.217	240.527	2.449	5.998
Gilt	-201	5877	-2315	343	-1140	3038	-1611.442	322.58	0.936	0.116
ELSS-Equity	5367	1357	1444	341	813	-1472	-127.4268	172.288	1.1614	2.753
Gold ETFs	415	194	482	1727	4046	1826	340	100.260	1.334	1.629
Other ETFs	-417	7092	-847	489	264	-160	-61.630	279.239	2.309	5.478
FOF										
Investing Overseas	0	453	-825	-941	48	-352	-177.704	-200.63	-0.087	-1.446
Total	-58651	5316857	143389	-90722	19676	81374	-238.742	239.977	2.440	5.966

Source: self-compiled

Equity funds, irrespective of their lineage and size, have witnessed outflows in the 12 months period between July31, 2011and June30, 2012. Reliance growth fund, SBI magnum tax gain, Fidelity equity (now sold to L&T), UTI master share, Sundaram select mid cap , Franklin flexicap , Birla Sunlife tax relief, HDFC growth, IDFC sterling equity, and HDFC Long term advantage funds are among the large funds that have lost 5-15pc of their assets over past one year. AMFI data shows that a little over Rs 3700 cr drop in HNI assets and as well as closure of 39000 folios. On the other hand 65percent of equity oriented MFs' assets in India are held by the retail investors (Bose, 2012). This indicates retail investors' portfolios remain less volatile irrespective of market volatility and became worst sufferers particularly when financial institutions, HNIs, and FIIs were resorted to offloading their investment in equity oriented mutual funds.

3. Determinants of growth of AUM :

The mutual fund industry flourishes with positive sentiments prevailing in the market and high investors' confidence. However, growth of GDP remained immune to expansionary policy measures adopted in context of bringing down key interest rate to combat financial crisis. The lowering interest rate strategy for reviving capital market liquidity however paved the way to higher valuations of debt funds. The Indian stock markets experienced a sharp downturn in the line with global volatility followed by weak domestic prospects till March 2009.The decline of AUM was further accentuated by ban on entry loads on all mutual funds

by SEBI effective from August 2009. It has declined about 4pc till March 2011 and industry faced netoutflows pressure. During FY 2011-12, surge in capital market was, however, due to, *inter-alia*¹, large valuation effect leading to increasing in equity prices. The shift in the investors' sentiment was reflected in Indian benchmark index which surged past the psychological 19000 marks-rally from the sub-10,000 levels at end-March 2009, and 17,500 at end-March 2010. Most of the equity funds have managed to outperform benchmark indices only after the market rally when indices gained 8pc between September 2011 and September 2012. The value research data as on September 30 , 2012 shows that return on Equity -large cap on average beat BSE Sensex return while, 55 out of 83 large cap equity funds outperformed their benchmark over a one year period. Generally, quantum flow of funds to MF family largely depends on FIIs inflows followed by domestic household and corporate savings. In this respect, impact of these variables on AUM in the same group at different time period is assessed by applying Paired Samples T test procedure. The results in the table-2, show low significance of "r (correlation coefficient)" (typically less than .05) value for 't' test (except in pair 4) indicating significant difference between the two variables. This is further confirmed by the difference between confidence interval is not zero. Thus, AUM of the industry as a whole is impacted by FIIs inflows, GDS (Gross Domestic Savings), Household savings in financial assets and corporate sector savings.

It may be worth mentioning that, FIIs are taking fancy investment decision for equity oriented MFs. Their investments in equity funds stood at Rs 1212 cr over 87 folios as on March31, 2012 against Rs 1027cr as on same date of the previous year. The reasons of such increase, despite market turmoil, may be attributed to the FIIs have crossed their investment limit in specific sector and want to derive benefits from second line stocks. Besides, government has allowed to foreign retail investors to invest in domestic equity mutual funds.

Table 2: Paired Samples Test

	Mean	Std. Deviation	Std. Error Mean	95% Confidence interval of the Difference		t Value	Sig. (2-tailed)
				Paired differences			
				Lower	Upper		
Pair 1 Asset under Management -Inflow of files	2344.700	1872.381	468.095	1346.978	3342.422	5.009	.000
Pair 2 Asset under Management - Gross Domestic Savings (Base 2000/05)	8436.002	5222.587	1348.466	-11328.175	-5543.829	-6.256	.000
Pair 3 Asset under Management - Household gross Domestic savings	1382.603	518.679	133.922	-1669.838	-1095.368	-10.324	.000

¹ In the current fiscal foreign investors started coming back to India without any major policy initiative and stayed invested (net buyers) in seven out of 10 months pumping Rs 93696.20crore up to October 2012. The reason may be attributed to increase in external liquidity in the context of liquidity injection by ECB and US Federal Reserve. Besides, Government of India since September 2012 announced positive steps in connection with; hike in subsidized diesel price, allowing up to 49percent FDI in multi brand retail. 49 pc in aviation by foreign carriers, 74pc various streams of broadcast services, 49pc insurance sector, reducing withholding tax on overseas borrowings to 5pc from 20pc, clearing companies bill 2011.

Pair 4 Asset under Management - Private sector gross Domestic savings	76.181	340.118	87.818	-112.170	264.532	.867	.400
Pair 5 Asset under Management - Public sector gross Domestic savings	1908.408	1619.600	418.179	1011.503	2805.312	4.564	.000

Source: Self-compiled

4. Role of Fund Managers :

The operational efficiency of the AMC's is reflected funds' performance in terms of return and risk in the respective benchmark. Of 44 AMC's that reported their results for March 2012, 16 earned profits in the past one year and 28 of them are yet to make any profit. To see the role the fund managers we have considered 21 number of equity oriented funds with a rider of at least three years duration of operation since their inception and measured their performance in terms of return² and compared with excess of average market return³ by using descriptive statistics. The reason behind of such selection is that these schemes have only focused on long term capital appreciation by investing in the equities, since fund managers have distinguished role in managing these portfolio than that in Balanced and debt funds. The results are tabulated in Table-3. It is revealed that, 14 out of 21 fund houses considered for the analysis could beat the benchmarks returns i.e., market return over risk free return, treasury bills rate. JM Equity on average found to be worst performer during its entire period of operation. The HSBC Equity topped the list in terms of return during its entire period of operation followed by ING, Baroda, and Fidelity and so on. The negative magnitude of Skewness along with comparatively lower value of Kurtosis and higher value of Standard deviation indicate respective volatility in returns of the funds.

Table 3: Fund performance as on March 31, 2012: Descriptive statistics

Name of Funds	Year of operation considered	Average return in%	Skewness	Kurtosis	Expense ratio % of AUM as on 30/10/2012
HSBC Equity (large cap)	9	24.866	-0.538	1.181	2.20
ING Large cap equity (large cap)	8	21.8	-1.146	1.217	2.65
HDFC index sensex (large cap)	9	18.512	-0.482	0.064	2.20
Baroda pioneer growth (large cap)	8	18.044	-0.849	0.447	2.50
Fidelity Equity (large cap & mid cap)	8	17.836	-1.179	1.106	1.85
Deutsch Alfa Equity reg (large cap)	8	17.828	-0.804	0.261	2.50
Quantum Long term Eq (large & mid cap)	5	13.095	-0.462	0.493	1.25
Mirae Asset India oppor (large & mid cap)	4	12.971	0.724	0.273	2.35
BNP Paribas equity (large cap)	8	12.961	-1.377	2.241	2.44
SBI magnum equity (large cap)	10	11.541	-0.708	0.004	2.03
Kotak Emrg equity (mid & small)	5	11.36	-1.531	2.179	2.49

$${}^2 R_t = \frac{NAV_t - NAV_{t-1}}{NAV_{t-1}} * 100, R_t - \text{return in } t^{\text{th}} \text{ period, } t-1 = \text{previous period, NAV - Net asset value}$$

³ Excess Return = Market return less risk free return = Return from Sensex less average risk free rate i.e., average treasury bills rate for the period.

LIC Nomura MF growth (large cap)	14	10.949	-0.656	0.16	\1.76
DSPBR Equity (Multi cap)	8	9.497	-0.531	-0.398	1.87
Sundaram Equity Multi(mid & small)	5	9.079	-0.729	-0.103	2.36
Benchmarks return (Sensex)	14	7.955	0.1156	-1.094	
ICICIPru focused bluechip (large cap)	4	6.577	-1.027	0.828	1.83
Edelweiss Equity enhancer (large cap)	3	5.982	-1.959	3.866	2.31
UTI Equity (large & mid)	10	5.466	-0.456	-0.537	1.45
Goldman Sachs Nifty ETS (large cap)	10	4.866	-0.365	0.657	0.50
CanaraRobeco Nifty Index(large cap)	6	4.388	-0.354	0.468	1.50
Axis Equity (Large cap)	3	2.676	1.677	-	2.21
JM Equity (large cap)	8	-28.276	-2.334	5.555	2.50

Source: self compiled

The schemes under consideration clearly exhibited that except LIC Nomura MF growth (4.039), SBI Magnum Equity (4.062) and Sundaram equity multiplier (4.439) most of the schemes had not performed well in connection with earning excess return over the market return. The reason of such non performance may be attributed to market volatility during financial year 2011-12 and low investors' confidence. This raises very pertinent question regarding fund managers' effectiveness in portfolio management for attaining best return.

Table 4: Performance of Fund Houses -Equity MFs as on March31, 2012

TYPE	NAME OF SCHEME	STNDRD	BETA	JENSEN	SHARPE	TREYNOR
		DEVIATION		ALFA		
LARGE CAP	DSPBRK TOP 100	1.430829	-12.8877	0.389567945	-0.00384	0.000426
	ICICI PRU TOP 200	1.610663	-14.8224	0.433537855	-0.01028	0.001117
	KOTAK 50	1.502258	-12.9897	0.377935189	-0.01333	0.001542
	SBI MAGNUM	1.567711	-15.4141	0.451882817	-1.12254	0.000976
	SUNDARAM					
	SELECT FOCUS	1.605884	-13.729	0.387584731	-0.01956	0.002288
	TATA INDEX NIFTY					
	PLAN A	1.731625	-14.8803	0.404939338	-0.0106	0.001234
	LIC NAMURA TOP					
	100	1.487716	-12.0506	0.309810046	-0.02208	0.002726
	JM EUIY	1.821328	-13.964	0.374129502	-0.0283	0.003691
	BARODA PIONEER					
GROWTH	1.651752	-15.5953	0.457178008	-0.00902	0.000956	
UTI MASTERSHARE	1.439452	-13.6503	0.400712676	-0.01114	0.001175	

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LARGE & MID CAP	HDFC TOP 200	1.576657	-15.1798	0.467159153	0.004374	-0.00045	
	ICICI PRU DYNAMIC	1.331387	-13.1057	0.399169358	-0.00157	0.00016	
	UTI DIVIDEND YIELD	3.458707	-7.43176	0.281785027	0.012123	-0.00564	
	CANARA ROBECO EQ. DIVERSIFIED	1.688567	-16.0832	0.489888971	0.002327	-0.00024	
	DSPBRK OPPORTUNITIES	1.478558	-15.6056	0.454880957	-0.01183	0.001121	
	LIC NOMURA MF INDIA VISION	1.636935	-11.5294	0.289121891	-0.04111	0.005837	
	QUANTUM LONG TERM EQUITY	1.362493	-16.1177	0.4978187	0.007983	-0.00067	
	SUNDARAM REGULAR GROWTH	23.49816	19.14992	0.170826028	0.029242	0.035882	
	TATA PURE EQUITY	1.455571	-13.7256	0.407056372	-0.00813	0.000863	
	SBI MAGNUM CONTRA	1.519432	-14.9795	0.432492968	-0.01453	0.001473	
	MULTI CAP	DSPBRK EQ	0.703133	0.142717	0.035082024	0.006891	0.033949
		SBI MAGNUM MULTIPLIER	1.408499	-15.3783	0.446001735	-0.01413	0.001294
KOTAK OPPORTUNITIES		1.619364	-14.9536	0.431679441	-0.01368	0.001481	
TATA EQ PE		1.43424	-16.8671	0.495029627	-0.00923	0.000785	
HDFC PREMIER MULTICAP		1.473398	-17.3237	0.507812872	-0.00912	0.000776	
MID & SMALL CAP	HDFC MID CAP OPPORTUNITIES	1.291987	-15.0543	0.464580222	0.006105	-0.00052	
	SUNDARAM SELECT MIDCAP	20.26937	-3.29842	0.780593888	0.032478	-0.19959	
	ICICI PRU DISCOVERY	1.390542	-18.4397	0.565550989	0.009028	-0.00068	
	DSPBRK S&M CAP	1.388806	-18.1954	0.544063857	-0.00143	0.000109	
	SBI MAGNUM GLOBAL	1.470147	-18.8168	0.545945048	-0.01209	0.000945	

CANAR ROBECO EMERGING EQ	1.730462	-21.022	0.617527396	-0.00516	0.000425
KOTAK EMERGING EQUITY	1.466529	-14.4738	0.404847511	-0.02409	0.002441
TATA DIVIDEND YIELD	1.352098	-15.7193	0.472925529	-0.00198	0.000171
UTI MASTER VALUE	1.436002	-18.9259	0.557058474	-0.0068	0.000516

Source: self-compiled

To examine the efficiency of fund managers in attaining specific objectives of funds particularly during the market turmoil, we have used tools like Standard Deviation, Sharpe's Index, Treynor's ratio and Jensen's Alfa. Standard deviation measures total risk of the scrip whereas beta indicates the systematic risk of the fund. The analysis of risk; standard deviation and beta indicated that mutual funds in the large cap category fall comparatively highest risk zone of 1.43-1.82 followed by large & mid cap (1.33-1.68) and Medium and Small cap (1.29-1.73). The multi cap mutual funds exhibited the lowest risks during the period under consideration. The reason of such lowest risk may be attributed to diversification approach of the funds in different segments based on their potentiality. Other sector specific funds didn't fare well in the context of financial crisis. This fact has also been revealed by the results of beta analysis. It depicted that multi cap segment is comparatively less systematic risk prone than that of the fund belonging to specific segments.

To compare the premium per unit of total risk (SD) and systematic risks (β), we applied Sharpe and Treynor ratio respectively. Sharpe ratio representing excess fund return over the market return for a unit of total risk (SD) i.e. associated volatility. The Sharpe ratio for mutual funds is typically between 0.5 and 3. A rule of a thumb is that if the annualized Sharpe Ratio is over 1.0, the fund had a 'pretty good' year (Timotej Jagric ,2007). Treynor's model is used as equity growth scheme is expected to be a well-diversified portfolio devoid of unsystematic risk. It was seen that during 2008-12, the performance of select funds considered in the study was found to be poor as revealed by the risk adjusted measure of Treynor. The similar results also found in the analysis of Sharpe's index. Thus, risk adjusted return of the funds remained volatile along with market volatility during the period under consideration.

This analysis perhaps is sufficient enough to infer conclusion against the prevailing market belief that the fund managers are able to assess properly the risks and potential returns associated with alternative investment opportunities and able to meet their investment objectives fairly well (Donald E Fischer, 2011). However, the equity segment of fund houses was deserted by the investors due to global financial crisis which led to deceleration in the growth of AUM over the period of the study. Moreover, the measures like ban on load factors, imposition of restriction on minimum subscription of NFOs, concentration of fund houses in Tier I and Tier II cities only and the like, aggravated woes of equity oriented mutual funds.

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Under this situation, to test the managers' efficiency in increasing in unit holders' value, Jensen's Alfa is applied. The **Alfa value** which measures quality of management performance; positive *Alfa* represents superior extra return because of management talent or vice versa

The econometric analysis in Table - 4 showed interesting result that none of the fund houses in the specific segment attained covetable results in the context of creating value for the unit holders. It is found that Jensen Alfa is lowest in DSP Blackrock Equity Fund (0.0350) and highest in Canara Robeco emerging equity in the mid and small cap. Thus, irrespective of segment, Jensen Alfa found to be less than unity (0.03 to 0.61) indicating the fact that fund managers have not done much for the unit holders during the period under study 2008-2012. It can be inferred that the performance of fund houses is susceptible to the macro fundamentals and fund managers have little scope for enhancing value of unit holders.

It may be mentioned that domestic equity funds which were invested overseas have not performed well (annualized average return 9.3pc compared to Sensex return 7.4pc). Value Research statistics revealed that 19 out of 32 of such funds could earn more than BSE sensex return (4.5%) for a year duration ending on October 30, 2012, while 6 funds witnessed negative return. The reasons may be attributed to declining of global equity markets, softening commodity prices in the context of tightening of fiscal policy across the countries, weakening of emerging market and financial crisis developed in the operational area fund houses' particularly in the countries like Australia, Brazil, and Indonesia during the fiscal 2012.

5. Conclusion:

In fine, the fund houses regarding poor performance may defend and assign the reasons to market sluggishness, financial crisis, low investors' confidence, scrapping of entry load and so on. The fact in this respect remains that they failed to sail through troubled water. Being manufacturer of products onus lies on the fund houses to perform and ensure better returns for the investors. The root cause of this moribund industry would remain unresolved by the claims for reviving entry load and increasing in expense ratio. Because, there are ample evidences that financial institutions; Lehman Brothers, Fannie Mac, World .com, Enron and so on with high incentive structure run into trouble.

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Business Process Outsourcing: A Strategic Choice for Competitive Advantage

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Abstract

The paper explores the strategic dimensions of Business Process Outsourcing. Outsourcing has brought about a shift in the forces of industry competition. We explain why company should restructure their structure and strategy. Today's state of the art and robust technology, especially information technology, has enabled BPO to be a strong link for organization's value chain. The paper subscribes that BPO is an evolution. After analyzing the emerging forces of competition, we present a competitive edge framework for gaining the competitive edge. The outsourcing advantage goes beyond cost savings. The competitive edge framework provides a context for competitive edge.

Key Words: *Evolution, Structure, Strategy, Process and Competitive edge*

Introduction

In today's business world one thing is constant – change and transformation. One of the reasons for the phenomenon is the dynamic environment. The globalization and breakthrough innovation in technology offer new opportunities. Internet is surfacing as the information system of the globe or the global information system. Time was when firm's processes were confined onshore. This day firms consider comparative advantage of the nations. The business processes not necessarily remain on-shore. The milieu has stepped up globalization and Business Process Outsourcing (BPO).

This day BPO's impact is not confined to the economic environment, but the social and political environment. There has been a rise of knowledge workers, as current jobs are demanding more cerebral than physical skills. The trend validates outsourcing. BPO has brought about a shift in the balance of the forces driving industry competition. Firms need analysis of the forces driving industry competition. Structure and strategy of an organization is influenced by such forces. So this day organizations need requestioning its structure and strategy.

BPO and Structure and Strategy Perspectives

Innovation entails change – continuous or breakthrough. Van (1986) subscribes that innovation is a new idea applied to initiating or improving a product, process or service. Outsourcing affects the processes of business as it reorganizes the processes. Systematic innovation embody purposeful and organized search for changes, and such changes might offer for economic or social innovation (Drucker, 1985). According to Hagen (1962) 'creative

innovation' or 'change' is the fundamental feature of economic growth. Outsourcing breaks the status quo by bringing in a change in the way the firm is organized. According to Day (1984), and Howell and Higgins (1990) autonomy facilitates employees to introduce and implement innovations in organizations. Dynamism and flexibility support innovation. An innovative organization needs flexibility and an open to change context. The hallmark of outsourcing is inherent flexibility and open to change context. Outsourcing organizes the business processes in a new way. The firm needs reorganization of its processes and rethinks what processes need to be retained and what to be outsourced. The reorganization and rethinking process nurtures creative and out of the box thinking.

According to Damanpour (1991) structural variables have been the most studied potential source of innovation. Peter F Drucker points out that organization theorists like Chris Argyis, Warren Bennis, Douglas McGregor and himself have been predicting and advocating a more free-form and humanistic organization. The structure of organization should be free form (Drucker, 1973). Breakthrough innovation taking place, especially in the technology environment, has made today's business environment dynamic and free-form. When the environment of the organization becomes dynamic, the structure of the organization becomes more free form (Mintzberg, 1979). So today's organizational structure would be more organic structure, than static. Organic structure encourages innovation (Robbins, 1996). So organizations can be more flexible through outsourcing and furthermore, flexible structure supports innovation.

The organizational culture that supports risktaking is conducive to innovation. Change in strategy brings about change in the structure (Chnadler, 1962). Researcher like Keen (2002) finds that historically business process innovation has driven innovation. Outsourcing is a strategic choice that entails restructuring of the organization. It needs reorganizing, rearranging and realigning of processes.

Organizations will be in great risk if they adopt reactive approach. Today's business demands proactive approach. According to Drucker (1988) innovation begins with the abandonment of the old and obsolete and innovative organizations spend neither time nor resources on defending yesterday. As per Hamel and Prahlad (1989) the essence of strategy lies in fast creation of competitive advantage for the future. Today's organizations need exploring the strategic choices of outsourcing and create competitive advantage for the future. Successful companies build portfolio of competitive advantages and face less risk in competitive encounters (Keegan, 2002). Companies need to see beyond its competitive advantage and explore competitive advantages of other companies. So organization needs to network with other organizations. Through networking, the firm can explore competencies of other organizations. Networking and competencies will reduce business risk.

According to D'Aveni (1994) company's ability to manage organizational dynamics hinges on its inherent flexibility -- structural and strategic. Outsourcing has made the environment more dynamic. Organizations need relentless self-questioning and reinvention to reveal the invisible box inside which the company operates. The organization can ask itself whether

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operating at its current level – doing what is predictable – can respond to competition. So organization needs requisitioning and rethinking the fitness of its structure and strategy.

The New Way of Organization

According to Aldrich (1999) the research on organization should not be confined to structure and stability. It should include emergence and change. He subscribes that by ignoring the origins, researchers have sidelined the question of why things persists, whereas question of evolutionary approach takes care of both the origin and persistence issue. Thus an analysis of the evolution of BPO will highlight the issues of emergence and change. For the last many a decades there have been organizational design challenges:

Organic Organization: Burns and Stalker (1961) propounded the concept of organic organization. An organic organization has inherent flexibility. They highlighted the need for flexibility to cope with the challenges of the dynamic internal and external environment. They emphasize on 'networks'.

Adhocracy: There has been emergence of new ways of organization, more on the ad-hocratic line (Toffler, 1970). Toffler (1980) points out that big organization are increasingly interlinked by temporary units. He termed this phenomenon as ad-hocracy. According to Mintzberg (1979) though Toffler used the term ad-hocracy in his book *The Future Shock*, it can be found in print as far back as 1964. Mintzberg (1979) cites that adhocracy is an organic structure and is dominated by expert's pull to collaborate Adhocracy is an innovative organization.

Shamrock Organization: Handy (1989) points out that the reason behind the changes in the way business work is the coming in of what he labels "the Shamrock Organization." Shamrock is a form of organization based around a core of essential executives and workers supported by outside contractors and part-time help. So, a shamrock organization need not have many full time employees, they outsource peripheral services.

Business process and flexibility: According to Kanter (1989) companies would identify and focus on their core capabilities. Strategic alliances will tend to be adopted for expansion strategy and peripheral activities be taken over by specialist service providers. She predicted the triumph of process over structure. Kanter subscribes that business needs be flexible. According to Hammer and Champy (1993) organization should put emphasis on the management of core business processes. They observe that many companies are reengineering their business to manage core processes. According to Peters (1992) the new organization would become highly flexible, enabling the organization taking on dynamic structure.

Value Chain Framework: Porter (1985) advocates the use of a values chain for the study of company's internal processes to determine how and where value is added. The value chain provides a framework to disintegrate a firm into discrete activities. The framework is used to analyze the activities of the firm. Linkages can take place with the value chains of other firms.

Core Competency: Prahalad and Hamel (1990) advocate the core competency concept – identify what your core competencies are, focus only on them and get out of everything else.

The organizational characteristics of BPO solve the design challenges:

- Organizational structure should be dynamic and flexible;
- Emergence of organization on adhocratic line;
- Emphasis on the use of organizational networks or links;
- Linkages of value chain;
- Organization should be structured around processes;
- An organization's peripheral activities can be taken over by outside specialist;
- Managing organization's core capabilities;
- Identifying the core competencies; focus only on them and get out of everything else.

The above characteristics of the new and better way of organization are fundamental characteristics of business process outsourcing. BPO had been a process innovation waiting for breakthrough technology innovation. Today's state of the art and robust technology, especially information technology, has enabled BPO to be a strong link for organization's value chain. So BPO is not a fad, or revolution; BPO is an *evolution* whose time has come.

Innovation in organization structure surfaced through the supportive legal, financial and logistical infrastructure in the 19th century (Aldrich, 1999). This day technological breakthroughs have enabled organizations to try new structures and design new ways of doing business. According to Coase (1973) pulling together activities into single company lower transaction cost. However, in the late 1990s Internet lowered communication cost by many folds and, the consequent decrease in transaction cost made economic sense to try external sources (Singh, 2002).

Business Process Outsourcing and Competitive Edge

The competitive edge framework (Figure 1) shows the competitive edge that BPO presents. The competitive edge framework comprises of BPO enablers, BPO core focus and competitive edge. BPO enablers and BPO core focus are the preconditions for gaining the competitive edge. The framework provides a context for gaining the competitive edge.

BPO enablers

The BPO enablers empower business process outsourcing. The absence of any one enabler would disable BPO. Comparative advantage of nations, respectable offshore competency, and ethics would act as BPO enablers.

Comparative advantage

The BPO provider develops portfolio of processes, scans for comparative advantage of nations and outsource the processes where there is competitive advantage. The core workers manage the core business. The absence of offshore advantages handicaps business process outsourcing. They are the factor conditions of the nation that facilitates and enables BPO. The factor condition refers to a country's endowment of resources, which may have been created

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or inherited and are divided into five categories: human, physical, knowledge, capital and infrastructure (Porter, 1990). A country's advantageous factor condition is the credential for outsourcing.

Competency

The BPO provider would analyze the offshore advantages, and outsource the process to firms befitting the processes. So BPO nurtures an environment of specialization and lends credence to core-competency. According to Hamel and Prahalad (1990) core competency is collective learning, especially in coordinating diverse skill of production and integrating multiple streams of technology. They subscribe that competencies does not diminish with use, unlike other assets, they are enhanced as they are applied and shared. Further, core competency is difficult to be copied by competitors and has potential access to a wide variety of markets. Outsourcing has the advantage of other firm's core competencies. The portfolio of core competencies validates business process outsourcing.

Ethics

Both trust and commitment are recognized as essential ingredients for successful long-term relationship. According to Morgan and Hunt (1994) to be an effective competitor, especially in the global context, requires the firm to be a trusted cooperator in some network. In today's business context successful executives possess a common and impressive ability to effectively build and manage "relationship networks" (Masciarelli, 1998). Longterm relationship brings about one advantage - the reduction of risk and uncertainties in one partner's actions. The concern for intellectual property (IP) protection is very high for organisations looking at outsourcing (Dubey, 2003). The BPO provider has process security and image value apprehensions. BPO managers are concerned about the loss of control over the processes, confidentiality and security of the data when an outsider handles it (Ramachandran and Voleti, 2004) The BPO client's respectable practices of ethics insure BPO providers against such risks, and develops environment of trust and commitment. When firms don't cultivate a culture of respectable ethical practices, the practices of outsourcing results in lose-lose game in the long run. Unethical practices can lead to following issues:

- Image dilution;
- Relationship, especially, customer relationship dilution; and
- Process security infringement.

All the above problems have long term implications. Ethics is a practice and the impact would be far reaching. The ethics issue will be prominent and significant. It is difficult to imagine BPO without ethics. Ethics is the foundation pre-requisite for BPO.

BPO core focus

This is about the core focus areas of the BPO provider. BPO provider needs taking up key role because it is the provider who, being the initiator and the source has to collaborate and coordinate the BPO network. The following should be the core focus areas: core process management, goal programming and management, collaboration management, and brand management.

Core Process Management

The hallmark of BPO is the provider outsources the noncore activities to free them to focus on core processes. According to Hamel and Prahalad (1990) the company's core competency is the real source of competitive advantage. So, the company's effort should focus on managing the core process and build the core competency and get out of everything else. By outsourcing the non-core activities the firm can focus on building its core competencies. A company winning the race to build core competencies will almost certainly outpace rivals in new business development (Gamel and Prahalad, 1990). So core process management is the critical activity of the BPO provider.

Goal Programming and Management

In the BPO framework there is network of processes. The networks of processes propose to achieve firm's objective. The BPO provider should program goals for the outsourced processes and subsequently accord the goals to clients for achieving the higher objectives of the BPO provider. Thus the network is integrated through a coordination of goal benchmarks. Goal programming and management is a domain of core focus. The goal programming provides a forum for interaction on what goals is to be achieved and when. It is important to discuss the goals to be achieved, issues regarding ethical practices, brand image, and process security considerations. The BPO provider should give the conditions and benchmarking in unambiguous terms.

The BPO provider needs to make the client know in clear terms how the activities of the client would contribute to the attainment of the overall business objectives. So goal programming is required because the processes are not automatically directed towards the larger business objective to be achieved through the process. This would insulate misdirection from the differences in the vision and work culture. The client and provider must have clear understanding of each other's expectations. That is why, not only the goals, the process of goal programming is critical for the success of business process outsourcing. It would greatly reduce uncertainty. Through goal programming and management the BPO provider can coordinate the activities in the BPO value chain.

Collaboration Management

Companies establishing relationship with partners experience learning relationship, which gets smarter with each interaction. Such companies gain competitive advantage by positioning itself at a position of higher experience on the relationship learning curve. According to Bleeke and Ernst (1993) many multinational companies are realizing that they must collaborate to compete. In the long run, a company's only sustainable competitive advantage is its relationships with customers, business partners and employees (Masciarelli, 1998). Increasingly, corporations are entering into partnerships to avail themselves of competitive advantages in the marketplace (Li and Dant, 1999). Linder et al. (2000) have focused on four key areas to provide business process outsourcing relationship context: (1). Relationship depth, (2). Relationship breadth, (3). Whose (client or provider) assets would be available, and (4). Whose (client or provider) way of working would be followed. The collaboration competency and efforts depends on the relationship context. Today collaboration is crucial to stay ahead of competitions (Balasubramanian, Srinivas, and

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Jayadev, 2001). As outsourcing forms networks with geographically dispersed corporations, collaboration competency is needed. Collaboration brings about supply chain integration. Networking of processes and coordination of process goals, need collaborative efforts. Firms need collaborative competency otherwise BPO is as strong as its weakest link.

Brand Management

According to Kepferer (1992) brand is source of value to the consumer and company, and strong brand offer certainty, guarantee and the removal of risk for the product or service. He subscribes that a dominant brand acts as entry barrier to the competitors because it acts as reference in its category; and a brand is a long term vision. When BPO creates value for the company and customer, it adds the brand value. Attrition of customer satisfaction erodes brand value. Brand cannot be outsourced. So brand management should be a core focus of BPO provider. Brand value addition or attrition through BPO is going to have a long term impact, especially on the product or services. So brand management is a core focus area of the BPO provider.

Competitive edge

The gains of BPO, as a strategic choice, should not be confined to cost advantages. In the initial phase of outsourcing firms could have the cost advantage considerations but as firms move up the outsourcing value chain the competitive edge of BPO would gain significance. Value Creation, Cost Advantage, Speed, Organizational Advantage, Scope, and Process Innovation, are the competitive edge of BPO.

Value creation

It is important for strategic reasons to measure and recognize how BPO adds value to the firm's value chain and what benefits are created for customer. Value creation would depend upon the portfolios of competencies of the BPO network and synergy of the collaboration.

The value creation can have different dimensions:

- BPO provider could appraise if its focus on core processes has improved its performances.
- Performances of the outsourced non-core processes could be evaluated in terms of the goal benchmarks.
- BPO provider could assess the synergy of process collaboration and its value addition to the firm's value chain.
- Brand value added.

Differentiation

The core competency of the BPO provider should be defined. It is the core competency that differentiates the firm from others. So the firm could lever differentiation by virtue of its core competency. The BPO provider networks with clients. The provider has access to portfolio of core competencies through outsourcing. The firm does not depend on single core competency factor. It gains the advantage of multiple core competencies through BPO clients. So outsourcing provides broader differentiation scope.

Cost Advantage

When technology made BPO feasible in the far end of 1990s, many companies in US and Europe started exploring BPO options because of the cheaper cost of operations (Singh and Jayashankar, 2002). A firm may not be capable of committing the optimum resources for the non-core processes. The firm outsource the processes and gains greater value because the specialist BPO client can offer greater value by virtue of experience and the substantial resources the client could commit on account of the economy of scale advantage.

Speed

Economies of experience, competency and infrastructure would capacitate BPO clients improving the time cycle of accomplishing the processes. The time saving would be significant, especially for innovative firms, to speed up introduction of products in the market. Many Indian BPO clients have made huge improvements in logistics and reliability of the supply even often at the cost of maintaining high inventory. Speed of new product introduction in the market is competitive edge for firms.

Organizational advantage

The organization of processes consigns inherent structural advantage. In today's environmental context one thing is constant: *change*. Firms not competent to cope up with change would be out of context eventually. The organization of network of processes capacitates structural dynamism. Adding or dropping processes could benefit the environment's demand dynamics. Thus, BPO presents organizational advantage.

Scope

The BPO provider can scale up or down by aggregating or disaggregating processes. This flexibility capacitates scalability. The firm is enabled to scale up or down. It has strategic choices – speed, cost, differentiation, innovation and structural. Thus the organization has scalability in size and direction – scope. So BPO provides advantage of scope. Business process outsourcing offers strategic choices of value creation, cost advantage, speed, organizational advantages, and process innovation. So BPO offers strategic lever – advantage of scope.

Process Innovation

The cooperation and networking of organizations in the BPO value chain step up learning potential, and is expected to enrich knowledge, simulate innovations and result in renewal of products and processes (Quinn, 1999; Unseem and Harder, 2000; SCB and Nutek, 2000). According to Zhao and Calantone (2003) companies have begun to have a motto “how not to make things” – how to outsource tasks to other firms who could make things better. Their case studies conducted in six firms bring to light the emerging trends of outsourcing some tasks in new product development. This day the organization that has adopted BPO as a strategic choice would be exploring new ways and opportunities. The organization is on the path to a strategic and structural shift. So the process would orientate the organization towards greater flexibility and open to change context. BPO entails questioning, rethinking, redesign and realign of business processes to benefit competencies. Historically business process innovation has driven business innovation (Keen, 2002).

Conclusion

Outsourcing has brought about a shift in the forces of industry competition. In today’s context wherein outsourcing is emerging as a new way of organization, organization needs questioning and rethinking about the fitness of its structure and strategy. Researcher like Keen finds that historically business process innovation has driven innovation. BPO, as a strategic, choice can drive innovation

The analysis of the works of researchers and organization experts favors the various facets and characteristics of Business Process Outsourcing. BPO had been a process innovation waiting for breakthrough technology innovation. Today’s state of the art and robust technology, especially information technology, has enabled BPO to be a strong link for organization’s value chain. So BPO is not a fad, or revolution; BPO is an evolution whose time has come.

The BPO enablers empower business process outsourcing. The absence of any one enabler disables BPO. Comparative advantage of nations, respectable offshore competency, and ethics are BPO enablers. BPO core focus is about the core focus areas of the BPO provider. BPO provider takes the key role because it is the provider, being the initiator and the source, has to collaborate and coordinate the BPO network. The following are the core focus areas: core process management, goal programming and management, collaboration management, and brand management.

The competitive edge framework provides a context for competitive edge. The outsourcing advantage goes beyond cost savings. In the initial phase of outsourcing, firms do have the cost advantage considerations. When firms move up the BPO value chain, the competitive edge gains significance. Value creation, cost advantage, speed, organizational advantage, scope, and process innovation, would be the competitive edge of BPO.

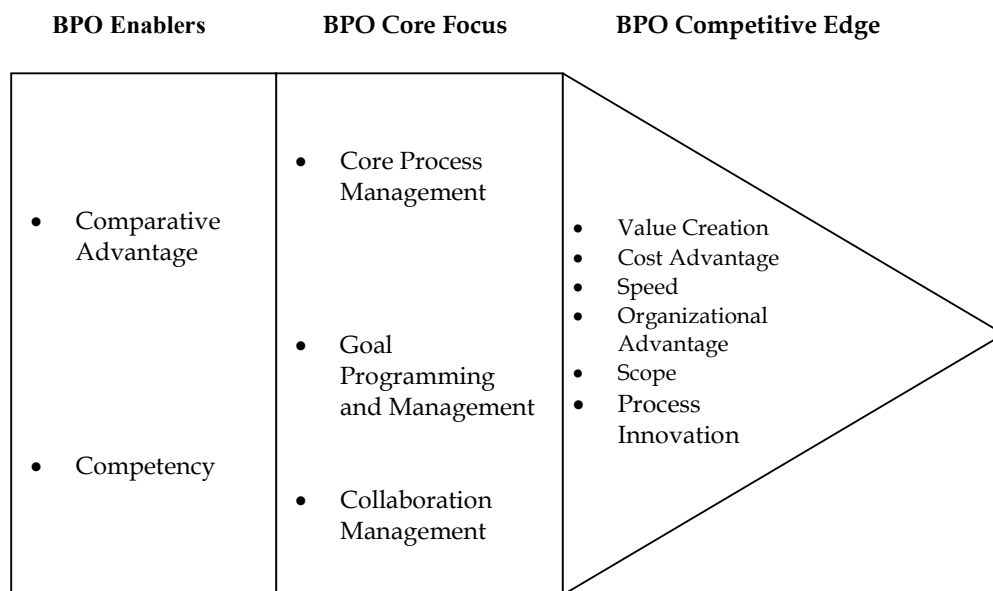


Figure 1: Competitive Edge Framework of BPO

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A Study of the Interrelationship between the Nifty and the Sectoral Indices of the NSE using the Techniques of Unit Root Testing, Cointegration Analysis and Granger Causality Analysis

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&

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Abstract

The National Stock Exchange (NSE) of India is the leading stock exchange in India in terms of the number of transactions per day. The primary index of this exchange is the S&P CNX Nifty, popularly known as the Nifty. In addition the NSE also includes various sectoral indices that track performance of shares across sectors. This paper tries to establish the degree of inter-relationship between the Nifty and the sectoral indices. It attempts to do so using the techniques of unit root, cointegration analysis and Granger causality analysis. It is observed that the Nifty has an influence on the sectoral components and vice versa. This leads to the conclusion that the sectoral performance can be taken as indicator of the overall market performance while the movements of the Nifty can aid in investment decisions relating to particular sectors.

Keywords: *NSE, Nifty, Sectoral Indices, shares, Unit Root, Cointegration Analysis, Granger Causality Analysis.*

Introduction

The stock market scenario in India is essentially a two-horse race comprising of the Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE). The former is India's oldest stock exchange while the latter occupies primacy of position in terms of volume of trading, particularly in the derivatives market. Each of these stock exchanges utilises a set of indices as a barometer for different dimensions of the market. Each such basket of indices consists of a primary index and a collection of sectoral indices. This paper focuses on the NSE, thereby limiting itself to the consideration of the S&P CNX Nifty (or simply the Nifty, as per popular use), the primary index of the NSE, and the sectoral indices covering areas like banking, information technology (IT), realty, infrastructure, etc. The attempt here is to examine the degree of inter-relationship among the primary index and its sectoral counterparts. This is sought to be achieved through the application of statistical tools

like unit root testing, cointegration analysis and causality analysis. Unit root testing has been performed using the commonly followed Augmented Dickey Fuller (ADF) test; the cointegration analysis utilises Johansen's Procedure; lastly causality is identified with the help of the Granger Causality Test.

The remaining part of the paper has been arranged as follows:

Section II provides an overview of the literature survey undertaken for the study. Section III outlines the brief objectives for the study. Section IV explains the database and methodology utilised for the study. Section V deals with the results and analysis thereof. Section VI ends the paper with the conclusive observations.

Literature Survey and Justification for the Study

There have been various attempts at using the methodologies that constitute the framework of this paper. A major portion of such research has concentrated on evaluating the relationship between the real economy and the capital markets in various countries. We consider here a brief selection of the relevant literature in this area.

Comincioli and Wesleyan (1996) tried to examine the causal relationship between stock prices and the economy in case of the USA using quarterly data over 24 years. Using Granger Causality Test, they found that stock prices Granger cause economic activity, but not vice versa.

A study by Naka *et al.* (1999) examines the relationship between the BSE Sensex and five macroeconomic variables, viz. - the Index of Industrial Production (IIP), the Consumer Price Index, money supply, interest rate and inflation. The unique feature of this study is that it involved a comparison between the pre and post reform performance employing the techniques of cointegration and vector error correction. It was found that IIP was the largest positive determinant of stock prices, while inflation is the largest negative determinant.

A different perspective is provided by the effort of Pethe and Ajit (2000) where they look into the inter-relationship between stock indices like the Sensex and the Nifty on one hand, and significant macroeconomic variables like the rupee-dollar exchange rate, the prime lending rate, narrow money supply, broad money supply and the IIP. The methodology involved the use of unit root testing, cointegration and error-correction models. The results indicated no cointegration among the variables; further, it was suggested that though the economy is influenced by both the stock indices considered, these indices did not have any impact on the IIP.

Another work by Panda and Kamiah (2001) relates to the causal relations and dynamic interactions among monetary policy, expected inflation, real activity and stock returns in the post-liberalisation period. Here the vector autoregression method was utilised to make conclusions regarding the relationship among variables like monetary policy, expected inflation, real activity and stock returns.

A study of the Interrelationship between the Nifty and the sectoral Indices of the NSE using the Techniques of Unit Root Testing, Co-integration Analysis and Granger causality Analysis.

Bhattacharya and Mukherjee (2002) used unit root tests, cointegration and the long-run Granger causality test to the causal relationship between the BSE Sensex and five macroeconomic variables. The conclusion was that there is no linkage between stock prices and money supply, national income and interest rate; the IIP induces increase in stock value; and there is a two-way causality between stock prices and the rate of inflation.

Yet another attempt at establishing the relationship between real economic variables and the stock market in an Indian backdrop was undertaken by Vani et al (2003). Similar efforts were also taken up by Chakravarty (2005).

Islam (2003) has carried out a study for the Malaysian economy where he has dealt with short-term dynamic adjustment and long-run equilibrium relationships among variables like interest rate, inflation rate, exchange rate and IIP. For this purpose he has utilised the error correction modelling technique. The results indicate a variety of short run and long run relationships among these variables.

Osman and Yakup (2003) have undertaken a study devoted to examining the relationship between the Turkish Stock Market and macroeconomic variables like money supply, dollar exchange rate, trade balance and the index for industrial production. Here they used Engel-Granger and Johansen-Juselius cointegration tests and Granger Causality Test for the purpose determining the long-run relationship among the variables.

Sharkasi et al. (2004) have looked into price interdependence between stock markets in Ireland, UK, Portugal, USA, Brazil, Japan and Hong Kong utilising a new testing method, based on the wavelet transform to reconstruct the data series, as suggested by Lee (2002). The authors have found evidence of intra-European (Irish, UK and Portuguese) market co-movements with the US market also weakly influencing the Irish market, apart from co-movement between the US and Brazilian markets and similar intra-Asian co-movements (Japanese and Hong Kong). According to them the European markets affect the markets in the Americas, which in turn influence those in Asia, which again impact the European markets, thus completing the circle. Lastly the authors claim evidence for intra-continental relationships and an increase in importance of international spillover effects since the mid 1990's. They suggest that the importance of historical transmissions has decreased since the beginning of the present century.

Dritsaki (2005) has performed some empirical tests in order to examine the long-run relationship between the Stock Market Index of Greece (GEN) and variables like industrial production, inflation and interest rates. The Granger Causality Test was once again applied for identifying the causal relationship among the variables.

The interaction between the real and financial sectors of the Canadian economy formed the focal point of the study by Gauthier and Fuchun (2005). They considered a

long-run relationship for the determination of output, stock market and term structure of interest rates. The study utilised the Vector Correction Model over six variables.

Chandrasekhar and Jayati (2005) undertook a study involving two consecutive years of the BSE Sensex; they concluded that the movements in the manufacturing IIP and the Sensex are independent of one another. Chandrasekhar and Ghosh (2005) also obtained a similar result.

Bhowmik (2008) has attempted an empirical study examining the inter-relationship between the BSE Sensex, the sectoral indices of the BSE and some stock indices outside India. Applying the method of cointegrated multiple regression analysis, the study concludes that the movements of the Sensex and some of the sectoral indices in India follow those of the foreign indices, specially those belonging to Asian countries and the United States. The author suggests that the results offer a strong case for integration of stock markets across the world.

The paper by Soenen and Johnson (2008) deals with the effects of changes in the consumer price index on industrial production and stock market returns for China. The authors have worked with six different types of Chinese shares covering the period from 1994 to 1998. According to them the results suggest a very significant positive relationship between inflation and real output. Further they have found a positive and significant association between stock returns and real output in current periods. As per their study, inflation does not seem to impact real stock returns in China. While the relationships are applicable to the "B" shares, "H" shares and red chips in China, the returns for the "A" shares do not seem to be affected by the changes in domestic inflation or real industrial production.

Ahmad (2009) has tried to examine the causal relationship between the stock market and the manufacturing sector in India on the basis of data relating to the BSE Sensex and the IIP. In doing so he has resorted to the Engel-Granger cointegration test for measuring the long-term relationship among the variables and the Granger causality test for evaluating the short-term causal relationship. He concludes that there is a long-term relationship between the stock market and the manufacturing sector, while in the short-term, causality runs from the BSE Sensex to the IIP.

The work by Iqbal et al. (2011) examines the dynamic linkages between the equity market of USA and emerging markets of Pakistan and India on the basis of daily data covering the period of January 2003–December 2009. For this purpose it uses the cointegration procedure suggested by Johansen and Juselius for discerning the long-term relationship among the markets. It also applies the Granger causality test based on the methodology of Toda and Yamamoto. The authors found no long-term relationship among the markets. There was evidence of unidirectional causality from the New York Stock Exchange to those in Bombay and Karachi.

A study of the Interrelationship between the Nifty and the sectoral Indices of the NSE using the Techniques of Unit Root Testing, Cointegration Analysis and Granger causality Analysis.

Chi-man Hui and Ng's paper (2012) relates to examining the relationship between the residential property market and the stock market in Hong Kong. For this purpose they have utilised the Granger causality test, variance decomposition and CUSUM test. A unique feature of this study is that it has tried to identify the break points and variation of relation. The results suggest that the correlation between residential property price and stock index had become weaker with time, despite the fact that the residential property price follows the same trend as the stock market during the sample period. The authors suggest that in such a situation there is a greater likelihood for the investors to make more profits by going for portfolio diversification.

Brief Objectives

Following the aforementioned goal of identifying the inter-relationship, if any, among the Nifty and the sectoral indices of the NSE, we formulate the following objectives for the present effort:

1. Examining the data collected for the study in order to evaluate the presence or absence of stationarity
2. Evaluating the possibility of existence of long-term relationship
3. Identifying how the indices influence one another

Data Base and Methodology

The study has been performed for discerning any possible relationship between the Nifty on one hand, and the sectoral components on the other. As some of the constituent scrips of the sectoral indices will obviously feature as components of the Nifty, an alternative approach has been considered where instead of operating with the sectoral indices per se, we consider the constituent scrips corresponding to each sectoral index which do not simultaneously feature as a component of the primary index. It is obvious that the number of such scrips may be substantial. Therefore we have chosen to consider the leading scrips in each case on the basis of market capitalisation. We try to relate the values of the Nifty with those of the non-Nifty scrips from the bank, infrastructure and IT sectors.

The data utilised for the purpose includes values of the Nifty and the selected scrips from 2000 to 2009. Care has been taken to ensure that only those instances are considered where data is concurrently available for all components.

A brief introduction to the major statistical tools that constitute the bedrock of the present effort would be very relevant here.

Whenever a sequence of data is to be used for time series analysis, it is necessary to evaluate whether such data may give rise to spurious phenomena that result in localised short-term effects that die down with time. The property of data that is free from such spurious phenomena is known as stationarity. It has been said that a stochastic process is said to be stationary if its mean and variance are constant over

time and the value of the covariance between the two time periods depends only on the lag between these two periods and not the actual time at which the covariance is computed. The problem with a non-stationary series is that the behaviour of a non-stationary time series can be considered only for the time period under consideration, i.e., it is not possible to generalise for other time periods, thus providing little practical value for forecasting.

For the purpose of testing the existence of stationarity in a data series we use the following equation:

$$Y_t = \rho Y_{t-1} + u_t$$

When $\rho=1$, i.e., when a unit root is present, it indicates a non-stationary process. The above equation can be alternatively written as follows:

$$\Delta Y_t = \delta Y_{t-1} + u_t$$

where $\delta = \rho-1$; obviously the existence of non-stationarity is now denoted by $\delta =0$. While Dickey and Fuller have proposed number of tests for stationarity, in this paper we have utilised the Augmented Dickey-Fuller (ADF) test, which also happens to be the most popular variant of the test. In a few cases, when the ADF test has not proved conclusive, we have opted for the Philips-Perron test.

For the next step, i.e., evaluation of the existence of long-term relationship, we have adopted the cointegration analysis technique proposed by Johansen. The phenomenon of cointegration was introduced by Granger. At a broad level it can be said that cointegration is applicable when several variables are driven by a common stochastic trend; such variables have a particularly strong link that may be of interest. If y_t and x_t are two $I(1)$ variables (i.e., two variables which integrated of the order 1), then they are said to be cointegrated if a linear combination of these variables is $I(0)$ [i.e., stationary], i.e., if there exists a β such that $y_t - \beta x_t$ is $I(0)$.

The third component of the analytic portion of the study is made up of the Granger Causality test. This kind of causality study enters into the picture as cointegration analysis cannot throw complete light on the nature of relationship between specific pairs of variables. However, in the light of the present study, the focus is obviously on the latter as we try to examine the interactions among the Nifty and the diverse sectoral scrips of the NSE.

At first each of the twelve data series is to be tested for stationarity using the ADF test. Once it has been ascertained that each of these series is non-stationary, i.e., all of them are $I(1)$, the Johansen cointegration test is carried out to evaluate the existence of a long-term relationship between the Sensex and each of the sectoral indices. Lastly, we have resorted to the Granger Causality test to identify the contours of the relationship.

Results and Analysis

5.1 Unit Root Test for the Nifty and the Sectoral Indices

A study of the Interrelationship between the Nifty and the sectoral Indices of the NSE using the Techniques of Unit Root Testing, Cointegration Analysis and Granger causality Analysis

The unit root tests for the Nifty and associated scrips of the NSE yielded the following results:

Table 5.1: Results of Unit Root Tests for the NSE Data Series

Sl.No.	NSE Data Series	ADF Test Statistic	p value
1	S&P CNX Nifty	-2.360916	0.4002
2	Bank of India	-3.067000*	0.1145*
3	Bank of Baroda	-3.371831	0.0554
4	GTL	-2.808468*	0.1942*
5	IDBI Bank	-3.024375	0.1256
6	Rolta	-2.429077	0.3642

*Philips-Perron Test Statistic

In this case, two scrips, viz., Bank of India and GTL do not yield convincing results through the ADF test; therefore the Philips-Perron was utilised to arrive at more conclusive results. As all the scrips are ultimately proven to be non-stationary, there is no difficulty in continuing to the cointegration test.

5.2 Cointegration Analysis for Primary and Sectoral Stock Indices.

Applying the cointegration test by the Johansen procedure, the following results are obtained:

Table 5.2: Trace Test for NSE Data Series

Date: 06/24/10 Time: 10:35

Sample (adjusted): 4 2496

Included observations: 2493 after adjustments

Trend assumption: Linear deterministic trend (restricted)

Series: NIFTY BANK_OF_INDIA BOB GTL IDBI_BANK ROLTA

Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.01939	123.1077	117.7082	0.0217
At most 1	0.013307	74.29436	88.8038	0.3477
At most 2	0.00641	40.89729	63.8761	0.8182
At most 3	0.004134	24.86695	42.91525	0.7964
At most 4	0.003533	14.54022	25.87211	0.6128
At most 5	0.002291	5.717226	12.51798	0.497

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Table 5.3: Max Eigen Value Test for NSE Data Series

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.01939	48.81334	44.4972	0.016
At most 1	0.013307	33.39707	38.33101	0.1656
At most 2	0.00641	16.03035	32.11832	0.9099
At most 3	0.004134	10.32672	25.82321	0.9528
At most 4	0.003533	8.822997	19.38704	0.7425
At most 5	0.002291	5.717226	12.51798	0.497

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

As the results of the above tests show, there is at least one cointegrating equation at the 5% level of significance. Table 5.4 on the following page demonstrates the cointegrating equation for the NSE data series.

5.3 Granger Causality Test for the Nifty and Sectoral Indices

Now proceeding to the Nifty and the sectoral indices of NSE the results of the Granger Causality test for are as follows:

Table 5.5: Results of Granger Causality Test for the Nifty and Sectoral Indices on the NSE

Sl. No.	H ₀	Result	p value
1.	Nifty does not Granger-cause the sectoral scrips of the NSE.	NOT ACCEPTED	0.0000
2.	Bank of India does not Granger-cause the Nifty and the other sectoral scrips of the NSE.	NOT ACCEPTED	0.0010
3.	Bank of Baroda does not Granger-cause the Nifty and the other sectoral scrips of the NSE.	NOT ACCEPTED	0.0189
4.	GTL does not Granger-cause the Nifty and the other sectoral scrips of the NSE.	NOT ACCEPTED	0.0000
5.	IDBI Bank does not Granger-cause the Nifty and the other sectoral scrips of the NSE.	ACCEPTED	0.1941
6.	Rolta does not Granger-cause the Nifty and the other sectoral scrips of the NSE.	NOT ACCEPTED	0.0000
7.	Bank of India, Bank of Baroda and IDBI Bank do not Granger-cause the Nifty and the other sectoral scrips of the NSE.	NOT ACCEPTED	0.0050
8.	GTL and Rolta do not Granger-cause the Nifty and the other sectoral scrips of the NSE.	NOT ACCEPTED	0.0000

showing that on an overall basis, the sectoral representatives can impose themselves on the Nifty to some extent. Considering individual effects of these scrips, Bank of India, Bank of Baroda, GTL and Rolta affect the Nifty IDBI Bank is the only scrip that does have an impact on the Nifty. From the sectoral perspective, both the banking and IT sectors had an influenced the behaviour of the Nifty. The explanation for each of the above may follow from a consideration of the performance of the relevant scrips or sectors.

Conclusion and Policy Prescriptions

The preceding results indicate that there is a possibility that the Nifty may have a long-term relationship with the selected scrips.

It is observed that the Nifty has an influence on the sectoral components and vice versa. This leads to the conclusion that the sectoral performance can be taken as indicator of the overall market performance while the movements of the Nifty can aid in investment decisions relating to particular sectors.

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Impact on customer satisfaction through CRM at big bazaar (MPM mall): An empirical study

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Abstract

Customer relationship management (CRM) is a management strategy that unites information technology with marketing. It originated in the United States in the late 1990's, and, to date, has been accepted in a significant number of companies worldwide. It is believed that "it is five to 10 times more expensive to acquire a new customer than obtain repeat business from an existing customer." As the needs of customers became diversified, conventional promotions became less efficient and drove up costs. According to the well-known empirical "Pareto principle," it is assumed that 20 percent of a company's customers generate 80 percent of its profits. In other words, retention of a large customer base is a major issue. This paper attempts to understand the true nature of Customer relationship management (CRM), identify strategies to retain the customer and tried to empirically understand the customer relationship through primary data and statistical techniques such as factor analysis and chi-square were used to analyze the data and results of the same have been presented.

Key words: Customer relation, business market technology, products and services, customer

Introduction

Customer relationship management (CRM) can help to select the most useful clients for an enterprise. Enterprises most frequently feel who their main customers are, but only some use systematized media of customers' stimulation, loyalty development. Collected data about consumers later become knowledge, and the latter determines profit for an enterprise. However the enterprise's activity can be based on such knowledge only when the data are processed and on their basis motivated decisions to attract or sustain customers are taken. At present most organizations recognize evident benefit of CRM and almost every enterprise either use certain CRM technologies, supporting their business, or evaluate specific benefit of CRM technology and plan its future realization.

Research Methodology

Nature of Study: descriptive research

Sampling Area :Big Bazaar MPM store, Abids, Greater Hyderabad city is the sampling area.

Sample size: 100 people

Sampling technique: sampling technique is convenience sampling,

Data collection instrument: questionnaires with structured set of questions which were to measure satisfaction levels of customers on various terms as if like on brands purchased, quality, price etc.

Data sources: The sources of data we used were mainly primary, with help of questionnaires.

Data analysis tools

Factor analysis: This technique is usually used for the data summarization. With the help of this technique we can arrange some correlated sets of variables under one factor. This helps in saving time and cost. Here factor analysis technique has been used to identify the prominent factors responsible for the satisfaction level towards the customer relationship management of insurance industry.

Chi-square analysis: -

Chi square technique is usually used to find the dependency of different variables or in other words we can say that it is used to find out the whether there exists a relationship between two variables or not.

Review of Literature

Fotheringham , (1988) studied that consumer choice may follow a hierarchical model at times. Most studies have focused on the relation between store choice and price formats. **Tang, Bell and Ho, (2001)** specified in their study that Price formats have an impact on store choice. There have been studies which found out that store choice is also related to perceived shopping utility which may depend on Service Quality (Parking space, friendliness of employees, billing time), Assortment of products (popular brands), Purchase Flexibility etc. (Tang, Bell and Ho, 2001) Lastly, unplanned time spend in store and unplanned purchases have been found to be linked with factors like perceived quality, variety, specials and value for money.

Oxenfeldt (1974) and Martineau (1958) mentioned that various definitions about a retail store image have been given by scholars form time to time. The oldest and most basic one can be credited to who defined a store's personality as:.... the way in which the store is defined in the shopper's mind; partly by its functional qualities and partly by an aura of psychological attributes." Later on, defined it as:" an image is more than the sum of its parts.....it represents interaction among characteristics and excludes extraneous elements... It has some emotional contents... a combination of factual and emotional material." **Ditcher (1985)** emphasized on the image being something complete."It describes not individual traits or qualities, but the total impression an

entity makes on the minds of others... an image is not anchored in just objective e data and details. It is the configuration of the whole field of the object.”

Smith and Barclay, (1997) mentioned that satisfaction with the relationship is regarded as an important outcome of buyer-seller relationships). We define relationship satisfaction as “a consumer’s affective state resulting from an overall appraisal of his relationship with a retailer”. **Anderson and Narks, (1984)** opined that business as well as consumer markets, customers tend to be more satisfied with sellers who make deliberate efforts towards them. Consequently, we posit the following hypothesis: “A higher level of customer retention orientation of the retailer leads to a higher level of relationship satisfaction. **Yim (2005)** presents four elements groups consumers (customers) characteristics, management of knowledge/data (information about customers), CRM structure (organisation structure, organisation obligations, sources, human resources, etc.) and CRM substantiation by IT technologies.

Jason (2004) viewed that each customer is a unique personality, thus it is necessary to analyze his or her needs and features. It means that it is necessary to accumulate at least little information about a customer, to possess his or her contact information, work profile and main wishes he also assumes that certain reorganization of an enterprise is necessary. If the level of customer service is not developed sufficiently, customer relationship cannot be managed effectively.

Data analysis and interpretation

Factor Analysis:

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.728
Bartlett's Test of Sphericity	Approx. Chi-Square	1073.494
	df	153
	Sig.	.000

Interpretation: Since Kaiser meyer olkin measure of sampling adequacy is more than 0.5 hence sample is adequate for factor analysis

Communalities		
	Initial	Extraction
Physical facilities	1.000	.845
presentation	1.000	.824
Store layout	1.000	.863
Employee behaviour	1.000	.605
billing	1.000	.868
Store reputation	1.000	.581
cards	1.000	.893
quality	1.000	.755
Brands available	1.000	.705

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Home brands	1.000	.340
price	1.000	.570
range	1.000	.750
Product available	1.000	.714
service	1.000	.666
Offer schemes	1.000	.185
overall	1.000	.802
Cleanliness hygiene	1.000	.727
packaging	1.000	.812

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
	1	5.678	31.543	31.543	5.678	31.543	31.543	3.759	20.885
2	2.215	12.306	43.849	2.215	12.306	43.849	3.188	17.713	38.598
3	1.758	9.769	53.618	1.758	9.769	53.618	2.088	11.602	50.201
4	1.627	9.041	62.658	1.627	9.041	62.658	1.815	10.084	60.285
5	1.310	7.279	69.938	1.310	7.279	69.938	1.737	9.653	69.938
6	.989	5.493	75.430						
7	.910	5.054	80.485						
8	.831	4.615	85.100						
9	.657	3.652	88.751						
10	.482	2.677	91.428						
11	.404	2.247	93.676						
12	.349	1.940	95.616						
13	.279	1.549	97.164						
14	.177	.982	98.146						
15	.162	.900	99.047						
16	.134	.746	99.793						
17	.037	.207	100.000						
18	-	-1.012E-15	100.000						

Extraction Method: Principal Component Analysis.

Interpretation : According to above table we can see that out of the total variance, 69.5% of the variance is explained by 5 factors, 20.885%,17.713%,11.602%,10.084%,9.653.

Rotated Component Matrix^a

	Component				
	1	2	3	4	5
physical facilities	.861				
presentation	.863				
store layout	.861				
employee behaviour				.747	
billing			.899		
store reputation					.714

cards		.905		
quality				.763
brandsavailable	-.548			.469
homebrands			.511	
price			.582	
range	-.686	.442		.546
productavailable	-.683			.455
service			.426	
offerschems		.118		
overall	.800			
cleanlinesshygine	.746			
packaging	-.746			

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 11 iterations.

Interpretation:

Out of the total factors above the factors can be divided into 5 factors namely,

Factor 1(physical characteristics of the store)

Physical facilities, Presentation and Store layout.

Factor 2(hygiene)

Cleanliness and Hygiene

Factor 3(monetary requirements)

Billing procedures, Cards acceptance and Offer schemes/ discounts)

Factor analysis 4(Store's support)

Service, Employee behaviours, Home brands quality and Price/quality justification in case of home brands

Factor 5(store reputation(quality)

Brands available sufficient or not, Product availability and Quality of product

Component Matrix^a

	Component				
	1	2	3	4	5
Physical facilities	.891				
presentation	.871				
Store layout	.891				
Employee behaviour		.451		-.536	
billing	.453	.523			.436
Store reputation			.639		
cards	.472	.531			.465
quality			.792		
Brands available	-.651		.402		
Home brands				-.465	
price		.592			
range		.522		.522	

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Product available service	-.504			.451	
Offer schemes overall	-.475	-.518			.404
Cleanliness hygiene	.808				
packaging	.696				
	-.729	-.403			

Extraction Method: Principal Component Analysis.

a. 5 components extracted.

Cross tabulation (shopping and quality)

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
shopping * quality	100	100.0%	0	0.0%	100	100.0%

Shopping * quality Cross tabulation

		quality					Total
		highly dissatisfied	dissatisfied	neutral	satisfied	Highly satisfied	
shop bazaar	Count	2	2	8	2	37	51
	Expected Count	11.8	.5	1.0	2.1	35.5	51.0
Non food section	Count	4	0	0	0	22	26
	Expected Count	6.0	.3	.5	1.1	18.1	26.0
clothes section	Count	0	1	2	2	3	8
	Expected Count	1.9	.1	.2	.3	5.6	8.0
electronic section	Count	5	0	0	0	5	10
	Expected Count	2.1	.1	.2	.4	6.3	9.0
furniture section	Count	4	0	0	0	1	5
	Expected Count	1.2	.1	.1	.2	3.5	5.0
Total	Count	15	3	10	4	68	100
	Expected Count	15.0	3.0	10.0	4.0	68.0	100.0

Interpretation:

From cross tabulation we can see that in food bazaar quality stated by maximum of our respondents is stated as highly satisfied, and in non food section it is also highly satisfied, as per our table we can see there were only 9 & 5 respondents in big bazaar who shopped electronic or furniture respectively from big bazaar and most of them stated quality as highly dissatisfactory So , it is advised to the management to

increase the quality of products in electronic and furniture section to increase sales there

Cross tabulation (shops and brands)

		Cases					
		Valid		Missing		Total	
		N	Percent	N	Percent	N	Percent
shopping *	100	100.0%	0	0.0%	100	100.0%	
brands							
available							

Interpretations

We can see from the table itself that in food bazaar there is high satisfaction level in customers as per as brands availability is concerned, but in, electronic and furniture section the more frequency is in highly dissatisfied (6)and dissatisfied (3)respectively, and for clothes(7) highly dissatisfied

So, according to the research if Big Bazaar wants to increase its sales and level of satisfaction in customers in electronic clothes and furniture section go on increasing brands or number of brand.

Cross tabulation(income group and overall satisfaction)

		Cases		
		Valid	Missing	Total

Shopping * brands available Cross tabulation

		Brands available					Total	
		highly dissatisfied	dissatisfied	Neutral	satisfied	highly satisfied		
shop	food	Count	4	4	12	6	23	51
	baza	Expected	12.4	14.4	10.8	4.1	9.3	51.0
ping	Non	Count	4	9	9	0	4	26
	food	Expected	6.3	7.4	5.5	2.1	4.7	26.0
secti	on	Count	7	1	0	0	0	8
	cloth	Expected	1.9	2.3	1.7	.6	1.5	8.0
es	secti	Count	6	0	0	2	2	10
	on	Expected	2.2	2.5	1.9	.7	1.6	9.0
electr	onic	Count	1	3	0	0	1	5
	secti	Expected	1.2	1.4	1.1	.4	.9	5.0
on	furni	Count	22	17	21	8	30	100
	ture	Expected	22.0	17.0	21.0	8.0	30.0	100.0
secti	on	Count						
		Expected						

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	N	Percent	N	Percent	N	Percent
Income group * overall satisfaction	100	100.0%	0	0.0%	100	100.0%

			Overall satisfaction					Total
			highly satisfied	satisfied	neutral	dissatisfied	highly dissatisfied	
income group	<10,000	Count	2	6	2	0	0	10
		Expected	.3	1.4	.8	.6	7.9	10.0
	10,000-20,000	Count	0	0	2	6	17	25
		Expected	.8	3.3	1.8	1.3	17.9	25.0
	20,000-30,000	Count	1	2	2	3	47	55
		Expected	1.7	7.2	3.9	2.8	39.4	55.0
	30,000-40,000	Count	0	3	0	0	0	3
		Expected	.1	.4	.2	.2	2.2	3.0
	>40,000	Count	0	5	1	0	1	7
		Expected	.2	.7	.4	.3	3.6	7.0
Total		Count	3	18	7	6	66	100
		Expected	3.0	18.0	7.0	6.0	66.0	100.0

Interpretations

We can infer from above data that in low income groups such as >10,000 or say 10,000-20,000 satisfaction level is highest 5 in highly and 19 in highly satisfied again respectively, while in high such as 30,000-40,000 and >40,000 the satisfaction level is 3 in dissatisfied and 4 in dissatisfied respectively so we can infer there is relationship or association between income group and satisfaction level.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	59.646 ^a	16	.010
Likelihood Ratio	47.077	16	.000
Linear-by-Linear Association	2.978	1	.084
N of Valid Cases	99		

a. 21 cells (84.0%) have expected count less than 5. The minimum expected count is .09.

Interpretation:

We can infer since the value of chi square is less than 0.05 therefore the H0 hypothesis is rejected hence we can say that there is association in income and overall

satisfaction, and how we have seen in above cross tabulation
Hence it is suggested the management that yes, though the lower income groups are more satisfied from big bazaar, but to increase the overall profitability we have to target high income groups because they are dissatisfied , hence we cans say that from the one before the previous cross tabulation ,that to make high income group satisfied increase brands in furniture ,electronic section. And target high income groups.

Cross tabulation (distance from the store and frequency of visits)

Case Processing Summary

	Valid		Cases Missing		Total	
	N	Percent	N	Percent	N	Percent
Distance from the store * frequency of visits	100	100.0%	0	0.0%	100	100.0%

Distance from the store * frequency of visits Cross tabulation

Distance from the store		Count	Frequency of visits				Total
			once	twice	thrice	>4times	
0-5	Count	2	0	0	59	61	
	Expected	8.6	.6	11.1	40.7	61.0	
5-10	Count	5	1	18	4	28	
	Expected	4.0	.3	5.1	18.7	28.0	
10-15	Count	2	0	0	3	5	
	Expected	.7	.1	.9	3.3	5.0	
>20	Count	5	1	0	0	5	
	Expected	.7	.1	.9	3.3	5.0	
Total	Count	14	2	18	66	100	
	Expected	14.0	2.0	18.0	66.0	100.0	

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	105.126 ^a	9	.023
Likelihood Ratio	99.152	9	.000
Linear-by-Linear Association	48.106	1	.020
N of Valid Cases	99		

a. 11 cells (68.8%) have expected count less than 5. The minimum expected count is .05.

Interpretation:

We can directly see that if distance is less 0-5 example say kms then frequency of visit is highest in >4 times(59) and if distance more >20 it is most in once a month(5) and as, the chi square coefficient is less than our level of significance so, H0 rejected hence, there is association between frequency of visit and distance from the store i.e inversely proportional.

Employee behaviour
employee behaviour

		Frequenc		Cumulative	
		y	Percent	Valid Percent	Percent
Valid	highly satisfied	6	6.0	6.0	6.0
	satisfied	13	13.0	13.0	19.0
	neutral	19	19.0	19.0	38.0
	dissatisfied	20	20.0	20.0	58.0
	Highly Dissatisfied	42	42.0	42.0	100.0
Total		100	100.0	100.0	

Interpretation:

The pie chart shows that out of our 100 samples 6%,13%,19%,20%,42% are highly satisfied, satisfied neutral, dissatisfied ,highly dissatisfied Hence management should increase the employee support and knowledge to increase customers satisfaction ,and thereby sales

Overall satisfaction

overall satisfaction

		Frequency		Valid	
			Percent	Percent	Cumulative
					Percent
Valid	highly dissatisfied	66	66.0	66.0	66.0
	dissatisfied	18	18.0	18.0	84.0
	neutral	7	7.0	7.0	91.0
	satisfied	6	6.0	6.0	97.0
	highly satisfied	3	3.0	3.0	100.0
Total		100	100.0	100.0	

Interpretation:

Out of total 66%,18%,7%,6% and 3% are highly dissatisfied, dissatisfied, neutral, satisfied , highly satisfied.

Conclusion

1. Summarizing the functionalism and validity of researched elements of different models, it would be possible to highlight that in order to successfully implement CRM, it is necessary for Big Bazaar store that they must balance and integrate technologies, processes and people. These elements are closely

2. Related to enterprise's strategy, processes of technologies, and processes of integration of overlapping functions as well as orientation to basic customers.
3. Model's formation has to appeal to certain continuity of actions (a situation is evaluated, CRM strategy is formulated, investments are determined, anticipated profit is calculated), and creation of the system can be successful when the following elements of the system are analyzed and related: customers, relationship interaction, information sources and data bases, processes and employees.
4. In the end it has been concluded from our analysis that though the overall satisfaction level as mentioned by the customers was low in Big Bazaar but there are several ways also to increase their satisfaction level and hence sales of select 5 Big bazaar stores .The customers had less confidence on quality of products, authenticity of billing procedures i.e. all went wrong every time, their schemes were not updated at cash counters or even at the different sections too. So, the managers should take some strict and constructive measures to ensure all such modifications to be done correctly by time.
5. Employees behaviors and support was also not satisfactory as per the customers so managers should take some serious training methods for the store sales force. Lastly, higher income groups were less satisfied from the store which signaled the store management to target higher groups with some appropriate kind of strategy. Promotional activities as carried during the study has provided a good way success which increased the overall foot fall in the store day by day. Hence in the end we can state though overall customer stated their satisfaction level as dissatisfactory but yet there are ways to make them satisfied as well as loyal customers of Big Bazaar

Recommendations

- Diversity of CRM model and its structure shows that CRM as system is forming and thus preparation of typical model, which would enable its successful implementation, is possible.
- Though gifts like bags, magazines were good to attract customers but more good offers should be inculcated to increase customer buying activities.
- The store should increase its product line and for this it should contact to many distributors so they can provide a huge amount of products so that they can find every product according to their need.
- The space should be increased in the store for the customers to move to find every products of their choice. The employees should be trained in this way so that they can answer the questions of the customers regarding their problems in services efficiently.

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- Number of brands in various sections specially clothes and clothes to be increased especially the quality of Home brands to be improved.
- Employees should be given proper training about knowledge and support to customers and billing softwares to be updated and improved.

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Growth and Performance of Micro, Small and Medium Enterprises in India: An Assessment

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Abstract

The industrial development becomes incomplete without the development of small and micro Industrial sector as this sector provides opportunity to utilize the abundant skill and unskilled human resources. These enterprises not only generate employment but also utilise optimum resources, increase total production and exports and help in balanced regional development of the country. Hence the paper is an attempt to evaluate the growth and performance of micro, small and medium enterprises in India. The study has met the objectives- growth pattern of micro, small and medium enterprises and has examined the contribution of micro and small enterprises in GDP terms in India.

Key words: Micro and Small Enterprises, Economics and Growth Assessment.

Introduction

At the time of independence in 1947, the industrial base of the economy was very small and the industries were beset with many problems such as shortage of raw-materials, deficiency of capital, bad industrial relations etc. In India, it was only after the attainment of independence in 1947, that the Indian Government realised the need for the rapid industrialisation of the country. To achieve this goal the government started the process of industrial development (Bakal, 1993).

Micro, Small and medium enterprises are two legs of industrialisation process of a country. These enterprises have been given an important place in the framework of Indian Planning since beginning both for economic and ideological reasons. Today, India operates the largest and oldest programmes for the development of Micro, small and medium enterprises in any developing country. As a matter of fact, small sector has now emerged as a dynamic and vibrant sector for the Indian economy in the recent years (Amit Singh, 2008).

The importance of micro, small and medium enterprises in the industrial front becomes more relevant in the agrarian economy of developing countries like India, where a wide spread disguised un-employment in agriculture exists. These unproductive masses can be employed in the MSME sector, where they can be regarded as resource and gainfully employed for productive activities. Industrial development becomes incomplete without the development of small Industrial sector as this sector provides opportunity to utilize the abundant skill and unskilled human resources. These enterprises not only generate employment but also utilise optimum resources, increase total production and exports and help in balanced regional development of the country. Therefore it is necessary to analyse the growth and performance of micro, small and medium enterprises in India. With this backdrop here an attempt has been made to evaluate the growth and performance of micro, small and medium enterprises in India.

Objectives

The study has been undertaken keeping view the following three objectives:

1. To assess the growth pattern of micro, small and medium enterprises across the country over the period from 2001-02 to 2009-2010.
2. To evaluate the performance of such enterprises in terms of output, employment and exports during the same period.
3. To examine the contribution of micro and small enterprises in the value of GDP in India.

Methodology

The researchers collected the data from secondary sources. The secondary data were obtained from the annual reports of MSME, government of India and other publications, news papers, journals and magazines. The estimates for the registered and unregistered sector taken together have given a complete picture of entire MSME sector. Information on economic activity, type of organization, type of management, employment, fixed investment, products, gross output, exports, etc., were collected from the registered units as well as from unregistered units.

In order to get inferences from collected data, statistical techniques like percentages, averages and growth rates were applied wherever necessary. More over regression techniques have also been used to analyze the performance levels of various enterprises and the factors determining their performances. For this purpose following regression models have been developed.

Model1 is a multi-variate regression model that expresses the relationship among production, employment and investment. The level of production is treated as dependent variable while employment and investment are considered as independent variables as shown in the equation below:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + u \quad (\text{model1})$$

Where, Y = Production Level

X₁ = Employment

X₂ = Fixed Investment

α is the intercept, β is the coefficient and u is the error term.

The data related to export and production during the period under consideration will be fitted to regression model2 to estimate the effect of production on export volume of the country. The specified model is as follows:

$$X = \alpha + \beta Y + u \quad (\text{model2})$$

Where,

X = Volume of Export

Y = Level of Production,

and α is the intercept, β is the coefficient and u is the error term.

Review of Literature

Several important studies on all India basis have been made both at individual and organisational level to look into the growth and performance of micro and small enterprises in India. Anand (2007) in his study pointed out the contribution of the SME sector in India as well as in the global environment. He states that bankers are reluctant to lend SMEs because of the high transactions costs, insufficient credit information, inadequate credit appraisal and risk management skills, poor repayment records and low market credibility of SMEs. He also said that SMEs require a modest amount of capital to generate large employment opportunities, to stimulate economic activity within a country and to distribute the benefits of economic development. Reena (2007) on her study found out that the SSIs contribute more than one-third of industrial output and exports of the country, share of SSIs in GDP of the nation is approximately 6 percent and this segment provide 28.29 million employment to the country. The study observed that banks were not able to provide timely and adequate credit to the SSI sector. Saroj (2007) suggested that bank should have the capacity to co-ordinate the process of microcredit operation through diversified financial services, which may help to strengthen the microfinance initiatives in a comprehensive manner. The contribution by the national state levels agencies in fostering the overall growth of the SME sector is phenomenal and currently public-private -partnerships have become models to hasten the process of SMEs development (Shankar, 2007). Banks play important role to the development of SMEs but banks are not enthusiastic to finance SME sector because of poor marketing arrangements, lower adaptability to improve technology, high transactions costs, higher Non Performing Assets (NPA) level and lack of succession planning of SMEs (Murali and Lakshminarasimha, 2007). Anand and Srikant (2008) in their study revealed that the development of right strategies for marketing, selection of the most suitable communication options and measurement of performance are vital for the success of any organisation engaged in the SME financing activity. Wang (2008) in his article observed that in the era of rapid globalization, internet, local networks and support system are of particular importance in helping SMEs to meet the challenges of the changing world. The study also pointed out that due to bank's financial problems, many SME owners in addition to bank loans depends on their personal

savings or the family members and friends. S. K. (2005) in his article revealed that under the current Basel Capital Accord, loans to SMEs generally fall in the 100 percent risk-weight category. Ramakishna (1962) in his study pointed out the nature and magnitude of financial problem faced by the small scale sector of India and the role of Government and Banks in financing this sector. Vepa (1988) argued that despite a well developed institutional framework it was the urban based and comparatively bigger entrepreneurs who obtained the bulk of the advances made to the small scale sector. The availability of institutional finance to SSI has not been commensurate with their needs. The promoters of SSI, feel that the rules and procedures of financial institutions are very cumbersome and time consuming (Rudramurthy,1997). G.P. Prasain, E. Nixon Singh and N. Sharat Singh (2006) in their study found that there were no statistically significant differences in the average of all financing entities in Manipur despite some visible variations thereon. District-wise homogeneity of variability of the financing entities has also been observed. They found that respondents depends more on family income (more than 50%) followed by government agencies and commercial banks. Commercial banks, on the other hand, played the main role of providing financial assistance to these industries as far as the source of borrowing is concerned. Both in the initial and latest year under study 20.5% of the industries depended on commercial banks for institutional borrowing followed by Manipur Industrial Development Corporation (14.2%), North-Eastern Development Finance Corporation Ltd.(6.6%) etc. In their study they suggested that the both central state governments should give wide publicity so as to reach the information to all the entrepreneurs about policies, incentives, schemes, programmes, etc., relating to small scale industries. The commercial banks and financial agencies may establish more small scale industrial specialized branches at least one in every district head quarters to cater to the financial needs of small entrepreneurs. Banking services should be available near to the entrepreneurs/enterprise. They suggested that the small scale industrial units should maintain proper books accounts. Statutory obligation should be imposed on the units to maintain and prepare their books of accounts by professional accountant. They also suggested that the commercial banks and financial agencies should establish small industrial specialised branches at least one in every district head quarters to cater to the financial needs of small entrepreneurs. He also suggested that banking services should be available near to the entrepreneurs / enterprises and the small scale industrial units should maintain proper books of accounts by employing professional accountant. S.K.Bagchi (2008) in his book pointed out that small and medium enterprises may require funds for acquisition of capital assets, e.g., land/building/machinery/equipments etc., and /or purchase of stocks of raw materials / finished goods, extending credit to trade debtors and for other day-to-day business operations. He assessed the financial requirements of small and medium enterprises. Small and medium enterprises need finance towards cost of fixed assets like land and building, machinery, equipment, including computers by way of loan to be repaid over a period of time generally three

to five years. Working capital finance by way of cash credit / overdraft, bills finance, etc., for a period, generally of twelve months, with a provision for renewal to enable the small and medium enterprises to buy raw materials / stocks, incur day to day business overheads and to take care of sale to its buyers on trade credit terms. It is also observed that often vendors of materials insist that the small and medium enterprise buyers arrange for a letter of credit facility from a bank.

S. Ganesan and N. Namasivayam (2008) in their study analyses the performance of financing Small Scale Industries by commercial banks in Maduri district and the performance scores of loans grants to small scale industries by commercial banks using Friedman's test. The result of Friedman's test indicates that there is no significance difference in the performance of commercial banks of different classifications operating in Maduri district in lending to small scale industries. They found that state bank groups have exhibited a high range of performance score (viz., 50%) resulting a high record of achievement in finance when compared its target, followed by National Commercial Banks (49%) and Private Sector Banks (33%). K. Sudarsan and Himachalam Dasaraju (2010) in their book revealed the role of Andhra Pradesh State Financial Corporation (APSFC) for the development of small and medium enterprises. APSFC reduced assistance to small and medium scale industries. They are ups and downs in the average size of assistance but the overall sanctions to the small and medium sector on an average show a positive significant growth. The average size of sanctions made to the small-scale sector has been less than that of the small and medium industries. In spite of the assistance rendered by the corporation 96 (80%) entrepreneurs out of 120 are faced with different financial problems. Shortage of working capital and high interest rate has troubled more than 80% of them. 11 Or 50% of the entrepreneurs which are located in villages are faced with shortage of working capital, 32 or 62.75% of the town enterprises find the rate of interest high, 3 or 50% of the district head quarters enterprises are faced with shortage of working capital and 13 or 76.47% of the industrial estate enterprises are faced with shortage of working capital. They also found that more than half of the sample entrepreneurs felt that the loan amount sanctioned has been much less than their requirement. A little more than one third of the sample found needless procedural delays by the corporation a hurdle. 111 (92.50%) entrepreneurs find the loan amounts sanctioned are inadequate. They are also troubled by procedural delays. Therefore they suggested that the APSFC should provide adequate finance to the enterprises with liberal collateral security without delay. Carbo, Rodriguez and G. Udell, (2010) in their study argue that the issue of bank competition and credit availability may matter most to small and medium enterprises because they are more vulnerable to information problems and are much more bank dependent than large enterprises. They suggests that constrained firms with restricted access to the bank loan market may turn to the trade credit market to exploit their investment opportunities, while unconstrained firms would turn to the bank loan market. Additionally they analyse the supply the side the trade credit market by testing whether extension of trade

credit is sensitive to bank lending. They find that there is a significant sensitivity of the extension of trade credit to bank lending for unconstrained firms, thereby suggesting that these financially unconstrained firms may act as lenders due to their easier access to a less costly source of funding. K. Das (2007) in his study observes that there is no transparency regarding the financial conditions of small and medium enterprises. Banks hesitate to give loans to small scale units. Unless fairly detailed information on small firms is available, banks would hesitate to take the risk and may prefer to lend to relatively larger firms and thus leaving smaller firms significantly constrained for capital. He also suggests that improving the quality of financial information is an important requirement for enhancing the flow of funds to the SME sector as the quality of information also influences decisions on loan finance. So here lies the scope of present study, which is a humble attempt to explore the growth and performance of micro and small enterprises in India.

Concept and Definition of MSMEs

Definition of MSMEs approved by the Reserve Bank of India (RBI)

As directed by the Reserve Bank of India in August 2005, a Small and Medium Enterprise can be defined as under :

“At present, a small scale industrial unit is an undertaking in which investment in plant and machinery does not exceed Rs. 1 crore, except in respect of certain specified items, under hosiery, hand tools, drugs and pharmaceuticals, stationery items and sports goods, where this investment limit has been enhanced to Rs. 5 crores. Pending enactment of the comprehensive legislation, the current SSI/Tiny industries definition may continue. Units with investment in plant and machinery in excess of SSI limit and upto Rs. 10 crores may be treated as Medium Enterprises (ME).”

Definition of MSME as per MSMED Act 2006

In India, very recently, a clear cut definition of MSME has been given. In October 02, 2006, Government of India has introduced “Micro, Small and Medium Enterprises Development Act 2006 (MSMED Act).” The Act defined, rather reclassified, the industries based on the investment in the plant and machinery and not on the turnover or employment basis.

As per the Act, the enterprise in the MSME segment have been classified as below:

Enterprises engaged in the manufacturing or production of goods:

Categorisation	Investment in plant and machinery
Micro Enterprises.	Not exceeding Rs.25 lacks.
Small Enterprises.	More than RS.25 lacks but not exceeding Rs.5 crore.
Medium Enterprises.	More than Rs.5 crores but not exceeding Rs.10 crores.

Enterprises engaged in providing or rendering of services:

Categorisation	Investment in plant and machinery
Micro Enterprises.	Not exceeding Rs.25 lacks.
Small Enterprises.	More than RS.25 lacks but not exceeding Rs.5 crore.
Medium Enterprises.	More than Rs.5 crores but not exceeding Rs.10 crores.

From the above discussion we may defined MSMEs as follows :

Micro Enterprises

The enterprise (engaged in the manufacturing or production) whose investment in plant and machinery does not exceed Rs.25 lacks or the enterprise (engaged in rendering of services) whose investment in equipment does not exceed Rs.10 lacks can be treated as Micro Enterprise.

Small Enterprises

The enterprise (engaged in the manufacturing or production) whose investment in plant and machinery is more than Rs.25 lacks but does not exceeds Rs.5 crores or the enterprise (engaged in rendering of services) whose investment in equipment is more than Rs.10 lacks but does not exceed Rs.2 crores is known as Small Enterprise.

Medium Enterprise

The enterprise (engaged in the manufacturing or production) whose investment in plant and machinery is more than Rs.5 crores but does not exceeds Rs.10 crores or the enterprise (engaged in rendering of services) whose investment in equipment is more than Rs.2 crores but does not exceed Rs.5 crores is called Medium Enterprises.

Size of the registered MSME Sector

The size of the registered MSME sector is estimated to be 15,63,974 in 2009-2010. The proportion of micro, small and medium enterprises are shown in figure-1. Figure-1 reveals that out of the total working enterprises, 94.94% are micro enterprises, 4.89% are small enterprises and 0.17% are medium enterprises. Data on this aspect reveals that most of the enterprises in India are Micro Enterprises and only few of them are

Small and Medium Enterprises.

The proportion of rural and urban enterprises is shown in figure-2. Figure-2 reveals that about 45.23% (7.07 lakh) of the units are located in rural areas about 54.77 % are located in the urban areas. Data on this aspect reveals that the maximum number of enterprises are located in the urban areas than that of rural areas.

Table-1
Distribution of registered MSME

Distribution by Nature of Activity	No. in lakh
Manufacturing/ Assembling/ Processing	10.49 (67.10%)
Services	2.62 (16.78%)
Repairing & Maintenance	2.52 (16.13%)
Total	15.64 (100%)

Source: Annual Report 2010- 2011, Govt. of India, Ministry of MSMEs

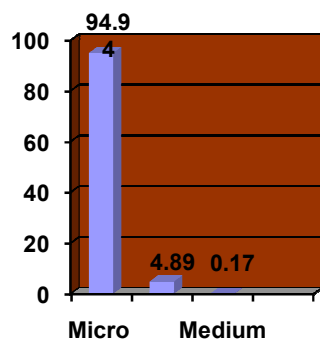


Figure-1

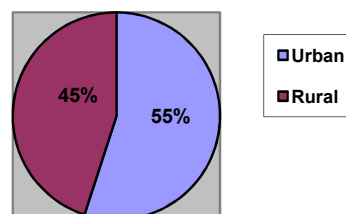


Figure 2

MSMEs are engaged in different activities. The distribution of registered enterprises according to the nature activity is shown in table-1. Table-1 reveals that 67.10 % of the enterprises in the registered MSME sector are engaged in manufacturing/ assembling/processing, whereas 16.78 % of the units are engaged in services activities. The remaining 16.13 % of the enterprises are engaged in the repair and maintenance. Data on this aspect reveals that most of the enterprises in India are engaged in manufacturing/ assembling/processing activities and a few of them are engaged in services, repair and maintenance activities.

The organizations of MSMEs are proprietary, partnership, Pvt. Company, Pub. Ltd. company, Cooperatives and others. The table-2 shows that 90.08 % of the enterprises in the registered MSME sector are proprietary concerns. About 4.01% of the enterprises are run by partnerships , 2.78 % of the enterprises are run by private companies, 0.54% of the enterprises are run by the Public Ltd. companies and the rest are owned by cooperatives and others. Data depicts that most of the enterprises are

proprietary concern followed by partnership and private companies and a few them are belonging to the public Ltd. Companies.

The study found that out of the total registered MSMEs 13.72% (2.15 lakh) (Table- 3) of the enterprises were women enterprises whereas 86.28% (13.49 lakh) were men enterprises. From the angle of community status, it was found out that 7.60% (table-4) of the enterprises were owned by Scheduled Caste (SC) entrepreneurs, 2.87% by Scheduled Tribe (ST) entrepreneurs and 38.28% by entrepreneurs of Other Backward Classes (OBCs). In terms of religion, 81.22% (table-5) units were owned by Hindu whereas domination of Muslim, Sikh , Christian , Jain and Buddhist was 9.11% , 3.31% , 4.12% , 0.52% and 0.07% respectively.

It is cleared that most of the enterprises are managed by the male entrepreneurs and a few of them are managed by the female entrepreneurs. Data also reveals that 48.75% of the working units in the registered MSME sector were being owned by socially backward classes and rest were owned by others. Most of the enterprises are owned by the Hindu and a few of them are owned by the other religion.

Table-2

Type of Organization of MSMEs	
Distribution by type of Organization	No. in lakh
Proprietary	14.09 (90.08%)
Partnership	0.63 (4.01%)
Pvt. Company	0.43 (2.78%)
Pub. Ltd. Company	0.08 (0.54%)
Cooperatives	0.05 (0.30%)
Others	0.36 (2.30%)

Source: Annual Report 2010- 2011, Govt. of India, Ministry of MSMEs.

Table -3

No. of enterprises Managed by	No. in lakh
Male	13.49 (86.28%)
Female	2.15 (13.72%)
Total	15.64 (100%)

Source: Annual Report 2010- 2011, Govt. of India, Ministry of MSMEs.

Table-4

Ownership by type of Social Category:	No. in lakh
---------------------------------------	-------------

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Scheduled Caste(SCs)	1.19 (7.60%)
Scheduled Tribe(STs)	0.45 (2.87%)
OBCs	5.99 (38.28%)
Others	8.02 (51.26%)

Source: **Annual Report** 2010- 2011, Govt. of India, Ministry of MSMEs.

Table-5

Ownership by type of Religion:	No. in lakh
Hindu	12.70 (81.22 %)
Muslim	1.43 (9.11 %)
Sikh	0.52 (3.31 %)
Christian	0.64 (4.12 %)
Jain	0.08 (0.52 %)
Buddhist	0.01 (0.07 %)
Others	0.26 (1.64 %)

Source: **Annual Report** 2010- 2011, Govt. of India, Ministry of MSMEs.

Growth of Micro, Small and Medium Enterprises in India

The growth of MSMEs in India is very slow. This can be understood from the figure-3 and table-6. The figure-3 and table-6 reveal that the number of MSMEs in 2001-02 was 105.21 lakh which had been increased to 113.95 lakh in 2003-04. In 2005-06 the number was 123.42 lakhs which had been increased to 272.79 lakhs in 2007-2008. The number of MSMEs was 285.16 lakh in 2008-09 but it had been reached to 298.08 lakh in 2009-2010. The growth rate of the number of MSMEs was 4.07 per cent which had been remained constant up to the year 2005-06 but after that it had been increased to 111.48 per cent in 2006-07. In 2007-2008 the rate of growth had been felled down to 4.51 per cent . But in that period rate of growth of the enterprises remained constant at 4.53 per cent in 2008-09 and 2009-2010.

Thus it is cleared that the number of MSMEs have been increased during the said period. The growth rate of number of MSMEs was constant during the first five years and it had been reached to highest in 2006-07 but after that it had been declined. The study observed that the rate of growth of MSMEs was very slow during the period.

Number of MSMEs

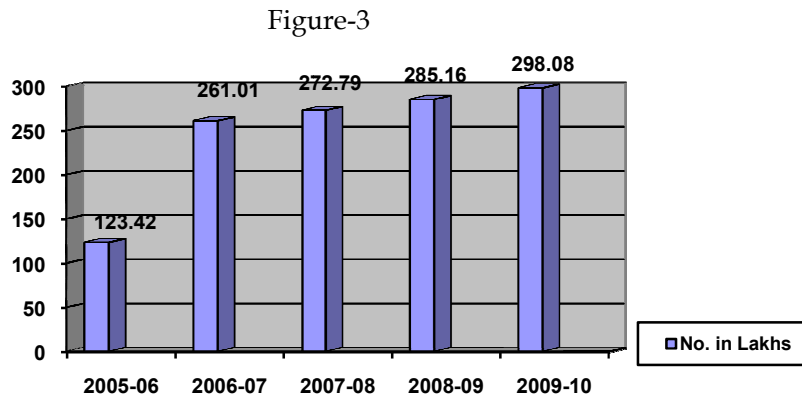


Table-6
Number and growth rate of MSMEs

Year	Number of MSMEs (in lakhs)	Growth Rate
2001-02	105.21	4.07
2002-03	109.49	4.07
2003-04	113.95	4.07
2004-05	118.59	4.07
2005-06	123.42	4.07
2006-07	261.01	111.48
2007-08	272.79	4.51
2008-09	285.16	4.53
2009-2010	298.08	4.53

Source: Annual Report 2010- 2011, Govt. of India, Ministry of MSMEs.

Performance of MSMEs

The micro, small and medium enterprises (MSME) sector contributes significantly to the manufacturing output, employment and exports of the country. It is estimated that in terms of value, the sector accounts for about 45 per cent of the manufacturing output and 40 percent of the total exports of the country. The sector is estimated to employ about 42 million persons in over 13 million units throughout the country. Further, this sector has consistently registered a higher growth rate than the rest of the industrial sector. There are over 6000 products ranging from traditional to high-tech items, which are being manufactured by the MSMEs in India. It is well known that the MSMEs provide the maximum opportunities for both self-employment and jobs after agriculture.

Table-7
MSMEs Performance: Units, Investment, Production, Employment & Exports

Sl. No.	Year	Total MSMEs (lakh Numbers)	Fixed Investment (Rs. Crore)	Production (Rs crore) Current Prices	Employment (lakh person)	Exports (Rs. crore)
1	2001-2002	105.21 (4.07)	154349 (5.11)	822702 (8.03)	249.33 (4.44)	71244 (2.07)
2	2002-2003	109.49 (4.07)	162317 (5.16)	314850 (11.54)	260.21 (4.36)	86013 (20.73)
3	2003-2004	113.95 (4.07)	170219 (4.87)	364547 (15.78)	271.42 (4.31)	97644 (13.52)
4	2004-2005	118.59 (4.07)	178699 (4.98)	429796 (17.90)	282.57 (4.11)	124417 (27.42)
5	2005-2006	123.42 (4.07)	188113 (5.27)	497842 (15.83)	294.91 (4.37)	150242 (20.76)
6	2006-2007	261.01 (111.48)	500758 (166.20)	709398 (42.49)	594.61 (101.62)	182538 (21.50)
7**	2007-2008	272.79 (4.51)	558190 (11.47)	790759 (11.47)	626.34 (5.34)	202017 (10.67)
8**	2008-2009	285.16 (4.53)	621753 (11.39)	880805 (11.39)	659.35 (5.35)	N. A.
9**	2009-2010	298.08 (4.53)	693835 (11.59)	982919 (11.59)	695.38 (5.46)	N. A.

Source: Annual Report 2010- 2011, Government of India, Ministry of Micro Small and Medium Enterprises.

**Projected N.A.: Not Available.

The figures in brackets show the percentage growth over the previous year. The data for the period up to 2005-06 is of small scale industries (SSI). Subsequent to 2005-06, data with reference to micro, small and medium enterprises (MSMEs) are being compiled.

The table- 7 shows the performance of MSMEs on output, production, employment and exports. The table shows that the fixed investment in MSME sector was Rs. 154349 crores in 2001-02 but it had been increased to Rs. 693835 crores in 2009-2010. The rate of growth had been also increased from 5.11 per cent to 11.59 percent in 2009-10. The data reveal that the investment in MSME sector had been increased during the period.

The table depicts that the total production of the MSMEs in India was Rs. 822702 crores (at current prices) in 2001-02 which had been increased to Rs. 709398 crores (at current prices) in 2006-07. In 2007-08 the production was Rs. 790759 crores which had been raised to Rs. 982919 crores in 2009-10. The growth rate in production was 8.03 percent in 2001-02 which had been raised more than doubled to 17.90 per cent in 2004-05. In 2005-06 the rate was downed to 15.83 per cent but after that period

there had been a tremendous growth of 42.49 per cent in 2006-07. The growth of production again downed to 11.59 per cent 2009-10. The data reveals that the production in MSME sector had been increased during the period but the rate of increment was very slow during the mentioned periods.

So far as employment was concerned it was found that employment in MSMEs in India had been increased the throughout the period . The total employment in MSMEs in India figured out as 249.33 lakhs persons in 2001-02 which was geared up to 594.61 lakhs persons in 2006-07. In 2007-08 the total employment was 626.34 lakhs persons which had been sharply increased to 695.38 lakhs persons in 2009-10. The growth rate of employment was 4.44 per cent in 2001-02 which had been raised to 4.37 per cent in 2005-06. During the period of study the rate was highest in 2006-07 as 101.62 per cent but after that period the rate was downed to 5.46 per cent in 2009-10. Thus it can be said that the growth rate of employment in MSME sector has been increased but the rate of increment is very slow.

The total exports of the country's MSMEs were only Rs. 71244 crores in 2001-02 which had sharply increased to Rs. 182538 crores during 2006-07. The rate of growth also increased from 2.07 per cent in 2001-02 to 21.50 per cent in 2006-07.

From the above analysis it is observed that growth rate of employment; production and exports of MSEs in India have been gradually increased over the period from 2001-02 to 2006-07.

Regression Analysis:

In order to analyze the functional relationship among production, employment and investment as well as between export and production the following regression models have been specified. The hypotheses designed for the study have also been tested and confirmed the effect of explanatory variables on the depended variables by employing these regression models. Model1 is a multi-variate regression model that expresses the relationship among production, employment and investment. The level of production is treated as dependent variable while employment and investment are considered as independent variables as shown in the equation below:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + u \quad (\text{model1})$$

Where, Y = Production Level
 X₁ = Employment
 X₂ = Fixed Investment

α is the intercept, β is the coefficient and u is the error term.

The strength of association between dependent and independent variables is represented by the value of R² whose significance is tested by t-statistic. The estimated equation is shown below:

$$Y = 11.377 + 1.164 X_1 - 0.525 X_2$$

(t=9.103) (t=1.365) (t= -1.009)
(se=1.250); (se=0.853); (se=0.520)
R² = 0.922 ; F = 35.490

The estimated equation shows that 92% of the variation in production level is due to the variations in employment and fixed investment over the period under consideration. This implies that production is effected by employment and investment to the extent of 92%. The employment coefficient is found to be positive but statistically not significant at 0.221 level judged by t-statistic. It is estimated that the propensity to change in production due to employment change is 1.164, implying that any increase in employment will cause an increase in output more than employment. Whereas the regression coefficient of fixed investment is negative and significant judged by t-value, indicating a negative association between production level and fixed investment. The negative association is due to the investment reason that with the increase in production the proportion of fixed investment to the total volume of investment decreases, and so the type of fixed investment has negative relationship with the level of production. The standard error of the estimate of production with respect to employment is 0.853 and the same with respect to fixed investment is 0.520. The equation has positive intercept value showing 11.377, which signifies that a small quantum of output was there even at zero level of employment and investment during the study period.

The data related to export and production during the period under consideration have been fitted to regression model2 to estimate the effect of production on export volume of the country. The specified model is as follows:

$$X = \alpha + \beta Y + u \quad (\text{model2})$$

Where, $X = \text{Volume of Export}$
 $Y = \text{Level of Production,}$

and α is the intercept, β is the coefficient and u is the error term.

The estimated equation with regression results is shown below:

$$X = 10.589 + 0.346Y$$

(t=1.768) (t=1.186)
(se=5.989); (se=0.292)
R² = 0.220 ; F = 1.407

The coefficient of determination in the estimated equation is calculated as R² = 0.220, explaining that only 22% of the change in export volume is due to the variation in production level. However, the regression coefficient of production is positive but statistically not significant at 0.289 level as judged by t-statistic. The standard error of the estimate is found to be 0.292. The positive coefficient of output reveals that propensity to change in export volume due to change in production level is 0.346, implying that any increase in production level will cause an increase in export but less than proportionate increase in production during the period under study.

Performance of the Sector in North Eastern Region

It is interesting to know the performance of the MSE sector in the north eastern region. The table-8 depicts that out of the total number of 402209 units in North Eastern Region, Assam ranks the highest number of MSEs (246980 units) whereas the

State of Sikkim shows the lowest number of MSEs (472 units) in 2007-08. The total production of MSEs in Assam was Rs. 8155.1 crores which was highest in 2007-08. The employment in MSEs in Assam was reached to 556896 persons out of the total employment of 1010210 persons in North Eastern Region during 2007-08. The data reveal that in North eastern region Assam ranks the highest in number of MSEs, investment, production and employment. The estimated number of MSE units in North-East, fixed investment, production and employment for the year 2007-08 (Projected) have been incorporated in the table-8.

Table - 8 North East and the MSEs (2007-08)

Name of the State	No. of Units	Fixed Investment (Rs. crore)	Production (Rs crore)	Employment (persons)
Sikkim	472	17.00	73.7	1828
Arunachal Pradesh	1614	46.76	115.2	5060
Nagaland	18653	583.49	897	81608
Manipur	60625	529.53	1168.5	173663
Mizoram	14242	188.66	343.6	32984
Tripura	30772	423.61	765.4	70774
Meghalaya	28851	224.07	799.8	87397
Assam	246980	1733.05	8155.1	556896
Total	402209	3746.17	12318.3	1010210

Source: Directorate of Industries, Government of Assam, Dispur.

The MSE sector has maintained a higher rate of growth vis-à-vis the overall industrial sector as would be cleared from the comparative growth rates of production for both the sectors during last five years as incorporated in the table - 9. The table-9 reveals that MSE sector achieved the growth rate of 8.68 per cent while that of overall Industrial Sector was only 5.70 per cent in 2002-03. The growth rate of MSE sector was 12.60 per cent while that of overall Industrial Sector was 11.5 per cent in 2006-07. It is also cleared from the above table that the growth rate of MSE sector in each year always remains higher than the growth rate of the overall industrial sector.

Table - 9
Comparative Growth Rates of MSE Sector and Overall Industrial Sector in India

Year	Growth Rate of MSE Sector (%)	Overall Industrial Sector (%)
2002-03	8.68	5.70
2003-04	9.64	6.90
2004-05	10.88	8.40
2005-06	12.32	8.10
2006-07	12.60	11.5

Source: Ministry of small industries as given in Economic Survey (2006-2007).

Contribution of MSEs in Gross Domestic Product

The contribution of MSEs in Gross Domestic Product of India has been increased gradually. Table- 10 depicts that the contribution of MSEs in Gross Domestic Product of India was 5.86 percent in 1999-2000 which had been increased to 8.72 percent in 2008-09. The table also reveals that the contribution of MSEs in total industrial production was 39.74 per cent in 1999-2000 which had been increased to 44.86 per cent in 2008-09.

Table - 10
Contribution of MSEs in Gross Domestic Product (GDP) of India

Year	Contribution of MSE (%) at 1999-2000 prices in	
	Total Industrial Production	Gross Domestic Product (GDP)
1999-00	39.74	5.86
2000-01	39.71	6.04
2001-02	39.12	5.77
2002-03	38.89	5.91
2003-04	38.74	5.79
2004-05	38.62	5.84
2005-06	38.56	5.83
2006-07	45.62	7.20
2007-08	45.24	8.00
2008-09	44.86	8.72

Source: Ministry of small industries as given in Economic Survey (2010-2011).

Conclusion

It is observed that the number of MSMEs, the growth rate of employment, production and exports of MSEs in India have been gradually increased over the period from

2001-02 to 2009-10. The contribution of MSEs in Gross Domestic Product of India have been also increased gradually. Regarding performance of MSMEs it is concluded that the production is effected by employment and investment to the extent of 92%. It is estimated that any increase in employment will cause an increase in output more than employment but there is a negative association between production level and fixed investment. The negative association is due to the investment reason that with the increase in production the proportion of fixed investment to the total volume of investment decreases, and so the type of fixed investment has negative relationship with the level of production. It is also observed that only 22% of the change in export volume is due to the variation in production level, implying that any increase in production level will cause an increase in export but less than proportionate increase in production during the period under study.

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An Empirical Analysis on Correlates of Information Technology, Business Process Reengineering and Organizational Culture

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Abstract:

The paper is an attempt to establish empirically the correlates of information technology (IT) and organizational culture (OC) and business process reengineering (BPR) and identify the vital enablers of business process reengineering. The purpose of this study is to assess factors that influence business process reengineering outcome in the context of four major industries in India. An assessment has been made on the impact of the independent variables Information Technology, Strategy, top management commitment and leadership, human resources and organizations culture on the dependent variable BPR outcome. It is found that IT has been extensively used by many firms/organizations as a major enabler of BPR implementation. The organizations which have undergone BPR program using IT as a major enabler has achieved business excellence in terms of lower operating costs, greater flexibility, increased efficiency, reduced cycle time, improved communication, better collaboration etc. It is established from the analysis that the organization culture particularly flexible culture is important for overall achievement through BPR implementation which is followed by awareness, task focused culture, innovative culture etc. The relationship between the role of top management commitment and leadership and outcome of BPR implementation is not found significant.

Key words: *Business Process Reengineering, Top Management, Information technology, Indian Industries, Organization Culture.*

Introduction:

In the present corporate world, the business environment is neither constant nor predictable. The market growth, customer's demand, product life spans, technological change, the nature of competition etc. are changing the world rapidly and in an unexpected way. As a result, customers, competition, and change have taken on

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entirely new dynamics in the business world. Several change agents, including globalization and increasingly sophisticated information technologies are causing organizations to review the essence of doing business. These change agents are forcing nations and their businesses to improve in order to become more competitive. To create an edge over competitors in the competitive business world, many organizations took shelter on different technologies from time to time. Information Technology tools such as databases, networking were used in the business world to automate the existing tasks, central record keeping, helping in making business decisions etc. In 1990, Michael Hammer, a former professor of computer science at the Massachusetts Institute of Technology (MIT), published an article in the Harvard Business Review, in which he claimed that the major challenge for managers is to obliterate non-value adding work, rather than using technology for automating it (Hammer, M.; 1994). This statement stated having focused on the wrong issues, namely that technology. The information technology has been used primarily for automating existing processes rather than using it as an enabler for making non-value adding work obsolete. In the light of the above, the paper attempted to study and to establish empirically the information technology (IT) and organizational culture (OC) as vital enablers of business process reengineering (BPR). The purpose of this study is to assess factors that influence business process reengineering outcome in the context of Indian industries. Specifically, an assessment was done on the impact of the independent variables Information Technology, Strategy, top management commitment and leadership, human resources and organizations culture on the dependent variable BPR outcome.

Conceptual Sketch:

Business Process Reengineering: Business Process Reengineering (BPR) is a method of improving the operation and the outputs of organizations. Usually Business Process Reengineering involves discovering how business processes currently operate, how to redesign these processes to eliminate the wasted or redundant effort, improve efficiently. In the second half of the 1980s companies such as Ford Motor Company and Taco Bell embarked on radical programs of business improvement never before seen in American industry. Faced with global competition and increasingly demanding customers, these companies realized that their old methods for developing, making, and selling products were no longer adequate and required some alternative thinking for survival in the competitive business world. Business process reengineering (BPR) has also become an increasingly significant and integral part of Indian industries. Lately in India, BPR has been implemented in both manufacturing and service industries and its role has grown and changed continuously in both the sectors.

Information Technology: Information Technology deals with the use of electronic computers and computer software to convert, store, protect process, transmit, and

securely retrieve information. Broadly, IT encompasses any information related technologies. These technologies include information processing, transformation of information from one format to the other; information storage related technologies, protection of stored information from unauthorized access, secure retrieval of stored information, and transmission of information from one place to another.

Organizational Culture: Organizational culture, the basic personality of the organization, shapes the behaviors of the people in the organization, which can affect decision making styles (Mack, Crawford and Reed, 2004). Organizational culture is formed by combination of environmental culture and constructed culture. Organizational culture is strongly influenced by the personality traits of most senior managers and stakeholders, who set the management style, with interpretation by managers and process experts at lower levels each wishing to make their mark on the company culture. Organizational culture is an important factor in developing an innovative organizational environment for successful BPR implementation. It is the organizational culture that gives identity, provides collective commitment, builds social system stability and allows people to make sense of the organization.

Literature Review:

Review of literature is carried out in such a way that on one hand it covers the major studies in the area of relevance and on the other hand it explains the various terms like IT, BPR and Organizational Culture etc. The first part exemplifies the need for changing the business process, followed by various definitions of different key terminologies used, the BPR initiatives and its various changing characteristics over the years, phases of BPR, the tools and technique used in BPR, major BPR enablers and various success and failure factors of BPR. The next part discusses how Information Technology is used as an enabler to accomplish reengineering of key business processes. The last part of this chapter discusses various studies in the area of culture/organizational culture and tries to find out if any relevant work has already been done or is being done taking into account the IT interventions in reengineering. This part further discusses the support organizational culture is successful BPR implementation using IT as a major enabler. This literature review also covers the relevant works in the context of Indian and global business organizations.

Call for Change:

In this pace of rapid changes in the markets, shorter product life cycles and consumers' high expectations and demands need basic changes within an organization's structure, culture and other management processes. For this changing market situation, organizations are seeking new management strategy, adopting new cutting edge technologies which ensure them of achieving competitive advantage and enhance profitability over the competitors. In 1989, (Dertouzos et al., 1989) pointed out the concern of North American leaders from business, government and academia of declining productivity leading to the eroding morale among industry. They sensed

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for the first time that something is woefully wrong in the entire business process and recommended for drastic measures in the tune of entire revamp of business process is needed.

(Johansson et al., 1993) demonstrated that since 1950, Western and Eastern countries have been in competition for market share. During the 1950s, Western firms increasingly enjoyed high production years. With "market-driven" philosophy Western firms began to pull away from the rest in the global competition for market share. In order to increase market share and to eventually catch up and overtake the Western firms in the global market, firms from Japan and other Pacific Rim countries began to seek "process excellence" to improve the quality of their products and their bottom line. (Hammer and Champy, 1993) suggested that call for the new competitive firm to be one that is lean, nimble, flexible, responsive, competitive, innovative, efficient, customer focused, and profitable. According to them, "If a company cannot stand shoulder to shoulder with the world's best in a competitive category, it soon has no place to stand at all". It is obvious that today's firms must become relentless in their attempts to delight their customers, to dominate the market in a specific niche, and to ensure profitability.

In competitive market, the change agents of business changes with time. There are several such agents other than the customer which are forcing change. Among these competition, costs, technology, and shareholders are the important ones. Competition can be local, national or global. Many might argue that with the arrival of ever-improving communication technology, there is little difference between global and local competition. The competitor on the other side of the globe is virtually down the Street.

BPR Enablers:

An enabler is a mediator that allows organizations to break their old rules and create new reengineered processes (Hammer & Champy, 1993). According to (Olalla, 2000), BPR is a method which requires change in existing processes and designation of radically new ones and it is expected that some convinced factors make this change possible. These factors are known as enablers and may be defined as elements that act as vehicles for processes to change.

According to (Love and Gunasekaran, 1997), there are four important enablers of BPR such as, IT, total quality management, human resources, and organization. Organizational enablers are categories in to two parts i.e., structural and cultural. Structural enablers are used to demand a change in human resources management, mostly in training areas and reward systems. Moreover, (Marchand and Stanford, 1995) propose that organizations undertaking BPR must look at six dimensions of its organization namely culture, configuration and coordination which represent the firms dynamics and people and information technology which represent the

resources to be redeployed in the engineering effort. According to (Davenport, 1993) Reengineering initiatives are affected by redesigned structures that are more appropriate for empowered employees, workgroups or teams, and employees working within the "virtual" designs of some organizations. Hence, organizational issues structural and cultural as well as human resource (HR) issues that comes with these changes; assume significance. (Love and Gunasekaran, 1997) states that among many structural changes that can facilitate process reengineering; the most effective is the organizing of functional tasks into group based units or teams. Teams perform better as they integrate cross functional skills in single work units. Moreover, teams give opportunities for small talk, development of friendships, social interaction and empathic reactions from other employees.

Information technology:

Information technology (IT) plays an important role in the business process reengineering initiative. Several BPR researchers (Hammer & Champy, 1993; Davenport & Short, 1990) regarded information technology as a crucial component of BPR. According to (Scott-Morton, 1991) IT plays an important role to promote changes in organizations, mostly changes in the nature of the work, the integration of business functions, and the transformation of competitive forces. According to (Hammer & Champy, 1993) Information Technology was originally considered as an enabler for BPR, and role of IT in process improvement has become much greater and more varied. (Kumar, D., Bhatia, A., 2012) states that IT is considered by some as a major enabler of BPR for new forms of working and collaborating within an organization and across organizational borders.

(Hammer 1990; Chan, 2000), states that IT is not only a key enabler of change, but also an initiator and a facilitator. (Broadbent et al., 1999) IT should be viewed as more than an automating or mechanizing force, it can fundamentally reshape the way business is done. It is considered as both a strategic catalyst and enabler of process reengineering. Information Technology that is commonly used in BPR programs includes workflow, automation, ERP, database and related technologies etc (Ahadi, 2004; Ranganathan and Dhaliwal, 2001) highlighted that there are some categories of information technologies that are frequently used in BPR implementation programs such as: Databases and related technologies, Networking and communication, Electronic data interchange (EDI), Workflow automation and GroupWare, Internet web based technology, Enterprise system and enterprise resource planning (ERP), Multimedia and interactive computing.

Organizational culture:

Organizational culture attracts attention from several researchers in recent time. Cultural enablers comprise person's norms, values, and beliefs about how things should be done. Business Process reengineering involves changes that simultaneously demand sharing, innovating, and giving new ideas. All this must be instilled

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gradually by the management so that at the time of redesigning the processes, employees could participate and accept it willingly. Some of the trends in organizational culture are greater empowerment and participation in decision making etc. According to (Love and Gunasekaran, 1997) by this way, employees involved in the process become decision makers through greater empowerment and consequently taking responsibility for the functional and operational procedure of the process. According to (Davenport, 1993a), communication is needed throughout the change process at all levels and for all audiences, even with those not involved directly in the reengineering project (Dixon et al., 1994). Farther more, (Love and Gunasekaran , 1997) highlighted that the best way of implementing BPR, the organizational culture and functional diversity should be fully understood and analyzed by the top management before carrying out any structural changes. (Herzog, et al., 2007) in their study states that education and training is important for any organization to incorporate any kind of change, modification, innovation or process improvement. Education and training in relation to BPR was assessed by them.

Strategy:

Strategy defines as a pattern or plan that integrates an organization's major goals, policies and action sequences into a cohesive whole (Quinn, 1980). (CSC Index, 1994) highlighted that successful BPR implementation is highly dependent on an effective BPR program management. According to (McDonald and Earl, 1995), "IT can best improve an organization's position by supporting a business thrust strategy which should be clear and detailed". Top management should be involved in strategy formulation, as well as providing a commitment for the whole process of redesign, while the IT manager should be responsible for designing and implementing the IT strategy. The degree of alignment between the BPR strategy and the IT infrastructure strategy is indicated by including the identification of information resource needs in the BPR strategy.

Top Management Commitment and Leadership:

Top Management Commitment and Leadership activity involved in establishing and communicating the organizations vision, goal, plans, and values for the quality program. (Belmonte and Murray, 1993), states that for the success of BPR it is important Top management be involved to support the process from the initiation of a project to its completion. Top management is an important enabler of BPR. According to Van De Ven (1986), Top management support is an important ingredient of an innovative organizational environment. Top management support must be obtained and sustained to successfully implement BPR. Since Top management and leadership are involved in BPR their role in the project becomes very important. Top management needs to communicate to its people why the change is necessary and how it will impact everyone's current job and future with the company.

Human resources:

Human resources are also an important enabler of BPR implementation. Hammer and Champy recognize the importance of the human resource when they state "companies are not asset portfolios, but people working together to invent, sell and provide service." Based on this statement, we can state that human factor plays an important role in the daily operations, performance and consequently in the success of organizations. When a company needs motivated employees who accept changes, propose ideas, share, and are able to vary their style of working, and then half of the effort should be centered on human resource management. Therefore, in depth training and motivation aspects must be studied.

Significance of the study:

Reengineering can generate a significant change in product and service requirements, a significant change in controls or constraints imposed on a business process, or a significant change in the technological platform that supports the business process. Implementation of a reengineering initiative usually has considerable impact across organizational boundaries, as well as impact on suppliers and customers. For this reason, it requires both sensitivity to employee attitudes as well as to the ramifications of change on their lives. While Information Technology is being used as a major enabler of BPR, the traditionally run Indian industrial Diaspora may face stiff challenge in coping up their employees with the technologies used.

This work, for the very first time have put forth an interesting interplay of three discrete variables viz. IT, BPR and organizational culture. This conundrum is interesting because it is first attempt to bring forward (i) Identification of the Enablers of BPR in Indian context (ii) The contribution of information technology as an enabler of BPR (iii) Organization culture and its various facilitating and impeding manifestations in Indian contexts especially concerning BPR (iv) To assess the relative role of IT and organization culture in BPR initiative. These relevant but slightly precarious issues have made the study worth doing and significant.

Objectives of the Study:

The aim of the study is to discuss the correlation of Information Technology (IT); Business Process Reengineering (BPR) and Organizational Culture (OC) through the development of an appropriate BPR methodology. The study objectives are -

1. To examine the correlates of information technology, organizational culture and business process reengineering in Indian context.
2. To comprehend the manifestations of organization culture in the backdrop of BPR initiative.
3. To establish the correlates of vital and complementary enablers with each other and their impact on BPR.

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Hypotheses framed:

H1: Information technology is a vital enabler for determining the radical improvements in BPR.

H2: There is negative association among other complementary enablers of BPR

The Research Model:

The literature review reveals that a set of enablers are used in the implementation of Business Process Reengineering (BPR). It further reveals several paradigms in examining the impact of different enablers in BPR implementation. For major improvements BPR is seeking for, the change of structural organizational variables, and other ways of managing and performing work is often considered as being insufficient. For being able to reap the achievable benefits fully, the use of information technology (IT) is conceived as a major contributing factor of BPR. While IT traditionally has been used for supporting the existing business functions, i.e. it was used for increasing organizational efficiency; it now plays a role of enabler in new organizational forms.

This research has developed a model (Figure 1) which shows the relationship of IT, organizational culture and other complementary BPR enablers and their impact on BPR outcome. The proposed model indicates the different variables that help together in enabling Business Process Reengineering (BPR) in one hand, and the relationship of the vital enabler and complementary enablers on the other. In this study an important enabler IT is considered as the independent variable, organizational culture is considered as independent variable of the model and the dependent variable is business process reengineering outcome. The complementary enablers are considered as moderating variables in the model, the way they are implemented will influence the primary effects sought by information technology.

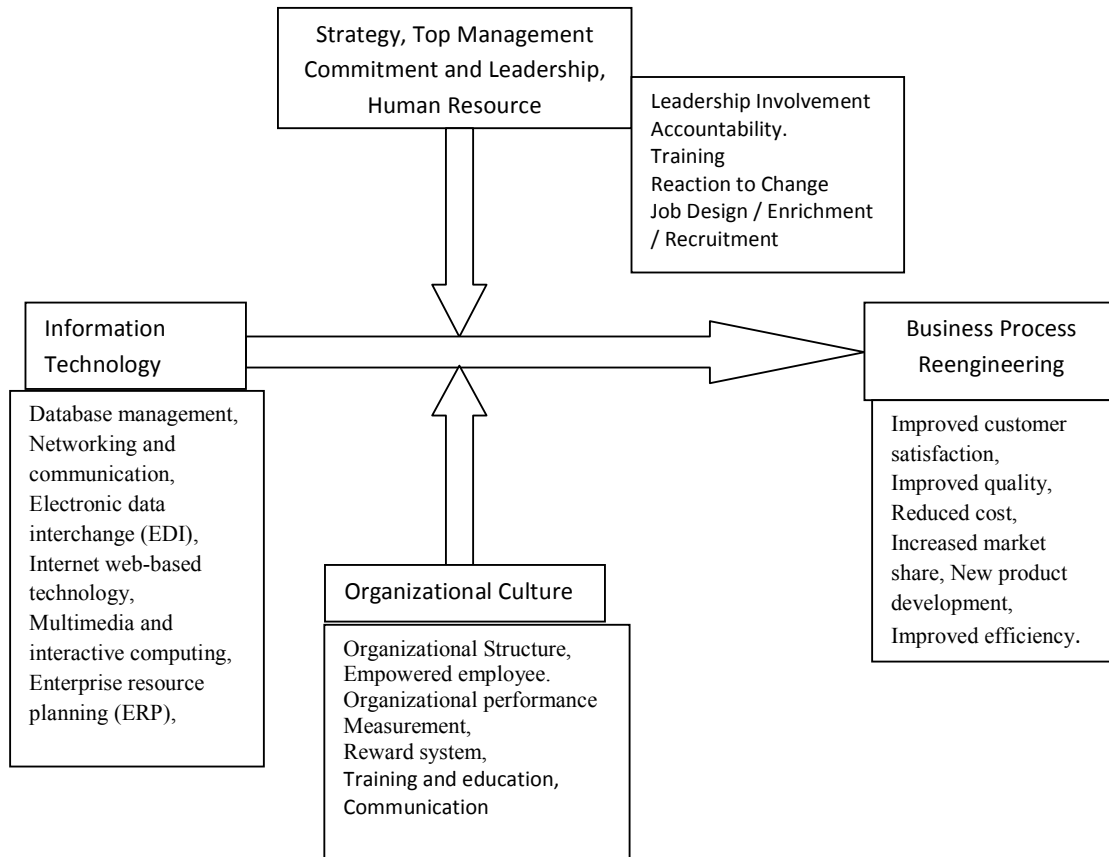


Figure 1: The Research Model

Research Design and Methodology:

This study followed a combination of qualitative and quantitative methods. The qualitative methods involve case studies and interviews; the quantitative method is based on questionnaire based survey. The use of questionnaire that was designed considering expert views on business process reengineering and its enablers. This study further employed personal interview to obtain additional information on the specific areas that the questionnaire instrument did not cover. The secondary data source is extracted from the company’s annual report, journals, textbooks and other relevant publications. Face-to-face interviews represent a primary source of data collection (Davis & Cosensa, 1993). This key informant interview coupled with complementary interviews (were in-depth interrogations of individuals who were

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either front line personnel or managers who initiated the reengineering efforts) were the backbone of data amassing effort. These interviews lasted from 15 minutes to 2 hours.

Quantitative Approach Using Questionnaire Based Survey

The quantitative approach was conducted through a questionnaire based survey. Questionnaire based survey research is designed to ensure objectivity, generalisability and reliability by utilizing techniques for selecting participants randomly from the study population in a balanced way.

Selecting Organizations for Qualitative Research

For this study the researcher has selected four different firms/organizations from India, on the basis of some important criteria. These criteria were derived from the preliminary interview and based on the research objectives. The main criteria for choosing firm/organization are the following.

- a) The firms/organizations which have started/gone through Business Process Reengineering in recent past.
- b) The firms/organizations which have used Information Technology in BPR implementation program.
- c) The firms/organizations which having representation from all sectors of company.

As all the firms/organizations fulfil the criteria, a logical study may be built and the criteria are justified.

Participating Organizations:

Firm/Organization A (Mahindra & Mahindra)

A leading Indian automobile manufacturer of multi-utility vehicles (MUVs) and light commercial vehicles (LCVs), has plants in four locations, an extensive supplier base and a distribution and service network across India. Firm/Organization-A was started in 1945 by a famous industrialist of that time. In 1994, a major restructuring exercise was initiated as part of a BPR program in Firm/Organization-A. Firm/Organization-A outlined three broad phases the client would undergo during a Business Process Reengineering (BPR) program i.e.

- **Long-term Business Strategy:** Firm/Organization-A has been helped by another company to identify suitable business opportunities and craft strategies to capitalize on them, enabling it to achieve its business objectives, despite mounting competition.
- **Process-Centric Enterprise (PCE) Phase I - Preparation:** Firm/Organization-A created a plan for the client to migrate into a Process-Centric Organization.

- **Process-Centric Enterprise (PCE) Phase II - Transformation:** A specific company helped the client become a PCE by redesigning key business processes.

Firm/Organization B (Income Tax Department, GoI)

In recent time Firm/Organization-B has taken a number of initiatives and implemented projects aimed at providing better taxpayer service, reducing compliance burden on tax payers and improving enforcement. These initiatives have benefitted the taxpayers, there remained severe operational bottlenecks and fundamental issues of aligning people, processes and technology. The BPR project in the Firm/Organization-B commenced on 1st May, 2007 and was completed with finalization of 18 reports covering more than 2000 pages within a timeframe of eight months. The BPR project was undertaken in two phases- 'As-is' study phase and 'To-be' Model stage and was conducted at 15 locations which included metros (Delhi, Mumbai and Kolkata), mid-size cities (Hyderabad, Nagpur, Patna, Bhopal, Mysore, Lucknow, Guwahati, Ludhiana and Shillong) and moffusil areas (Hajipur, Mandya and Itarsi). The Business process Re-engineering of the Firm/Organization-B is first such project initiated by the Government of India.

Firm/Organization C (State Bank of India)

The Firm/Organization-C is the largest commercial bank in India. The Firm/Organization-C has started Business Process Reengineering in the mid-nineties and took nearly more than 5 years to implement the reengineered processes across its 9600 branches in India and abroad with McKinsey & Company as consultants. The basic goal of BPR was to create an operating architecture that would facilitate service delivery of international standards. The BPR team is simplifying and redesigning process to leverage the core banking solution platform. Strategies are being evolved for migrating transactions to full set of alternate channels namely, ATM, internet and call centers. After implementation of BPR the Firm/Organization-C has also introduced single window service in its 7,466 branches for increasing customer satisfaction. Moreover, by implementation of BPR the Firm/Organization-C has been given some strategic advantages i.e., lower operating costs, better collaboration, and greater flexibility, reduced cycle time, increased customer satisfaction, improvement in organizational culture etc.

Firm/Organization D (Oil and Natural Gas Corporation)

In 2000, Firm/Organization-D started project ICE (Information Consolidation for Efficiency) with an aim to achieve global standards in operations and introduce new business processes. This was called One Organization, One Data, One Information. The move towards ERP package was to enable the availability of information on a real time basis and the elimination of duplicate activities across business processes by capturing data at the source point. This will, in turn, facilitate decision support, better operation control, and efficient cost management. Firm/Organization-D is a public

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sector enterprise and India's highest profit making corporate, achieving the record of being the first Indian corporate to register a five digit profit figure of Rs.10,529 Crore in the year 2002-03.

Variables selected:

From the literature review, it is observed that there are some variables that would significantly affect a BPR initiative. The variables considered in our study are explained below. The independent variables identified are Information Technology, Organizational Culture, Top Management Commitment and Leadership and Human Resources on the dependant variable i.e., BPR outcome for the purpose of the analysis.

Questionnaire Development:

For this study a questionnaire was developed which is based on literature review. The questionnaire contained a thorough brief and clear instruction, and was arranged to facilitate ease of response, where the respondents were advised by cover letter of the nature of the research, the researcher's background and education, and why the research was being carried out. Respondents were informed that they would need a maximum of 30 minutes time to answer the complete questionnaire. They were further assured about confidentiality of the information provided by them. The survey questionnaire was created to obtain the necessary data that were used to analyze the hypotheses. The questionnaire was mainly divided into two parts. The first part asked the basic information about the interviewees and their organization while the second part asked the respondents on their views on the different relevant constructs of the research such as use of Information Technology in business, Outcome of BPR, Organizational Culture, role of other BPR enablers like Strategy, top management and leadership and human resource. All variables were measured with multiple questions using a five point Likert scale. Most of the questionnaires were sent by post and e-mail. For some organizations the questionnaires were distributed in person to the respondents. After answering the questions, the questionnaires were either returned by post, e-mail or asked to collect. For this study, a total number of 400 questionnaires were sent to five organizations. From one organization the researcher has received very less responses (only 4 numbers), so that organization has been dropped for further study. And remaining four organizations were used for further study. From those four organizations the researcher has received 92 number of responses used for analysis.

Sampling Technique

This study involved companies/organizations from India which have gone through the process of BPR using IT as an enabler. Initially, with the help of Prowess database, a set of top fifty companies/organizations was selected. A questionnaire was floated among the selected companies to get some basic information. After receiving the replies, a group of four experts have checked the veracity of claims made by the firms.

Only on becoming reasonably sure that the firm has undergone reengineering through sustained interface with IT; it was selected for our study. As per the suggestions of the group of experts, a set of four companies were finalized from divergent sectors. The set included private sector, government sector, financial sector and manufacturing sector.

This study required at least two in-depth informant interviews per firm followed by interviews using open-ended questionnaires with several other individuals. A non-probability sampling approach was used for the selection of participants. Every effort is made to ensure that informants represented a cross section of those involved in the reengineering process at various levels in the organizations. It was also ensured that the informants are representative mix of senior, middle and front-line staff.

Reliability and Validity of the questionnaire

Questionnaire validation is a great concern for the researcher because validity permits the researcher to find out if the research fits the reality and if the researcher is measuring what the researcher really wants to measure, in accordance with his/her research questions, objectives and purpose of the study. Validity and reliability are properties of a measurement questionnaire that gives the research community confidence in the results of the study. For this study, the construct reliabilities (Cronbach's alpha) are computed based on the several questions that were asked to measure each construct and all the values were found greater than 0.7.

Data Analysis and Results:

Demographic Statistics:

The respondents were asked to furnish information about their gender, designation, age group and length of service. For this information, the researcher used descriptive statistical analysis, such as frequencies, percentage, valid percent and cumulative percent so as to present the data systematically and meaningfully with the aim of emphasizing any characteristics and trends of the questionnaires, while at the same time providing sufficient statistical support to the findings. Moreover, the researcher presents the results by using the Statistical Package for Social Science (SPSS v 17.0). The descriptive statistics on the respondents' gender is shown in Table 1. The results indicate that there is a good representation of male and females in the sample, although there are more male than there are females. Out of 92 respondents 71 are male (77.2%) and female respondents are 21 (22.8%).

Table 1: Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	21	22.8	22.8	22.8
	Male	71	77.2	77.2	100.0
	Total	92	100.0	100.0	

Source: Self calculated on the basis of primary data collected.

Designation of the respondents:

The descriptive statistics for the designation of the employees are shown in the Table 2. The results indicate that out of 92 respondents the majority of respondents are Staff (48), the valid percentage is 52.2 percent. Total numbers of 22 Assistant Managers has given the replies and their valid percent is 23.9 percent. From Deputy Director the researcher has received 5 responses and their valid percent is 5.4 percent. The researcher has received 17 responses from Manager of various organizations; the valid percent is 18.5 percent.

Table 2: Designation of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Asst. Manager	22	23.9	23.9	23.9
	Deputy Director	5	5.4	5.4	29.3
	Manager	17	18.5	18.5	47.8
	Staff	48	52.2	52.2	100.0
	Total	92	100.0	100.0	

Source: Self calculated on the basis of primary data collected.

Age Group:

The responses of the participants on the age group are shown in Table 3. The number of responses were received from less than or equal to 30 age group is 17 numbers (18.5%), the valid percentage is 18.5 percent, the highest numbers of responses were received from 31 to 40 age group, 42 numbers (45.7%), the valid percent is 45.7 percent. From the age group of 41 to 50 the total number of 25 (27.2%), valid percent is 27.2 percent and from more than 50 ages group total number of 8 (8.7%), valid percent is 8.7 percent responses were received.

Table 3: Age Group

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than or equal to 30	17	18.5	18.5	18.5
	31 to 40	42	45.7	45.7	64.1
	41 to 50	25	27.2	27.2	91.3
	More than 50	8	8.7	8.7	100.0
	Total	92	100.0	100.0	

Source: Self calculated on the basis of primary data collected.

Length of Service (Years):

The descriptive statistics on the respondent's years of experience is shown in Table 4. In the table it is shown that total number of respondents are 92, missing value is zero, mean is 13.66 and standard deviation is 6.172.

Table 4: How long in this role (Years)?

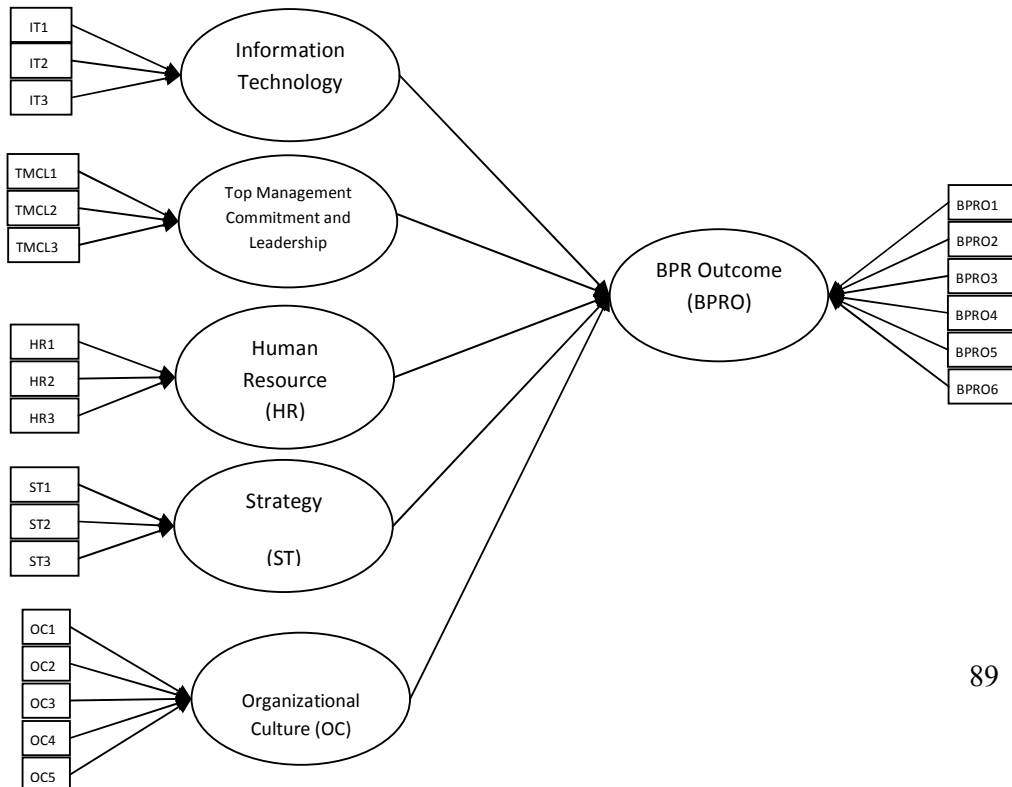
N	Valid	92
	Missing	0
Mean		13.66
Std. Deviation		6.172
Minimum		4
Maximum		30

Source: Self calculated on the basis of primary data collected.

Construct Validity and Reliability Analysis:

The conceptual framework is pictorially presented in the figure 2. The model depicts the relationship between the latent constructs and their associative measurements including correlation among them.

Figure 2 : The measurement and structural Model of the Research



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An exploratory factor analysis was conducted to confirm the construct validity. The exploratory factor analysis used Principal Component Analysis with Varimax rotation and Kaiser Normalization. The results (factor loadings and cross loadings) obtained in the experiment is presented in Table 5. All factor loadings were found to be greater than .5, with 21 of the 23 factors being greater than .5. All the items perfectly load on the correct latent constructs, supporting the good factorial validity of the measurement instruments. Table-5 shows the factor loadings, cross loadings and reliability constructs.

Table 5: Factor Loadings, Cross Loadings, and Reliability of Constructs

	Component of Construct					
	BPRO	IT	HR	ST	TMCL	OC
OC1	.264	-.189	.609	.235	.033	.551
OC2	-.055	-.429	-.256	-.372	.107	.518
OC3	.257	.041	.677	.069	.143	.330
OC4	.199	.179	-.044	.123	-.077	.722
OC5	-.329	.101	.187	-.101	-.050	.730
BPRO1	.681	.105	.297	-.049	-.002	-.064
BPRO2	.619	.386	.069	.166	.183	.060
BPRO3	.467	.577	.151	-.079	.102	-.097
BPRO4	.750	.260	-.003	-.010	.021	-.019
BPRO5	.592	.163	.235	.304	-.038	.095
BPRO6	.820	.087	.022	.105	-.062	.013
IT1	.232	.769	.014	-.183	.026	.042
IT2	.077	.820	.036	-.005	-.108	.140
IT3	.335	.813	.048	-.030	.079	.046
TMCL1	.072	-.147	.100	.157	.804	-.107
TMCL2	-.070	.350	-.056	-.066	.734	.066
TMCL3	.029	-.061	.029	-.032	.879	-.018
HR1	-.048	.042	.815	-.012	.042	-.178
HR2	.103	.528	.707	.097	-.007	-.006
HR3	.226	.067	.729	.339	-.077	-.005
ST1	.320	.025	.022	.788	.142	-.012
ST2	-.038	-.131	.109	.836	-.208	.048
ST3	.001	-.150	.355	.665	.291	-.040

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

*Rotation converged in 7 iterations.

Source: Self calculated on the basis of primary data collected.

In this study, the researcher implemented analysis for reliability testing and assessment after collecting the questionnaires and used the test for Cronbach's alpha, which is one of the most commonly used reliability coefficients among researchers. The construct reliabilities (Cronbach's alpha) based on the several questions that were asked to measure each construct, which is presented in Table 6. The Cronbach's alpha values were all greater than 0.7. The reliability statistics are presented in table-6.

Table 6: Reliability Statistics of Instruments

Constructs	Questions	No. of Questions	Cronbach's alpha
BPR outcome (BPRO)	2.1	5	.786
Information Technology (IT)	2.2	3	.816
Organizational culture (OC)	2.3	4	.655
Strategy	2.4	3	.707
Top Management commitment and Leadership (TMCL)	2.5	3	.747
Human Resources (HR)	2.6	3	.729

Source: Self calculated on the basis of primary data collected.

The reliability of these constructs was also confirmed by the results of a confirmatory factor analysis done using AMOS, and is consistent with the good Cronbach's alpha values obtained in the exploratory factor analysis presented earlier. The confirmatory factor loadings and their significance for the six constructs are shown in Table- 7. All of the factors loading estimates are greater than .5 and most of them greater than .7.

Table 7: Confirmatory Factor Loading and Significance

Constructs	Components	Factor Loading	Significance
BPR outcome(BPRO)	BPRO 1	.691	Yes
	BPRO 2	.625	Yes
	BPRO 3	.451	No
	BPRO 4	.765	Yes
	BPRO 5	.602	Yes
	BPRO 6	.841	Yes
Information Technology (IT)	IT1	.784	Yes
	IT 2	.854	Yes
	IT 3	.823	Yes
Organizational Culture (OC)	OC 1	.542	Yes
	OC 2	.521	Yes
	OC 3	.321	No
	OC 4	.745	Yes
	OC 5	.731	Yes
Strategy (ST)	ST 1	.812	Yes
	ST 2	.845	Yes
	ST 3	.671	Yes
Top management commitment and leadership (TMCL)	TMCL 1	.8211	Yes
	TMCL 2	.772	Yes
	TMCL 3	.892	Yes
Human Resources (THR)	HR 1	.842	Yes
	HR 2	.728	Yes
	HR3	.719	Yes

Source: Self calculated on the basis of primary data collected.

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Furthermore, the factor loading estimates were found to be statistically significant ($p < .05$) except the factors ie, greater flexibility and innovative culture to support BPR program. The relatively high ($> .7$) significant factor loadings suggest good convergent validity. The good construct reliability and validity obtained in this study suggest that the measurement model is adequate, and therefore the descriptive statistics of the six constructs can now be meaningfully presented.

Descriptive statistics for latent constructs:

The latent constructs statistical descriptions are shown in the following Table 8. The results show that for the respondents mean of BPR Outcome, IT, Top Management Commitment and Leadership, Human Resource, Organizations Strategy, Organizational Culture are 4.3013, 4.4420, 4.1014, 3.6486, 3.9710 and 3.8406. The standard deviation in the given sequence are .38089, .55494, .39761, .58547, .40040 and .24324.

Table 8: Descriptive Statistics for Latent Constructs

Constructs	Questions	N	Mean	Std. Deviation
BPR Outcome	2.1	92	4.3013	.38089
IT	2.2	92	4.4420	.55494
Top Management Commitment and Leadership	2.3	92	4.1014	.39761
Human Resource	2.4	92	3.6486	.58547
Organizations Strategy	2.5	92	3.9710	.40040
Organizational Culture	2.6	92	3.8406	.24324
Valid N (listwise)		92		

Source: Self calculated on the basis of primary data collected.

In order to analyze the enabling factors of BPR, regression analysis have been employed considering the independent variables as IT and IC and BPR as dependent variable. The ANOVA result found is displayed in table-9

Table-9: ANOVA^c

	Sum of Squares	df	Mean Square	F	Sig.
Regression	4.352	2	2.176	21.886	.000 ^b
Residual	8.849	89	.099		
Total	13.202	91			

b. Predictors: (Constant), IT Use, Organizational Culture

c. Dependent Variable: Mean BPR Outcome

The statistically significant F ratio indicates that the correct enablers of BPR chosen in the model. It appeared from the analysis that both IT and Organisational culture are the enablers of BPR outcome. The higher 't' value of IT use, however, indicates that use of IT is the major enabler of BPR. This requires a further enquiry on the relationship of IT use with components of the BPR outcome. For this purpose, we have employed correlation matrix analysis. The result of the analysis are shown in table-11.

The other regression results may be had from table-10

Table-10: Regression Coefficients^a

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.831	.538		1.545	.126
IT Use	.696	.141	.444	4.924	.000
Organizational Culture	.179	.062	.261	2.897	.005

a. Dependent Variable: Mean BPR Outcome

Variables	IT Use	BPR Advantages - Low Operating Cost	BPR Advantages - Better Collaboration	BPR Advantages - Greater Flexibility	BPR Advantages - Increased Efficiency	BPR Advantages - Reduced Cycle Times	BPR Advantages - Improved Communication
IT Use	1						
	92						
BPR Advantages - Low Operating Cost	.301**	1					
	91	91					
BPR Advantages - Better Collaboration	.392**	.377**	1				
	89	88	89				
BPR Advantages - Greater Flexibility	.330**	.350**	.377**	1			
	90	89	87	90			

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BPR Advantages - Increased Efficiency	.458**	.392**	.494**	.427**	1		
	88	87	86	86	88		
BPR Advantages - Reduced Cycle Times	.404**	.305**	.433**	.271**	.387**	1	
	90	89	87	90	86	90	
BPR Advantages - Improved Communication	.404**	.424**	.529**	.322**	.495**	.503**	1
	90	89	87	88	86	88	90

** . Correlation is significant at the 0.01 level (2-tailed).

Source: Self calculated on the basis of primary data collected.

The component wise analysis of variables also shows that the correlation values of components of BPR with IT are significant indicating that IT becomes a major enabler of all the component of BPR. In order to assess the association ship between organizational culture and BPR, the correlation analysis has been employed. The result obtained is presented in table-12

Table-12: Correlations

		Organizational Culture	BPR Outcome
BPR Outcome	Pearson Correlation	.383**	1
	Sig. (2-tailed)	.000	
	N	92	92

** . Correlation is significant at the 0.01 level (2-tailed).

Source: Self calculated on the basis of primary data collected.

The significant 'r' value (0.383) indicates that organizational culture as push factor affecting the BPR process. A further analysis has been done to examine impact each individual factor of organizational culture in the BPR process. For this purpose multiple regression model has been fitted over the independent variables ie, on the factors of OC viz, Task focused culture, Flexible Culture, Innovative Culture, Awareness about Organizational Culture Importance and Sharing Culture considering BPR outcome as dependant variables.

The ANOVA result found are given in table-13.

Table-13: ANOVA^e

	Sum of Squares	df	Mean Square	F	Sig.
Regression	5.146	5	1.029	11.366	.000 ^e
Residual	7.243	80	.091		
Total	12.389	85			

e. Predictors: (Constant), Task focused culture, Flexible Culture, Innovatiove Culture, Awareness about Organizational Culture Importance, Sharing Culture

Dependent Variable: Mean BPR Outcome

The regression co-efficients found are presented in table-14

Table-14: Regression Coefficients^a

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.953	.589		1.618	.110
Task focused culture	.207	.087	.266	2.389	.019
Flexible Culture	.366	.083	.427	4.425	.000
Innovative Culture	-.033	.088	-.043	-.377	.707
Awareness about Organizational Culture Importance	.267	.099	.252	2.680	.009
Sharing Culture	.036	.098	.033	.367	.715

Dependent Variable: Mean BPR Outcome

Source: Self calculated with SPSS on the basis of primary data collected.

The above analysis shows that all the components of are significant except innovative culture (t = -0.377) which is not statically significant. The flexible culture appeared to be the important parameter for BPR outcome followed by awareness about organizational culture and task focused culture.

Taking queue from earlier analysis, an attempt has been made to examine the impact of other complementary factors such as top management commitment, human resources, organizational strategy etc on BPR outcome. For this purpose, regression analysis has been employed over all the variables. The ANOVA results found are presented in table-15.

Table-15: ANOVA^f

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	5.455	5	1.091	12.112	.000 ^e
Residual	7.747	86	.090		
Total	13.202	91			

e. Predictors: (Constant), IT Use, Organizational Culture, Top Management Commitment, Human Resource, Organizations Strategy

Dependent Variable: Mean BPR Outcome

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The other regression coefficients are exhibited in table-16.

Table-16: Regression Coefficients^a

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.128	.673		-.190	.850
IT Use	.654	.135	.418	4.831	.000
Organizational Culture	.157	.061	.228	2.587	.011
Top Management Commitment	.054	.080	.056	.675	.501
Human Resource	.156	.057	.240	2.734	.008
Organizations Strategy	.109	.081	.114	1.333	.186

a. Dependent Variable: Mean BPR Outcome

Source: Self calculated with SPSS on the basis of primary data collected.

The F ratio indicates that all the identified factors put in the model is accurate. The 't' values of each individual factor indicates that apart from IT and organizational culture, all other factors like top management commitment , human resources and organizational strategy used to influence the BPR outcome.

Empirical Findings

1. IT has been extensively used by many firms/organizations as a major enabler of BPR implementation. In this research, we have attempted to find the relationship between use of IT and BPR in the context of Indian firms/organizations. The correlation study explored that the use of IT is closely associated with achieved BPR outcome.
2. The firms/organizations which have undergone BPR program using IT as a major enabler has achieved business excellence in terms of lower operating costs, greater flexibility, increased efficiency, reduced cycle time, improved communication, better collaboration etc. The study revealed that increase in business efficiency is a major achievement for Indian firms/organizations.
3. The organization culture is considered to be an important facilitator for process changes. Innovative culture helps in understanding the technology used and gains the maximum out of it. The study found that a flexible culture is important for overall achievement through BPR implementation. This is followed by awareness, task focused culture, innovative culture etc.
4. The relationship between the role of top management commitment and leadership and outcome of BPR implementation is not found significant. The

5. Correlation between the top management commitment and leadership and BPR outcome signifies less association. The result suggests that there is a lapse in motivating of employees from the top level management of a firm. The result further indicates that the top level managers should increase the frequency of communication with the employees to achieve the goal of BPR implementation.
6. Human resource plays a critical role in the success of any organization. This study also hints the same as the obtained relationship between the BPR outcome and human resource is high. Training of employees emerges out as a very important factor in human resource.
7. This study shows that the role of strategy in successful implementation of BPR program is significant. The analytical result explains that for successful implementation of BPR program having a right strategy is very important.

Direction for Future Research

A study considering specific type of firms/organizations may be taken up so that the result can be a well representative of the considered type. This study only considered the significant enabler of BPR. However few more enabling factors such as worker productivity increase, defect reduction, customer satisfaction etc. could have been also considered. An extensive study involving the entire BPR enabling factor would have revealed more interesting and realistic result.

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Critique on Literature Review on Customer Satisfaction in the Telecom Sector in India

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Abstract:

The concept of customer satisfaction has attracted much attention in recent years. Customer Satisfaction has now become the key to compete and survive in today's competitive scenario. Telecom Sector in particular has been one of the most competitive one and with tariffs dropping to one paisa per second. Now it is only Customer Satisfaction which can guarantee incremental revenues for an Operator. The objective of this paper is to do a detailed review of literature of customer satisfaction in Telecom Sector in India and is a part of a doctoral thesis. This paper tries to understand the work done so far on this subject and also identify the direction for further research in this area. Review is done in a sequential manner from 1980 onwards on what various authors have opined on customer satisfaction on an overall basis. Review of Literature on Customer Satisfaction in the Telecom Sector on three aspects: International Scenario, Domestic Scenario and Special review on Assam and North East. The key findings of this paper are: The review of literature on customer satisfaction indicates that customer satisfaction is a widely researched area in the field of service sector. There are various variables which impact or determine customer satisfaction which can vary from customer perception to the actual experience of the product or service. In the field of Telecommunication, studies indicate that customer satisfaction is dependent on price, service quality and market perception. It is seen that findings from the studies on service sector in India and abroad is co related to the findings in the studies done on Telecom Sector in particular

1. Introduction:

The Telecom services sector was opened for private participation in 1994, based on National Telecom Policy (NTP) framed in that year which initiated the first generation reform process. However, in line with the rest of the world, the policy makers in India adopted an evolutionary approach towards competition and opted for limited competition that is allowing only two players in each of the four metro circles, which

were opened for private players. Then Bharti Airtel & Hutch came in to existence in 1995. In 2001 VSNL & MTNL were allowed as third players. (Source: information from TRAI and DoT)

In 2003 RCom entered the telecom market as the fixed services operator which was later on converted to Unified Access License. The abolition of incoming call charges in 2003 and finally issue of additional licenses in 2008 brought the rates to a level which is uneconomical and unviable. (Source: information from TRAI and DoT)

Indian telecom industry underwent a high pace of market liberalization and growth since 1990s and now has become the world's most competitive and one of the fastest growing telecom markets. The Industry has grown over twenty times in just ten years; from under 37 million subscribers in the year 2001 to over 846 million subscribers in the year 2011. India has the world's second-largest mobile phone user base with over 929.37 million users as of May 2012 (Source: www.indiatelecomonline.com/tariff-war-in-telecom and data as per TRAI)

As the current market place becomes more competitive, consumers tend to become more and more demanding. Mobile telecommunication service sector in India has been experiencing the highest growth rate in terms of subscribers and revenues. With the increasing competition in cellular services, the consumers are demanding more. The main condition for protecting the subscriber base is to win customer satisfaction (S K Chadha and Deepa Kapoor, 2009)

2. Review Methodology:

In order to undertake the review of literature, detailed review was done in the following manner:

- I. Review of year wise, author wise work done on Customer Satisfaction. Various definitions on customer satisfactions were also studied and the ones suiting this research were taken up in this paper.
- II. Review of Studies undertaken on Customer Satisfaction in general and Service Sector in particular. International studies were also reviewed to understand the work done so far.
- III. After having done this, research studies done on Customer Satisfaction in Telecommunication were review at three stages: a) International, b) National and c) Specific to Assam and North East in India.
- IV. Review of Regulatory guidelines and survey and audit done by TRAI was also studied for Assam and North East from Customer Satisfaction perspective.

3. Customer's Satisfaction Definition:

Oliver (1980) defines that "Customer satisfaction is a summary psychological state when the emotions surrounding disconfirmed expectations are coupled with the

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consumer's prior feelings about consumption experience". According to Churchill and Surprenant (1982), "Customer satisfaction is an output, resulting from the customer's pre-purchase comparison of expected performance with perceived actual performance and incurred cost".

Parasuraman *et al.* (1994) have put further put forward the simple and clear definition for satisfaction. They suggest that satisfaction is influenced by service quality, product quality and price. They researched satisfaction on a transaction level, implying that the overall satisfaction is a function of transactions. Yi (1991) opines that the customer satisfaction operates in two different ways: transaction-specific and general overall. The transaction-specific concept concerns customer satisfaction as the assessment made after a specific purchase. Overall satisfaction refers to the customer's rating of the brand, based on all encounters and experiences (Johnson and Fornell, 1991).

Customer satisfaction is an important tool that can increase profits by preventing customers from defecting (Reichheld and Sasser, 1990). Linking to Telecom Sector; Bei and Chiao (2001) concluded that customer satisfaction has got a positive effect on customer retention. Fornell (1992) concluded that customer satisfaction heightens customer loyalty and prevents customer churn (a very important aspect for Telecom Service Providers), lowers the customers' price sensitivity, reduces the costs of failed marketing and of new customer creation, reduces operating costs due to the increase in the number of customers, improves the effectiveness of advertising and enhances business reputation.

4. Customer Satisfaction Studies- Overall:

Customer satisfaction has been a popular topic in marketing practice and academic research since Cardozo's (1965) initial study of customer effort, expectations and satisfaction. Customer satisfaction is typically defined as a post consumption evaluative judgment concerning a specific product or service (Gundersen, Heide and Olsson, 1996). It is the result of an evaluative process that contrasts pre-purchase expectations with perceptions of performance during and after the consumption experience (Oliver, 1980). The most widely accepted conceptualization of the customer satisfaction concept is the expectancy disconfirmation theory (McQuitty, Finn and Wiley, 2000). The theory was developed by Oliver, who proposed that satisfaction level is a result of the difference between expected and perceived performance.

Satisfaction (positive disconfirmation) occurs when product or service is better than expected. On the other hand, a performance worse than expected results in dissatisfaction (negative disconfirmation). Studies show that customer satisfaction may have direct and indirect impact on business results. Luo and Homburg (2007) concluded that customer satisfaction positively affects business profitability. The majority of studies have investigated the relationship with customer behavior patterns (Dimitriades, 2006; Olorunniwo *et al.*, 2006; Chi and Qu, 2008; Faullant *et al.*,

2008). According to these findings, customer satisfaction increases customer loyalty, influences repurchase intentions and leads to positive word-of-mouth. Given the vital role of customer satisfaction, it is not surprising that a variety of research has been devoted to investigating the determinants of satisfaction.

Satisfaction can be determined by subjective (e.g. customer needs, emotions) and objective factors (e. g. product and service features). Applying to the hospitality industry, there have been numerous studies that examine attributes that travelers may find important regarding customer satisfaction. Atkinson (1988) found out that cleanliness, security, value for money and courtesy of staff determine customer satisfaction. Knutson (1988) revealed that room cleanliness and comfort, convenience of location, prompt service, safety and security, and friendliness of employees are important. Barsky and Labagh (1992) stated that employee attitude, location and rooms are likely to influence travelers' satisfaction.

A study conducted by Akan (1995) showed that the main determinants of hotel guest satisfaction are the behavior of employees, cleanliness and timeliness. Choi and Chu (2001) concluded that staff quality, room qualities and value are the top three hotel factors that determine travelers' satisfaction.

Customer service is a system of activities that comprises customer support systems, complaint processing, speed of complaint processing, ease of reporting complaint and friendliness when reporting complaint (Kim, Park and Jeong, 2004). Customer services are the opportunities for telecom service providers that are added to mobile network other than voice services in which contents are either self produced by service provider or provided through strategic compliance with service provider (Kuo, Wu and Deng, 2009).

The improved customer services are the focal point of the telecom service providers for social as well as for economic reasons. From a social point of view, services should be available to the customers on reasonable terms. As far as economic factor is concerned, services should satisfy the needs of the customers (Turel and Serenko, 2006; Melody, 1997). For developing satisfaction among customers, the telecom service providers need to be extra careful for the customer services they provide. Satisfaction of customer is determined by his evaluation of service provided by a brand (Gustafsson, Johnson and Roos, 2005). The study of Ahn, Han and Lee (2006) shows that when the customers, do not get their complaints considered properly, they start looking for other brands. It happens because either the customer service centers do not handle the complaints or the customers are not able to address them properly. Sometimes, telecom service providers take considerably longer time to resolve the problems like network coverage or call quality, the customers do not wait for long and hence they lose satisfaction with that particular brand (Ahn, Han and Lee, 2006).

Furthermore, the friendly attitude and courteous behavior of the service workers at service firms leaves a positive impression on the customer which lead towards

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customer satisfaction (Soderlund and Rosengren, 2008). On the other hand, if a telecom service provider lacks in providing services (call drops) to its customers it experiences customer churn. Kim, Park and Jeong (2004) argued that service provider should provide customer oriented services in order to heighten up customer satisfaction. It was also found that the customers get satisfied to a brand more if they get all the needed services accumulated in that very brand (Ahn, Han and Lee, 2006).

Attempt has also been made to sequentially check author wise work done on Customer Satisfaction from 1980 onwards: Following is the summary

Table 1: Summary of contributions from various authors on Customer Satisfaction from 1980 onwards

Authors	Year	Comments on Customer Satisfaction
Oliver	1980	Customer Satisfaction is the result of an evaluative process that contrasts pre purchase expectations with perceptions of performance during and after the consumption experience
Churchill and Surprenant	1982	It is an outcome of purchase and use resulting from the buyer's comparison of the rewards and costs of the purchase relative to anticipated consequences. Operationally, similar to attitude in that it can be assessed as a summation of satisfactions with various attributes
Reilly	1983	He defines consumer satisfaction as either a cognitive response or an effective response
Day	1984	The evaluative response to the current consumption event The consumer's response in a particular consumption experience to the evaluation of the perceived discrepancy between prior expectations (or some other norm of performance) and the actual performance of the product perceived after its acquisition

Parasuraman	1985	It is the traditional notion that views quality as the customer's perception of services excellence, i.e. quality is the customer's impression of the services provided".
Westbrook	1987	He defines satisfaction as a "global evaluative judgment about product usage/consumption". It provides little guidance for developing context-specific measures.
Atkinson	1988	He found out that cleanliness, security, value for money and courtesy of staff determine customer satisfaction.
Tse and Wilton	1988	The consumer's response to the evaluation of the perceived discrepancy between prior expectations (or some norm of performance) and the actual performance of the product as perceived after its consumption.
YI	1990	Satisfaction is a process or outcome
Bolton	1991	A customer is satisfied when an offering performs better than expected and is dissatisfied when expectations exceed performance or when actual experience exceeded from expectations.
Fornell	1992	High customer satisfaction leads to a stronger competitive position resulting in higher market share and profit.
Peterson and Wilson	1992	Studies of customer satisfaction are perhaps best characterized by their lack of definitional and methodological standardization.
Oliver	1993	Customer satisfaction can be derived from product
Taylor and Baker	1994	Satisfaction and loyalty are recognized as strongly related
Parasuraman	1996	Customer satisfaction also contributes to customer retention

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Heskett	1997	Satisfied employees tend to be more involved, dedicated, have greater organizational commitment, more loyal and productive towards customer needs, thus enhancing customer satisfaction, which is the ultimate aim of businesses today
Roger	1998	Expectations and disconfirmation are important variables to explain customer satisfaction
Reynolds and Arnold	2000	Satisfied customers have a higher likelihood of recommending that others try the source of satisfaction
Homburg & Giering	2001	Customer satisfaction can be defined —as the result of a cognitive and affective evaluation, where some comparison standard is compared to the actually perceived performance. The satisfaction judgment is related to all the experiences made with a certain supplier concerning his products, the sales process, and the after-sale service.
Johnson	2002	Customer satisfaction can be empirically measured and meaningfully compared as a weighted-average or index of satisfaction indicators
Frederick Reichheld	2003	Satisfaction lacks a consistently demonstrable connection to actual customer behavior and growth.
Thurau	2004	Customers have expectations with regard to the behavior of service employees, when these are exceeded; the level of customer satisfaction with the service provider is positively influenced.
Ju	2005	Service value has a positive connection with customer satisfaction, which leads to customer loyalty

Kotler	2006	Whether the buyer is satisfied after purchase depends on the offer's performance in relation to the buyers expectations.
Syed & Conway	2006	Customer satisfaction is influenced most by the responsiveness of the frontline employees, followed by price and quality.
Padhy, Yogaswara	2007	Customer satisfaction is mainly based on traditional service quality (SERVQUAL) dimensions of tangible, reliability, responsiveness, assurance and empathy.
Hsu	2008	Cumulative customer satisfaction is a fundamental indicator of firms past, current and future performance instead of specific transactional information about a product or service encounter.
Young	2009	Organizations depend on their employees to be in tune with the needs of their customers for purposes of designing and delivering services or products which provides satisfaction to the customers.

5. Telecom Industry Specific Studies on Telecom Sector

- Studies done in Assam and NE Circles
- Studies done in Rest of India
- Studies done Globally

5.1 Studies on Customer Satisfaction in Assam and NE Circles

For Assam and NE Circles, study has been done by TRAI on both the Survey and Audit Model.

The Survey module has been commissioned with the objective of gauging the subscriber feedback on Quality of Services by way of primary survey and comparing them with quality of service benchmarks stipulated by TRAI. In addition, Survey module would also measure the compliance of 'Telecom Consumer Protection and Redressal of Grievances Regulations, 2007'.

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The Audit module assesses the Quality of Service of telecom operators (Basic (Wireline), Cellular Mobile (Wireless) and Broadband services) by auditing the service level records maintained by the operators, conducting drive tests as well as live measurements and comparing them with quality of service benchmarks stipulated by TRAI. (Source: QoS report by TRAI)

5.2 Studies done in Rest of India on Customer Satisfaction in Telecom

Studies done in Customer Satisfaction domain in the Telecom Sector in India show that customer satisfaction is one of the most important reasons for a customer sticking to a particular Operator and giving incremental revenues (*S K Chadha and Deepa Kapoorin 2009*). This fact is also substantiated by the various definitions given earlier from authors and researchers. Studies in Telecom sector have shown that perceived quality is a very important predictor to customer satisfaction, which ultimately results in trust, price tolerance and customer loyalty. (*Makam S Balaji, 2009*). Studies have also shown that product offerings needs to be revisited very frequently and competition to be watched closely for ensuring stickiness of customers (*Shitala Tripathi, 2009*)

5.3 Studies in International Scenario on Customer Satisfaction in Telecom

Study done on Customer Satisfaction in Malaysian Telecom Sector indicates that operators need to look beyond price for customer satisfaction. A high level of service becomes the selling point to attract customers' attention (*Chang Ee Ling and Ernest Cyril de Run, 2009*)

Another study on Customer Satisfaction level in Pakistan Telecom sector explores trust as a important factor for satisfaction serving as a linkage between customer satisfaction and customer loyalty. (*Khokhar, et al 2011*)

Similarly a study on the Telecom Sector in Iran tries to apply Disconfirmation Theory on Customer Satisfaction determination. This study indicates that expectation disconfirmation, desire disconfirmation and perceived performance were important determinants of Customer Satisfaction. (*Setayesh Sattar, 2009*). On theoretical side this study dwells on conceptualization of formation of customer satisfaction by examining its determinants and on the practical side the empirical findings highlight better understanding of the respective roles and relative importance of respective determinants to Customer satisfaction

To add to the above, studies have also been done in the Telecom Sector in Pakistan on the factors determining customer satisfaction and have been evaluated against price fairness and customer service. It is seen that customer service is the most important stimulant for customer satisfaction as prices are more or less similar for competitive offerings. (*Hanif, et al 2010*)

6. Conclusion:

The review of literature highlights that there are many common factors which impact customer satisfaction on an overall basis. These factors are similar in nature even if

industry is different. Some important common factors are pre purchase perception v/s actual experience, price fairness, loyalty, trust and product offerings. Also it is seen that these factors are closely connected to the various definitions and theories on this subject.

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Strategic Human Resource Management and Sustainable Growth: A Study with Special Reference to Management Educational Institutions in India

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Abstract

The transition from a socialistic pattern to an era of cut-throat competition, certain policies and modalities pertaining to the fulfillment of the aforesaid dynamic phenomena had necessitated towards policy reforms in Indian subcontinent since 1991-92. Thus, the genesis of the recent growth in the context of Indian economy can be attributed to the liberalization process and thereby the nations' tendency of going towards a global civilization by the means of realization, which can be dubbed as *Globalization*. Last two decades of globalization in India has its imprint on different sectors of economy, and eventually the educational sector has also not been able to escape from the intrinsic worth of the same. Off late India is at the crossroads of positioning herself as a knowledge hub with an indomitable spirit and treasure since the ancient period.

Thus, the present paper encompasses different facets of ideal management educational institutions from the perspective of a farsightedness vision which inculcates into the domain of Strategic Human Resource Management (SHRM). Further, the descriptive discourses identified different aspects of SHRM in particular, which pave towards conceptualizing an Axiomatic Model. Thus, the basic tenet of the study is directed towards the key ingredient of economic jargon, viz; *Sustainability* of management educational institutions across the country.

Keywords: *Management Educational Institution, SHRM, Sustainability.*

Introduction

India is merely a geographical expression, because it embraces the extraordinary mixture of ethnic groups; the profusion of mutually incomprehensible languages; the varieties of topography and climate; the diversity of religions and cultural practices and the range of levels of economic development. And yet India is more than the sum of its contradictions. It is a country held together....*by strong but invisible threads*. The country is a land of myth and an idea, a dream and a vision, and yet very real and

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present and pervasive. One of the few generalizations that can safely be made about India is that, nothing can be granted about the country, all in which the avenues are open and everything is possible. All the convergent influences of the world run through this society: Hindu, Islam, Christian, Secular, Stalinist, Liberal, Maoist, Democratic Socialist, Gandhian etc. There is not a thought that is being thought in the West or East that is not active in some Indian mind. The Indian mind has been shaped by remarkably diverse forces such as ancient Hindu tradition, myth and scripture, the impact of Islam, Buddhism and Christianity and two centuries of British colonial rule. The result is unique, not just because of the variety of contemporary influences available in India, but because of its diversity of its heritage.

India has witnessed a radical transformation in both political and economic system with the passage of time, ranging from a socialistic-structure towards a more liberal and a capitalist regime. But, it is not surprising that the economic life of modern India has been rather like traditional Indian educational ethos: the broad basic rules are firmly set, but within them one is free to improvise, unshackled by a written score.

In the era of galloping modernization in the country, due to the confluence of Globalization and liberalization of certain policies, so as to align the country's economy with global intersection, thus, the need of the hour necessitates revamping and rethinking of static thoughts to a more situational and strategic avenues. As India is now at the crossroads of becoming an economic powerhouse and corporate leader, the age of legacy of Indian Educational system, dating from the ancient "*Guru-Sishya Parampara*" to an era of "*Digitalization of Education*", cannot be ruled out, but importance be prearranged on transformation of Indian educational system, so as to make the country a "*Knowledge Hub*".

Realization of Liberalizational Buoyancy (*RLB*) in India since 1991 has lead to the growth of economy in the recent years. The sporadic setting up of firms ranging from medium scale to a diversified Transnational Corporations, the spurt in the macro-economic indicators of the country, narrowing down of the disparities of economic wealth within the country etc. are all testimony to the fact in regard to the phenomenon of "*RLB*". The aforesaid parameters are fuelled by a well-groomed and a competitive "Human Resource", particularly trained in the sphere of management domain so as to cope-up with diversities and adversities of cutting-edge competition in the era of industrialization and consolidation of National prowess.

Indian educational thinkers and philosophers were able to appraise the importance of management education during 60's, with the setting up of IISWBM (*Indian Institute of Social Welfare and Business Management*) in Calcutta. The setting up of aforesaid first ever management institute in the country can be dubbed as a strategic view-point of the then thinkers and educationalists. Today, the imprints of Indian management graduates can be seen in widely acclaimed corporate sectors across the world coupled

with the establishment of some of the finest management institutes, viz. IIM's, XLRI, ISB, FMS etc.

However, in the ever changing socio-political and economic scenario in the global order due to unstableness of the economy, which also results in the advent of management educational giants like Yale University, Harvard, LSE, Stanford etc. to India. Thus prevailing discourses in the Indian management institutes can be a threatening, if pro-active steps are not undertaken from the view point of a robust strategic alliance towards development and preparedness of human resources in the Indian management institutes and also future dominance of the same from the framework of resource sustainability.

Review of Literature

Getting right people at the right place is the prime function of HRM which contribute to higher productivity of an organization (Huselid, 1995). Suitable employee-selection process determines the future growth trajectory of an organization by reducing employee turnover to a greater extent (Verburg, 1998), which ensures better organizational performance (Delaney and Huselid, 1996). Investments in the recruitment and selection process; and the scientific Human Resource Planning (HRP) process have positive relations with productivity of employees in the organization (Koch and McGrath, 1996). Employees' reward-system has positive relations with their satisfaction level and organizational growth thereby, i.e., better reward system contribute to superior organizational-relations between management and employees (Kalleberg and Moody, 1994). Better reward system, decentralization of authority, more investments in training etc. reduce employee-turnover rate, increase productivity and ensure higher market-value of the organization (Arthur, 1994). Performance-Linked-Pay-Package (PLPP) motivates sincere employees (Dowling and Richardson, 1997). Workers' Participative Management (WPM) practice and superior ambience in the organization positively influence the productivity (Fernie, Metcalf and Woodland, 1995). WPM has positive role in enhancing employees' commitment and job satisfaction level (Wallace, 1995). Healthy personnel management policies positively influence employee commitment level (Leijten, 1992) and good HRM practices are linked with higher productivity (MacDuffie, 1995). Training plays a positive role to enhance employees' performance and ensures better relationship with management (Kalleberg and Moody, 1994). Training and internal promotional opportunities of employees have positive relations with the future of the organization (Verburg, 1998), and training and management development is positively related with profit of the organization (Leget, 1997). Employee satisfaction, motivation, commitment etc. are positively related with productivity and performance of an organization (Guest, 1999). High employee-turnover and bad-organizational climate reduce productivity and product quality (Katz, Kochan and Weber, 1985). High-

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performance organizations use advanced human resource management strategies and techniques in order to attract and retain talent (Hiltrop, 1999).

Objectives of the Study

The present study considers the following objectives:

- To highlight some SHRM components of management educational institutions.
- To understand the contributions of those SHRM components for ensuring sustainability of management institutions in India.

Methodology

The present academic discourse is descriptive in nature, where the information are primarily sourced from various websites, reference books and articles published in the academic journals in India as well as abroad. The paper has exclusively dealt with the SHRM of management institutions operation in India and also tries to establish a cause-effect relationship with sustainability; therefore, an axiomatic model has been proposed to corroborate the aforesaid objectives of the study.

Major SHRM Components

SHRM is the way of managing people strategically towards attainment of competitive-edge in the cut-throat market. Organizational triumph depends on the way the stakeholders are being managed in competitive situation. For an educational institution, faculty and students are the prime stakeholders; therefore, organizational success lies with their hands to a greater extent. Management education, being professional service, used to adopt '*7Ps of Service-Marketing Philosophy*' which considers seven elements of service marketing such as *Service; Service-charge; Service-place; Service-promotion; Service-provider; Service-process and Service-evidence*. But, following section of the paper will discuss only the HRM aspects as strategic tool for the management institutions in India with a view to ensure sustainability of this sector.

(i). Organizational Structure and e-Governance

Good governance and decentralized system offer much-needed greater autonomy and status for the teaching-fraternity. Further, Horizontal-Organizational-Structure (HOS) and e-governance implementation is the suitable alternative for smooth functioning of modern management institutions, which collectively ensure organizational functioning very fast, hassle-free and accurate. Functions such as information sharing; receiving and sending all types of applications and pay-slip; conducting admissions and examinations; issuing admit card, registration card and mark-sheets; sending complaints and receiving feedbacks through online etc. are the

essential functions of e-governance, which make the system very effective and efficient for the management institutions towards sustainability in the competitive world.

(ii). ICT and HRIS

Information and Communication Technologies (ICT) implementation and systematically monitoring the same enable fast communication process for staff mobility, job rotation, training, performance measurement etc. by the management institutions. With the digitalization of educational system, ICT culture can meaningfully transform the entire Teaching-Learning-Process (TLP) by making the system more interactive. Further, ICT can enhance administrative process and can bring efficiency in Human Resource Information System (HRIS) for storing and retrieving all pertinent information of stakeholders of management institutions.

(iii). Industry-Academia-Interface (IAI)

For a modern management institute, only Academia-Academia-Interface (AAI) is not adequate to finally placing students in their dream organizations. Therefore, strong linkage with industries and well-build Industry-Academia-Interfaces (IAI) are much-needed survival mantra. Management institutions must make the industry as their strategic-partner for sustaining in the competitive ambience. Inviting resource persons from the industry for sharing their corporate experience with the budding-managers is necessary. IAI works in many ways such as summer placement as well as the final placement for the students, which is the prime focus of any modern management institute.

(iv). Pedagogy

Well-designed pedagogy includes continuous case-based-learning on corporate-world which provides need-based-orientation to all the students. The pedagogy must include professional-development-projects; behavioral assignments; off-campus workshops and seminars where there is scope for adequate interactive-sessions with premier management institutes across the world through video-conferencing. It must have ample scope for research-orientation; group-discussion and mock-interview; etc. Pedagogy must be developed as per the market and industry demand, which must not include only theoretical TLP. Whatever pedagogy is introduced in the management institutions, it must ensure employability among the students.

(v). Faculty Selection Process

The success of a management institution surely depends on quality and contributions of faculty members associated with the system. But, recruiting suitable teaching staffs becomes a herculean task. Unscientific selection process followed particularly by some of the government run management departments which is not very rigorous also. Selection is primarily done based on academic-scores and performance in the interview. UGC-NET or Ph.D is even not required as per AICTE guidelines for

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selecting faculty for such management departments. Sometimes, political and other interventions are also experienced. Therefore, for selecting suitable faculty, rigorous selection process consists of presentation-skill, communication-skill, interactive-skill, group-discussion, case-presentation, in-depth subject knowledge etc. must be judged thoroughly in addition to counting Composite-Academic-Scores (CAS). Faculty with core competency in a particular field should be selected at any expense if the management institutions are to sustain in the long run irrespective of their ownership (government or private). Therefore, quality should not be compromised at any cost in the faculty selection process.

(vi). Faculty Training and Development Program

After selection, imparting rigorous training program in the core area for the concerned faculty is essential for developing core-competency. The present government institutional system permits only attending Orientation Program (OP) and Refresher Course (RC) to a limited extent, which is really inadequate and relatively less effective for the teachers in enhancing their skill and knowledge for making professional MBA-students employable. Resulting, the faculty members become '*jack of all trades, master of none*', whereas, they should be '*jack of all trades, master of one*'. Therefore, for developing faculty-competency; attending and organizing Faculty Development Program (FDP), Management Development Program (MDP), Executive Management Program (EMP), etc. is the need of the hour. Strategic investments on education and training for the core-faculty-members have become prerequisite for attaining competitive advantage in the perfectly-competitive-market.

(vii). Faculty Exposure and Experience

The faculty should have adequate industry exposure, academic knowledge (implicit and explicit) and adequate experience for transforming the management students to budding corporate professionals. Developing strong linkage with All India Management Association (AIMA), University Grants Commission (UGC), All India Council for Technical Education (AICTE), etc. can help the members of teaching-fraternity in many ways. Senior teachers to avoid obsolescence of knowledge should keep in touch with the other good academicians, academic institutions as well as industry professionals.

(viii). Assessment of Faculty Performance and Remuneration

Assessment of faculty performance and contribution to the management institutions must be measured scientifically. The nature of assignment of faculty members is primarily qualitative; therefore, it may not always be possible to quantify their performance. In the present system, student-feedback, number of project undertaken, number of publications or books published (with ISSN or ISBN number), numbers of

seminar, conference, workshop attended etc. are counted for measuring the performance of a faculty by the management department of government institutions, which should not be the sole criteria to evaluate the performance, because a specific faculty may tactfully develop unholy-nexus with the students with a view to gain cheap-popularity and better-evaluation, and also the quality of publications may not be very satisfactory and up to the mark. The management institutions must be concerned about the quality, not to count the numbers only, which is the common practice in India. Therefore, performance in the regular open-access-classroom, performance in the faculty-discourse, performance in departmental annual-interview (irrespective of seniority and designation), etc. must be the component of 360-degree-performance-appraisal for a faculty; based on which promotion; pay-scale and other facilities can be determined accordingly.

(ix). Faculty Retention

An institute is known by its best faculty members. Experienced and best teachers are the assets of an organization, therefore any management institute cannot afford to let them switch-over or leave and the vacuums created cannot be filled up so easily. Therefore, the faculty members having adequate exposure, quality and experience must be retained at any expense by the organization. Adequate facility; infrastructure; good academic-ambience and academic-culture; job satisfaction; career-growth-opportunity; remuneration at per industry; academic freedom to work must be ensured to retain them. Retention of best faculty and sustainable growth of management institutions are the two sides of the same coin.

(x). Student-Selection-Criteria

Student selection criteria must be made scientific considering many factors such as calculation of academic-composite-scores; performance in group-discussion, personality-test, psychological-test; physical and mental-fitness-test; studying group-behavior; in-depth interview etc. to select suitable candidate for pursuing management program. Success in placement depends on quality of students admitted and they way they are processed to finished products. Starting journey with poor quality raw-materials (students) will result poor outcome and bad experience or vice-versa. In this particular context, GIGO (*Garbage In Garbage Out*) concept is very pertinent. Therefore, adequate precautions must be taken for selecting suitable students for pursuing management course. Management Aptitude Test (MAT) and GMAT are very common selection tests conducted which does not reflect much quality among the students in true sense. Entrance test such as CAT with certain minimum cut-off marks can be considered as benchmarked test for potential management graduates. In this regard, some private management institutions in India with money-making motive do not follow any strict admission rules and guidelines in real sense.

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(xi). Assessment of Students' Performance

Honest practices for evaluating the performance of students are essential. MBA certificate should not be sold like *grocery-items*. Deserving students only be given higher grade (or CGPA). Therefore, students' performance appraisal process must be comprehensive and preferably with 360 degree system of performance appraisal. Examination evaluation process also must be free from all sorts of pitfalls such as *halo effect, leniency effect, stringency effect, primacy effect, central tendency effect, stereotyping, and fundamental attribute error.*

(xii). Employability and Placement of Student

The ultimate mission of a management institute must be to ensuring employability of students and well-placement in their dream-organizations. Therefore, all efforts, policies, strategies, functions must be directed towards attainment of the same. Utmost care must be taken for summer-placement and final-placement through vibrant and dedicated-placement-cell to ensure good placement for all as per the quality of the students of the institute. Summer-placement or training provides birds' eye view about the corporate-realities in a short span of time and also gives exposure, skills and knowledge to the trainees which further help developing employability. Employability leads to ensure final-placement of students, which is the key factor for the management institutions to survive and sustain in the competitive market-place.

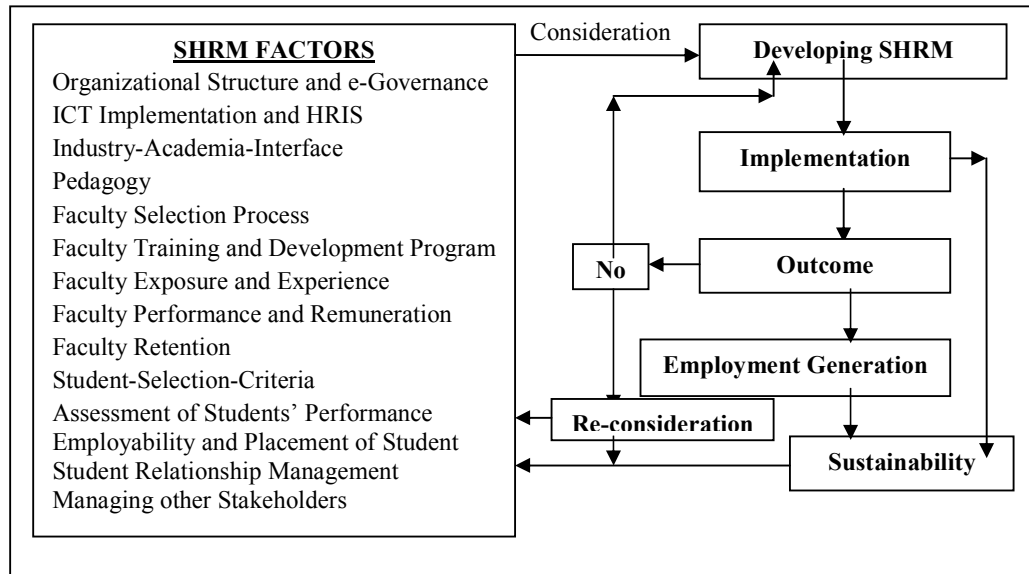
(xiii). Student Relationship Management (SRM)

The strength of a management institute depends on the alumni and their contributions for parent organization. Alumni enhance the brand value of the institute and contribute in many ways such as financial assistant, acting as visiting faculty and help in the placement process. Therefore, all the management institutions need to manage their own alumni for getting support from them in every possible ways. Therefore, strong SRM is advocated for the sustainable growth of a management institute.

(xiv). Managing other stakeholders

In addition to managing the students and faculty; the management institutions must have vibrant office for assisting and supporting in all activities such as admission process, students' enrollment process, examination process etc. Parents are also to play very vital role for continuously motivating their wards. Therefore, these groups of stakeholders of management institutions must be the strategic-component for sustaining in the turbulent situation.

Figure - 1: SHRM Model for Sustainability



Source: Self-developed.

An Axiomatic Model

The entire strategic human resource management components discussed earlier may help in sustainability of management institutions in India. Following axiomatic model gives the clear picture and direction towards attainment of sustenance of management educational institutions.

Conclusion

Indian professional are excelling in a variety of professions across the world due to their innovative thinking and hard work, but still there is a long way to go. The management education in India is broadly a synthesis of American concept, imported during 60's, which lacks the Indian fusion of philosophy and ground realities, unlike the Japanese Management philosophy of their own.

The management institutes in India draws a very cynical approach in the pedagogy, as most of the institutes offers and imparts relatively the same stuff. The phenomena can be dubbed as *"everything to everybody model"*. Thus, contemplating on the aforesaid model though helps the institutes to draw large influx of students and faculties but at the expense of sacrificing the core-competency and USP's of the same. Top B-Schools in the West, over the period of time has able to develop the USP's of their own and a global-identity. Some notable examples are Stanford:

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Entrepreneurship; Kellogg: Marketing; Wharton: Financial Management; Sloan: Engineering management and Harvard: General Management. In the Indian context except few of the leaders like IIM's who-so focuses on core-specialization and USP's, but the majority of the B-schools in India still failed to inculcate this.

A well-crafted and well-designed teaching mode is essential, keeping in view the changing and the dynamic corporate environment. Industrial field visits, case studies, brain storming sessions and deliberations and options for modern electives etc. are required to be a part of a B-school discourse. Excessive classroom teaching and less numbers of advanced-level elective subjects are related to a very low level research outputs and consequently low levels of competence. Lack of competence reduces the income generating capacity of the school. It is believed that 2/3rd of the income of Harvard Business School come from non-fee collection, viz. from Executive Training and Publishing, Consultancy etc. In contrast, for all India B-schools, fee collection is the most important source of revenue for its expansion and survival.

Selection of faculties plays a pivotal role in shaping the future direction of the B-school. Bureaucratization and politicization of the faculty selection process should be negated keeping in view the long term strategic objectives of the institute. Stress should be given in attracting research minded and experienced faculties in the selection process. As well as concomitantly, Industry-Academia-Interface should be given a strategic importance with a prime vision of training the students with the real life situation of a corporate world and also for facilitating and expediting the placement procedure.

As the Indian Government is opening its doors to permit foreign universities to set up their campuses in the country, there is a genuine fear that many global brands will invade the country to capture the existing market in India for a reputed international MBA degree at affordable costs. Though it is too premature to ignore such a possibility, but the current Indian market leaders, the IIM's and a few others may not immediately face any competitive threat because of their established brand image and infrastructure facility, however, gradual loss of faculty to some strategy-focused institutions arriving from abroad is a real possibility. Under the prevailing situation, for the rest of the 2385 B-schools in India, the day of reckoning has come and it is time to migrate from management education to the next emerging field of potential easy money.

Thus, in the state of crisis during 60's (i.e transition of Indian economy from agriculture to Industry), in India had lead to the importation of management education from U.S. and Europe. Even after four decades of introducing management education in India, the B-school lacks strategic focus, with *everyone trying to teach everything*, adopted by the IIM's and few others and copied by the rest, this

representation leaves little tile for creative thinking. It has also led to faculty shortage (in terms of expertise, quality and core-competency) and has lead to low levels of research orientation and output and thus ensuring mediocrity in the management education system. The Indian B-schools has off-late become *teaching-shops* and with the entry of foreign schools it will be for thousands of B-schools to look for some other avenues for survival.

“Leaders establish the vision for the future and set the strategy for getting there; they cause change. They motivate and inspire others to go in the right direction and they, along with everyone else, sacrifice to get there”John Kotter.

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Whether Age Determines Asset Creation? - A Case Study of the Microfinance Institutions of Assam

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Abstract

Microfinance today has become one of the most debated and documented but still hangs around much confused buzzwords in banking, inclusive growth and developmental policymaking fields. Asset creation is one of the most important and crucial component of MFIs since these institutions have the dual objective of outreach and profitability. In this study an attempt is made to find out the role of age in the asset creation process of the MFIs of Assam. In order to achieve this primary objective, a sample survey was conducted during June – October, 2010 in 14 districts of Assam finally selecting 34 MFIs based on their outreach. Linear regression analysis was used to test the null hypothesis that there is no significant relationship between the total assets created by the MFIs and the age of the MFIs. Finally the results of the study concluded that there is significant relationship between the total assets created by the MFIs and their age.

Key words: *Asset Creation, Micro finance, MFIs, Assam*

1. Background and Motivation

Microfinance refers to the means by which poor people convert small sums of money into large lump sums (Rutherford, 1999). Specifically, it refers to the broad range of financial services such as deposits, loans, payment services, money transfers, and insurance to poor and low-income households and, their micro-enterprises (Asian Development Bank [ADB], 2000). Thus microfinance institutions (MFIs) are special type of financial institutions.

Microfinance today has become one of the most debated and documented but still hangs around much confused buzzwords in banking, inclusive growth and developmental policymaking fields. Actually in some form or the other, the concept of “microfinance” always existed in almost each and every society. But as a more formal process, the history can be traced back to portions of the Marshall Plan at the end of second world war in the middle of the 20th century and the writings of abolitionist/legal theorist Lysander Spooner who wrote about the benefits of numerous small loans to the poor as a way to alleviate poverty (Khandelwal, 2007).

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Microfinance was born as a response to the frustrated development resulting from subsidized rural credit in the 1950s and 1960s (Adams & Fitchett, 1992; Mersland, 2009). Some global examples of microfinance initiatives are - FINCA and ACCION International of Latin America, Bank Rakyat of Indonesia (BRI), and Grameen Bank of Bangladesh, now acting in more than 50 countries.

2. Literature Review

This section tries to find out any direct or indirect literatures studied by the past researchers in the field of the age and asset creation of the MFIs in India and Abroad.

The microfinance revolution, particularly the success stories of institutions like Grameen Bank in Bangladesh, Banco Sol in Bolivia, and Bank Rakyat in Indonesia, attracted several economists to study microfinance in the latter half of the 1990s. A number of studies have shown a significant impact on the lives of people benefiting from microfinance services across a wide range of economic and social indicators, including better access to education for the children, greater empowerment of women, economic upliftment, and increased participation of women in social and political activities (Fisher & Sriram, 2002; Robinson, 2001; Simanowitz & Walter, 2002; Yunus 2004; Zohir & Martin, 2004). The Malegam Committee Report of 2011 reports that the level of penetration in the South is more than four times the penetration in the second highest region, namely the West and over ten times the penetration in the least penetrated region, namely the Central. This concentration of total microfinance activity in the South is paralleled by the distribution of MFI portfolio as between the regions. The Malegam Committee report also revealed that the Southern region has an overwhelmingly large share of the MFI portfolio, it also shows that this share is only a little over twice the share of the region with the next highest share, namely the East but significantly higher than the share of other regions. This supports the complaint that MFIs have been concentrating in the Southern region where Self Help Groups are well developed while neglecting the other regions.

Gonzalez (2008) shows that MFI efficiency is strongly related to age, after screening out the effect of other variables. This effect is strongest in the first six years of institutional history, when efficiency increases 2-8 percent annually. In the following years this figure drops to 1-2 percent per year. Next to the obvious learning effects that explain this finding, it seems reasonable to assume that MFIs build up a solid customer base in their early years of existence, which significantly translates into greater efficiency. In subsequent years, this trend is still positive, but begins to level off, as most internal processes have already been tested and improved. If the time to become efficient were decreasing from one age cohort to the next, then one could assume a marketwide learning effect as new entrants into the market avoid the mistakes of previous entrants. Thus we see in this paper the researcher tries to find out the role of age as the efficiency drivers of MFIs.

In another study Swain and Varghese (2008) made an attempt to evaluate the effect of Self Help Group participation on asset creation. In other words, they tried to find out whether Self Help Group Participation Lead to Asset Creation. The results of their study reveal that longer membership in SHGs positively impacts asset creation, robust to various asset specifications. With longer participation in SHGs, members move away from pure agriculture as an income source towards other sources such as livestock income. Training by NGOs positively impacts asset creation but the type of SHG linkage per se has no effect.

Thus in this limited search, no such literature is found which studied whether age of the MFIs determines its asset creation in India and particularly in the state of Assam.

3. The Problem Area

Asset creation is one of the most important and crucial component of MFIs since these institutions have the dual objective of outreach and profitability. In other words MFIs objective is not only incurring profit but also reach those where the formal financial institutions are unable to provide microfinance services. Asset creation is also determines the operating efficiency of an institution in general In this study an attempt is made to find out the role of age in the asset creation process of the MFIs of Assam.

4. Research Methodology

The main objective of this study is to find out whether the age of the microfinance institutions determine the asset creation of the MFIs operating in the state of Assam. In order to achieve this primary objective, a sample survey is conducted during June - October, 2010 in 14 districts of Assam. Annexure 1 in the appendix documents the numbers of MFIs present in different districts of Assam. The study is based on primary data. The research strategies considered for the study is exploratory in nature. Top 34 MFIs are selected based on their number of active clients. The list of MFIs studied is shown in the Annexure 2. To select the representative number of MFIs for the study, the data base of Centre for Microfinance Livelihood (CML) is considered. The CML data base is published in February 2010 focusing the sector overview of NGOs, NGO-MFIs and MFIs of Assam. In this CML database, total number of institutions is 212 which consists of 84 NGO-MFIs, 7 MFIs and 121 NGOs. From this data base, we have selected only those MFIs that are continuing microcredit operations for the last three years as on 31st March 2010. After this first level screening, the number of available MFIs comes down to 79 from 212 which consists of 6 MFIs, 8 NGOs, and 65 NGO-MFIs. Thus, we have finally selected 34 MFIs (43% of the sample population) based on the MFI's outreach i.e., number of clients served by the MFIs.

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5. Role of Age and Asset Creation of the MFIs

The primary objective of this paper is to find out the role of age in the asset creation of the MFIs of Assam. Let us consider the economic relationship between age and asset creation. Each additional years of existence enables an MFI to create more assets. As age of the MFI increases, we expect total asset to rise as well. If we were to hypothesize a relationship between age of the MFI and asset creation of the MFI, it would be positive, the more the number of years of existence, the more is the total assets. To start this experiment, the following equation shows the theoretical model of this relationship:-

$$y = \beta_0 + \beta_1 x + \varepsilon,$$

where ε is a random error term,

Here 'y' represents the respective average assets created by the sample MFIs and 'x' represents the average age of the respective sample MFIs for the three financial years 2007-2008, 2008-2009, and 2009-2010. If 'x' and 'y' genuinely have a positive relationship, β_1 is a positive number. If they have a negative relationship, β_1 is a negative number. If they have no relationship at all, β_1 is zero. Our null hypothesis is that there is no significant relationship between the total assets created by the MFIs and the age of the MFIs which is stated below:-

Null Hypothesis,

$$H_0 : \beta_1 = 0$$

Alternative Hypothesis,

$$H_0 : \beta_1 \neq 0$$

The regression results are summarized below in Table 1, Table 2, and Table 3:-

**Table 1:
Regression Statistics**

Multiple R	0.611893152
R Square	0.374413229
Adjusted R Square	0.354233011
Standard Error	3.269277825
Observations	33

**Table 2:
ANOVA**

	df	SS	MS	F	Significance F
Regression	1	198.3028613	198.3028613	18.55347756	0.000154419
Residual	31	331.3335023	10.68817749		
Total	32	529.6363636			

**Table 3:
Coefficient**

	Coefficients	Standard Error	t Stat	P-value
Intercept	6.755858463	0.604707291	11.17211346	0.000013085
	1844796.333	2.10470527	4.307374788	0.000154419

From Table 1, we find that the coefficient of determination, R^2 is 0.37 which is very low. Thus we see that changes in the age of the MFI account for only 37% of the variation in asset creation of the MFIs.

In this instance, the null hypothesis being tested is that the true slope, β_1 , equals 0. Here with an F statistic in excess of 18.55 and a significance level of 0, we would reject the null hypothesis.

The final piece of output is the table of coefficients. In a regression equation, the slope and the intercept are referred to as the coefficients in the model. We find both coefficients in the column labeled Coefficients; the intercept (β_0) is constant, and the slope (β_1) is the coefficient of average age of the sample MFIs. From the table we find that our estimated line can be written as:

$$\text{Total Assets} = 6.755858463 + 2.10470527 (\text{Age of the MFIs})$$

The slope of the line (2.1047) means that if Age of the MFIs increases by one year, Total Assets of the MFIs would increase by 2.1047 years. In other words, in the aggregate, Total Assets created by MFIs is about 2.1047 times of each year of existence of the MFIs.

Considering the t statistic and P value From Table 3, we see that the value of the test statistic for the slope is 4.307, and the associated P -value is approximately 0 at 5% level of significance. Therefore the null hypothesis would be rejected and we conclude that there is significant relationship between the total assets created by the MFIs and their age.

6. Conclusion:

Over the last decade, the microfinance field has expanded substantially both in terms of number of institutions and the size of these institutions. While such scaling up is applauded for its progress in spreading the benefits of microfinance services to a greater number of poor and for achieving sustainability, there is a concern that scaling-up may lead to a drift from the microfinance institutions original poverty alleviation mission (Hishigsuren, 2004). Christen et al., (2004) reported an astonishing 500 million persons served, mostly with savings accounts, while the Microcredit

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Summit in the 2006 meeting in Halifax had celebrated the milestone of 100 million borrowers reached.

The primary objective of this study is to find out whether the age of the microfinance institutions determine the asset creation of the MFIs operating in the state of Assam. In order to achieve this primary objective, a sample survey was conducted during June - October, 2010 in 14 districts of Assam finally selecting 34 MFIs based on their outreach. Linear regression analysis was used to test the null hypothesis that there is no significant relationship between the total assets created by the MFIs and the age of the MFIs. Finally the results of the study concluded that there is significant relationship between the total assets created by the MFIs and their age. Thus we see that the MFIs as an institution are efficient and the assets created by these MFIs depend on their years of existence.

The advent of MFIs in the Microfinance sector appears to have resulted in a significant increase in reach and the credit made available to the unorganized sector in India and globally now accepted as a poverty reduction tool. But unfortunately, the presence of MFIs and their activity is very less in the North Eastern part of India. So it is expected that the MFIs must be encouraged to serve those sections of the community which are beyond the reach of formal financial institutions and their activities should be promoted for the socio-economic development by creating social capital.

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Appendix I:
District-wise Distribution of Sample MFIs

Sl. No.	Districts	No. of MFIs
1	Baksa	2
2	Barpeta	2
3	Cachar	1
4	Darrang	3
5	Goalpara	1
6	Golaghat	1

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7	Hailakandi	1
8	Kamrup	8
9	Karimganj	1
10	Lakhimpur	1
11	Morigaon	2
12	Nalbari	5
13	Sivasagar	1
14	Sonitpur	5
	Total	34

Appendix II

List of the MFIs surveyed in Assam

Sl. No.	Acronyms of MFIs	Full Name of MFIs
1	PRDS	Pragati Rural Development Society
2	MZGPS	Morigaon Zila Gramya Puthibharal Sanstha
3	NCS	Nightingale Charitable Society
4	PROCHESTA	Prochesta
5	ASOMI	Asomi
6	GS	Grameen Sahara
7	RGVN	Rastriya Gramin Vikash Nidhi
8	RGVN NE	RGVN North East Microfinance Ltd.
9	CRD	Centre for Rural Development Association for Advancement of Micro Institution and
10	AAMIVA	Voluntary Action
11	ASC	Ajagar Social Circle
12	GSEDC	Gandhinagar Socio Economic Development
13	AGUP	Anchalik Gram Unnayan Parishad
14	Pancharatna	Pancharatna Gramya Bikash Kendra
15	GM	Gwudan Muga
16	WDS	Weavers Development Society
17	BJS	Bishnujyoti Janakalyan Samiti
18	GVM	Gramya Vikash Mancha
19	LSS	Lok Seva Samiti
20	AD	Asha Darshan
21	SATRA	Social Action for Appropriate Transformation and Advancement in Rural Areas
22	SDC	Sipajhar Diamond Club Community Centre
23	AGUS	Associated Gramya Unnayan Society

24	Reneissance	Reneissance
25	MASK	Mahila Sakti Kendra
26	DASK	Doulung Ajon Samajik Kendra
27	JPYS	Jyoti Puthibharal & Yubak Sangha
28	DPYS	Donyi Polo Youth Society
29	ROAD	ROAD
30	RMI	Rainbow Microfinance Institution
31	MACC	Monacherra Athletic & Cultural Club
32	DC	Deshbandhu Club
33	Sonali	Sonali SHG Unnayan Samiti
34	Mandal	Maandal

Appendix III

Age and Average Age of the Sample MFIs

Sl. No.	MFIs	Age (in Years as on 31.03.2010)	Average Total Assets (2008-2010)
1	PRDS	5	1844796
2	MZGPS	10	10889696
3	NCS	6	28581822
4	PROCHESTA	9	14361282
5	ASOMI GRAMEEN	8	154988583
6	SAHARA	4	33311899
7	RGVN RGVN NE	20	437324392
8	MICROFIN	15	458609973
9	CRD	6	20447967
10	AAMIVA	4	456693
11	ASC	9	13071559
12	GSEDC	7	4630924
13	AGUP	14	3807508
14	PANCHARATNA	5	6676559
15	GM	3	296265
16	WDS	7	5010445
17	BJS	5	315756
18	GVM	8	2000141
19	LSS	6	2152731
20	AD	5	170457

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21	SATRA	5	11732468
22	SDC	13	11206110
23	AGUS	13	2883389
24	RENEISSANCE	7	1840546
25	MASK	4	4671137
26	DASK	3	441033
27	JPYS	9	1054522
28	DPYS	12	58410
29	ROAD	6	1252707
30	RMI	5	1180999
31	MACC	3	11643057
32	DC	12	11643057
33	SSUS	6	14463300
34	MANDAL	3	1240980

Hurdle Technology: Its Potential Application in Food Industry

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Abstract

Consumers are very much aware of nutritive values, quality and safety of the processed foods available in the market. Hurdle technology is one of the food processing technology through which foods can be processed safely as well as nutritive values and quality will be maintained throughout the processing of the foods. Hurdle technology also provides different types protection layers against various food borne organisms present in foods and make the foods safe for consumption. Recently various non-thermal technologies like pulsed field technology, HHP, plasma technology combined with compounds of hurdles such as NaCl, organic acids, bacteriocins etc. are added to make these technology more strengthful against the food borne microorganisms.

Keywords:

Consumers, hurdle technology, consumption, plasma technology, microorganisms

Introduction:

Hurdle technology also called combined processes, combined methods, combination preservation, combination techniques or barrier technology. In other words we can elaborate this technique as- combined use of several preservation methods, possibly physical and chemical or a combination of different preservatives is an age-old practice. It has been commonly applied by the food industry to ensure food safety and stability. In smoked products, for example combination treatment includes heat, reduced moisture content and antimicrobial chemicals deposited from the smoke onto the surface of the food. Some smoked foods may also be dipped or soaked in brine or rubbed with salt before smoking, to impregnate the flesh with salt and thus add a further preservative mechanism. In recent years, the concept is now ready to be introduced for use with a much wider range of food products, including fruits and vegetables, bakery products, dairy products, fish and so on. The concept of combining several factors (Hurdle Technology) has been developed by Leistner. From an

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understanding of the hurdle effect, hurdle technology has been derived, which has the goal not just to understand why a certain food is safe and stable, but to improve the microbial quality of the food by an optimization and intelligent modification of the hurdles present. It employs the intelligent combination of different hurdles or preservation techniques to achieve multi-target, mild but reliable preservation effects. Hurdle technology is used in industrialized as well as in developing countries for the gentle but effective preservation of foods. Previously hurdle technology, i.e. a combination of preservation methods was used empirically without much knowledge of the governing principles. Since about 20 years the intelligent application of hurdle technology became more prevalent, because the principles of major preservative factors for foods (e.g. temperature, pH, a_w , Eh, competitive flora) and their interactions became better known. Recently, the influence of food preservation methods on the physiology and behaviour of microorganisms in foods, i.e. their homeostasis, metabolic exhaustion, stress reactions, are taken into account and the novel concept of multi-target food preservation emerged. Hurdle Technology also called: combined processes, combined methods, combination preservation, combination techniques, and barrier technology. Hurdle technology is a method of ensuring that pathogens in food products can be eliminated or controlled. This means the food products will be safe for consumption and their shelf life will be extended. Hurdle technology usually works by combining more than one approach. These approaches can be thought of as "hurdles" the pathogen has to overcome if it is to remain active in the food. The right combination of hurdles can ensure all pathogens are eliminated or rendered harmless in the final product. Hurdle technology has been defined by Leistner as an intelligent combination of hurdles which secures the microbial safety and stability as well as the organoleptic and nutritional quality and the economic viability of food products. The organoleptic quality of the food refers to sensory properties, i.e. its look, taste, smell and texture. Examples of hurdles in a food system are high temperature during processing, low temperature during storage, increasing the acidity, lowering the water activity or redox potential or the presence of preservatives. According to the type of pathogens and how risky they are, the intensity of the hurdles can be adjusted individually to meet consumer preferences in an economical way, without compromising the safety of the product. An effective combination of different hurdles can work in synergy and thereby provide a good antibacterial effect even though the "height" (level) of each individual hurdle may be small. A poor combination of hurdles may have an antagonistic effect means the effect of the combination is less than if any of the individual hurdles had been used alone. Hurdle technology used in the correct way is therefore a good tool for achieving safe and tasty products of high quality. Understanding how various hurdles work together and what effect they have on bacteria and other micro-organisms is important for ensuring safe food. About 60 different hurdles have been identified in food preservation. Apart from the most important and commonly used hurdles such as temperature, pH and water activity, there are many others of potential value. Other hurdles include: ultrahigh pressure, mano-thermo-sonication, photodynamic

inactivation, modified atmosphere packaging of both non-respiring and respiring products, edible coatings, ethanol, maillard reaction products and bacteriocins. Some hurdles (e.g., Maillard reaction products) will influence the safety and the quality of foods, because they have antimicrobial properties and at the same time improve the flavour of the products. The same hurdle could have a positive or a negative effect on foods, depending on its intensity. For instance, chilling to an unsuitable low temperature is detrimental to some foods of plant origin ('chilling injury'), whereas moderate chilling will be beneficial for their shelf life. Another example is the pH of fermented sausage which should be low enough to inhibit pathogenic bacteria, but not so low as to impair taste. If the intensity of a particular hurdle in a food is too small it should be strengthened, if it is detrimental to the food quality it should be lowered. By this adjustment, hurdles in foods can be kept in the optimal range, considering safety as well as quality, and thus the total quality of a food (Leistner, 1994a). For each stable and safe food a certain set of hurdles is inherent, which differs in quality and intensity depending on the particular product, but in any case the hurdles must keep the 'normal' population of microorganisms in this food under control. The microorganisms present ('at the start') in a food should not be able to overcome ('leap over') the hurdles present during the storage of a product; otherwise the food will spoil or even cause food poisoning.

In developing countries the application of hurdle technology for foods that remain stable, safe and tasty if stored without refrigeration is of paramount importance and has made impressive strides, especially in Latin America with the development of novel minimally processed, high-moisture fruit products. However, much interest in intentional hurdle technology is also emerging for meat products in China as well as for dairy products in India. There is a general trend in developing countries to move gradually away from intermediate-moisture foods because they are often too salty or too sweet and have a less appealing texture and appearance than high-moisture foods and this goal could be achieved by the application of intelligent hurdle technology. The progress made in the use of advanced hurdle technology in Latin America, China, India and Africa has been reviewed by Leistner (1999b).

Principle:

When cells are exposed to multiple hurdles, the intensity of damage may be higher since some of the hurdles may act on the same cellular target. The repair of multiple damages may also require much higher energy costs, leading to energy exhaustion and cell death. Therefore, the probabilities for survival and proliferation for cells confronted with multiple hurdles are very low. In addition, the synergy between different multiple hurdles may allow the use of lower doses compared to their individual application. An important phenomenon that is crucial with regard to hurdle technology is the so-called homeostasis of microorganisms. Homeostasis is the constant tendency of microorganisms to maintain the stability and balance (uniformity) of their internal environment. Although the pH values in different foods

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may be quite variable, the microorganisms living in them expend considerable effort keeping their internal pH values within very narrow limits i.e. they will actively expel proton against the pressure of a passive proton influx. Another important homeostatic mechanism regulates the internal osmotic pressure (osmohomeostasis). The osmotic strength (which is inversely related to the water activity) of a food is a crucial physical property, which has a great effect on the ability of organisms to proliferate. Cells have to maintain a positive turgor (pressure) by keeping the osmolarity of the cytoplasm higher than that of the environment and they often achieve this using so-called osmo-protective compounds such as praline and betaine. Preservative factors functioning as hurdles can disturb one or more of the homeostasis mechanisms, thereby preventing microorganisms from multiplying and causing them to remain inactive or even die. Therefore, food preservation is achieved by disturbing the homeostasis of microorganisms. The best way to do this is to deliberately disturb several homeostasis mechanisms simultaneously. This means that any hurdles included in a food should affect the undesired. microorganisms in several different ways, for example by affecting the cell membrane, DNA, enzymes, pH, Eh and water activity homeostasis systems thus a combination of multiple hurdles (hurdle technology) could increase the effectiveness of food preservation.

The success of hurdle technology also depends on ensuring metabolic exhaustion. Metabolic exhaustion of microorganisms could cause 'autosterilization' of a food. Microorganisms in stable hurdle-technology foods use every possible repair mechanisms for their homeostasis to overcome the hostile environment, by doing this they completely use up their energy and die, if they become metabolically exhausted. This leads to an autosterilization of foods (Leistner, 1995b). For example, Unilever laboratories at Vlaardingen have confirmed metabolic exhaustion in water-in-oil emulsions (resembling margarine) inoculated with *Listeria innocua*. In these products *Listeria* vanished faster at ambient temperature (25°C) than under refrigeration (7°C), at pH 4.25, pH 4.3, pH 6.0, under anaerobic conditions more quickly than under aerobic conditions. From these experiment it has been concluded that metabolic exhaustion is accelerated if more hurdles are present and this might be caused by increasing energy demands to maintain internal homeostasis under stress conditions.

Most stress reactions of microorganisms are active processes and this often involves the expenditure of energy, e.g. to transport protons across the cell membrane, to maintain high cytoplasmic concentrations of 'osmoregulatory' or 'compatible' solutes. Restriction of the availability of energy is then a sensible target to pursue. This probably forms the basis of many the successful, empirically derived, mild combination preservation procedures exemplified by hurdle technology. As an example, if a food can be preserved by lowering the pH, then it is sensible also to include a weak acid preservative which will amplify the effect of the protons or to allow a milder, higher pH to be employed. It is sensible if proton export is made more difficult by the additional requirement that cells be forced to regulate osmotic strength. Then, if the food can be enclosed in oxygen-free vacuum or modified

atmosphere packaging, facultative anaerobes will be further energy-restricted at a time when the various stress and homeostatic reactions are demanding more energy if growth is to proceed (Gould, 1995). However, environmental stresses can provide varying results because some bacteria may become more resistant or even more virulent under stresses through stress reactions such as synthesis of protective stress shock proteins. If there is activation of genes for the synthesis of stress shock proteins, which help organisms to cope with stress situations, should be made more difficult if different stresses are received at the same time. Simultaneous exposure to different stresses will require energy consuming synthesis of several or at least much more protective stress shock proteins, which in turn may cause the microorganisms to become metabolically exhausted. Therefore, multi-target preservation of foods could be the key to avoiding synthesis of stress shock proteins, which otherwise could jeopardize the microbial stability and safety of hurdle technology foods (Leistner, 1995b).

List of hurdles:

Physical hurdles: Aseptic packaging, high temperatures (blanching, pasteurization, sterilization, evaporation, extrusion, baking, frying), microfiltration, low temperature (chilling, freezing), packaging films (including active packaging, edible coatings).

Physico-chemical hurdles: carbon dioxide, ethanol, lactic acid, lactoferrin, lactoperoxidase, low pH, low redox potential, low water activity, lysozyme, maillard reaction products, organic acids, oxygen, ozone, phenols, phosphates, salt, smoking, sodium-nitrite/nitrate, sodium or potassium sulphite, natural additives (spices and herbs), surface treatment agents.

Microbially derived hurdles: antibiotics, bacteriocin (nisin, pediocin etc.), competitive flora, protective cultures.

New emerging hurdles: Bactofugation, electromagnetic energy (microwave, radio frequency, pulsed magnetic fields, high voltage electric fields), modified atmosphere packaging, photodynamic inactivation, ultra-high pressures, ultrasonication, ultraviolet radiation, Ionic radiation, thermization

Microbial Hurdle Which Reduces Microbiological Load:

Bactofugation: This process includes the removal of microbial cells of high density from raw milk using high centrifugal forces.

Competitive microflora: The reduction of the number of undesirable microorganisms by lowering the pH. Consumption of nutrients and production of bacterial antimicrobial substances (nisin, other bacteriocins and hydrogen peroxide). Usually, this Hurdle is applied by choice of starter culture.

Microfiltration: This includes the removal of microbial cells, clumps and somatic cells by recirculation over a microfilter (0.22-0.44micrometer).

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Thermization: This process includes the application of a heat treatment to milk of a lower intensity than pasteurization in order to reduce the number of microorganism. Thermized milk is alkaline phosphatase positive.

Ultrasonication: The application of high intensity ultrasound (18-500MHz) that cause cycles of compression and expansion as well as cavitation in microbial cells. Implosion of microscopic bubbles generates spots with very high pressures and temperatures able to destroy cells. Ultrasonication at high enough intensities has long been known to inactivate vegetative bacteria and to reduce the heat resistance of spores; the effect is amplified by increasing the temperature. However, as the temperature is increased, the relative magnitude of the amplification becomes reduced. It is thought that this occurs because, as the vapour pressure rises, it has the effect of reducing the effectiveness of cavitation (the rapid formation and collapse of tiny bubbles), which is the main vehicle of killing. However, application of a slight overpressure (i.e. a few atmospheres) has been reported to overcome this fall in effectiveness, so that the amplification is maintained at higher temperatures. The combination procedure ('manothermosonication'), therefore, has been claimed to have potential for reducing pasteurization and sterilization temperatures for pumpable liquid and semisolid foods.

Electromagnetic energy treatment: Electromagnetic energy results from high voltage electrical fields, which alternate their frequency millions of times per second (<108MHz). Examples are microwave energy (thermal effect), radio-frequency energy (non-thermal effects). The treatment destroys cells by establishing pores in the cell walls due to the build-up of electrical charges at the cell membrane.

Low intensity irradiation: The submission of beams of photons/electrons to destroy viable microorganisms. The use of ionizing radiation, including gamma radiation from isotopes such as ⁶⁰Co and electrons and X-rays from machine sources is legal for disinfection, to prevent sprouting of bulbs and tubers, and for antimicrobial pasteurization of foods in many countries. Doses allowed have generally been up to 10 kGy (kilogray). Recently, the World Health Organization recommended that there are no toxicological or other hazards associated with higher doses, so that there should be no upper dose limit imposed for the irradiation of foods. The technology is relatively simple to apply with straightforward inactivation kinetics and geometry that makes dose control and processing requirements much easier than for many heat processes. The potential value to consumers, in the area of prevention of food poisoning through the elimination of pathogens such as *Salmonella* and *Campylobacter* from some foods of animal origin and some sea foods is substantial. However, this is not widely recognized by consumers, so that slow acceptance by the public continues to restrict its introduction in most parts of the world.

High voltage electric discharges: High voltage electric discharges ('Electroporation') are most effective for the inactivation of vegetative bacteria, yeasts and moulds, while spores are much more tolerant. The cell membrane is one of the most important structures controlling many of the vegetative cell's homeostatic mechanisms. It is not surprising, therefore, that electroporation, which breaches this structure, has such a

lethal and essentially non-thermal effect on vegetative cells. Voltage gradients in the region of 20-60 kV/cm are used to deliver in a series of microsecond pulses at pulse repetition rates sufficiently low to avoid too much heating. Foods such as milk and fruit juices can be pasteurized using this technique in flow-through continuous treatment cells. The reason for the resistance of spores is not known for certain, but probably results from the fact that the central cytoplasm of spores is thought to be relatively dehydrated. This would reduce its conductivity and make difficult the development of a sufficiently high voltage gradient to breach the surrounding membrane.

High intensity magnetic field pulses: Exposure to high intensity oscillating magnetic fields has been reported to have a variety of effects on biological systems ranging from selective inactivation of malignant cells (Costa JL, Hoffman GA, 1987) to the inactivation of bacteria on packaging materials and in foods (Hoffman GA, 1985). Treatment times are very short, typically from 25 ms to a few milliseconds and field strengths are very high, typically from 2 Tesla to about 100 Tesla at frequencies between about 5-500 kHz. Efficacies of treatments did not exceed about 100-fold reductions in numbers of vegetative micro-organisms inoculated into milk (*Streptococcus thermophilus*), orange juice (*Saccharomyces spp.*), bread rolls (mould spores) and no inactivation of bacterial spores has been reported (Hoffman GA, 1985), so the practical potential for the technique, as it has been developed so far, appears to be limited (Barbosa-Canovas GV, Weln-Chanes J., 1995).

Ultrahigh pressure: The application of high hydrostatic pressure is now well-established for the non-thermal inactivation of vegetative bacteria, yeasts and moulds in foods, by 'pressure pasteurization'. Vegetative forms of microorganisms are generally sensitive to pressures in the region of 400-600MPa (Megapascals) or so (equivalent to 4000-6000 atmospheres), though with large differences in the sensitivities of different species and sometimes large strain-to-strain variations too. Foods so treated include jams, fruit juices, dressings, and avocado dip (guacamole). The advantage of the treatments is that, whereas pressure may greatly alter the state of macromolecules in foods, such as proteins and polysaccharides, it has little effect on small molecules, so that flavours and odours remain relatively unaltered and 'fresh-like'.

Microbiostatic Hurdles that limit and/or prevent growth by Biochemical means:

pH reduction: The creation of extra-cellular acid conditions that enables hydrogen ions to be imported into the cytoplasm of microorganisms, thus disturbing the homeostasis mechanism of the intracellular pH responsible for maintaining functionality of key cell components vital for continuing growth and viability. Low pH values are obtained by fermentation or addition of acids (inorganic or organic).

Carbon dioxide: The addition and/or formation of carbonic acid to obtain a multiple Hurdle effects, including the creation of anaerobic conditions by replacing oxygen,

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reducing pH, inhibiting certain intracellular enzymes (decarboxylation) and inhibiting the transport of water soluble nutrients across the membrane (by dehydrating the cellular membrane).

Use of Preservative: The addition of certain additives to enhance keeping quality and stability through direct or indirect antimicrobial and/or fungicidal activity. Most preservatives are rather specific and have effect only on certain microorganisms.

Modified Atmosphere: The establishing of gaseous environment (either low in oxygen and/or high in carbon dioxide or nitrogen) to limit growth of aerobic microorganisms by impairing biochemical pathways. Modified atmosphere packaging means that a modification of the gas atmosphere in the packaging is created.

Redox potential control: The redox potential (Eh) is a measure of the oxidizing or reducing potential of food systems that determines whether aerobic or anaerobic microorganisms are able to grow. Eh is influenced by removal of oxygen and/or addition of reducing substances (e.g. ascorbic acid, sucrose etc.).

Lactoferrins: The utilization of naturally present glycoprotein (highest concentration in colostrum) to prolong the lag phases of bacteria for 12-14 hours by binding iron in the presence of bicarbonates.

The lactoperoxidase system: The activation of lactoperoxidase/thiocyanate/hydrogen peroxide system (indigenous system in milk) to inactivate several vital metabolic bacterial enzymes, consequently blocking their metabolism and ability to multiply.

Application in Food Industries:

Bacteriocins and heat treatments:

Bacteriocins can be used to reduce the intensity of heat treatments in foods without compromising microbial inactivation. Nisin and heat act synergistically against *L. plantarum* and *L. monocytogenes* (Mahadeo and Tatini, 1994; Ueckert *et al.*, 1998), reducing the heat resistance of *L. monocytogenes* in milk (Maisnier-Patin *et al.*, 1995). Nisin-resistant *L. monocytogenes* cells grown in the presence of nisin were more sensitive to heat at 55 °C than wild-type cells (Modi *et al.*, 2000). The effectiveness of enterocin AS-48 was higher on *S.aureus* cells sub-lethally injured by heat due to the lower concentration of remaining viable cells and to the cell damage induced by the heat treatment (Ananou *et al.*, 2004). Bacteriocins can also provide an additional protection during food storage against proliferation of endospores surviving heat treatments. Moreover, it has been demonstrated that the intensity of heat treatments against bacterial endospores can be lowered in combination with nisin as well as with enterocin AS-48 (Beard *et al.*, 1999; Wandling *et al.*, 1999; Grande *et al.*, 2006), saving costs in the heat treatment and decreasing the impact of heat on the food. Sub-lethal heat has been shown to sensitize Gram-negative bacteria to several bacteriocins such as nisin or pediocin AcH (Kalchayanand *et al.*, 1992; Boziaris *et al.*, 1998), enterocin AS-48 (Abriouel *et al.*, 1998; Ananou *et al.*, 2005), or jensenin G (Bakes *et al.*, 2004),

extending their spectrum of action. Highest sensitization was reported for combined treatments of bacteriocins, heat and a chelating agent (Abriouel *et al.*, 1998; Ananou *et al.*, 2005).

Bacteriocins and modified atmosphere packaging:

Modified atmosphere packaging (MAP) is frequently used in the food industry to prolong the shelf life of perishable food products. MAP may be defined as “the enclosure of food products in gas-barrier materials, in which the gaseous environment has been changed” (Young *et al.*, 1988). Prolongation of the shelf-life of food by MAP is based on retardation of intrinsic food changes and inhibition of spoilage microbiota. In a modified atmosphere, the dissolved CO₂ will determine growth inhibition of microorganisms (Devlieghere *et al.*, 1998). Gram-negative bacteria are generally more sensitive to CO₂, while lactic acid bacteria are much more resistant (Farber, 1991; Church, 1994). Since Gram-negative bacteria are usually not sensitive to bacteriocins, MAP and bacteriocins are therefore two complementary hurdles of advantage to food spoilage. Fang and Lin (1994a,b) found that growth of *L. monocytogenes* was completely inhibited on pork immersed in 10 IU/ml nisin and packed in 80% CO₂/20% air during 30 days of storage at 4°C. It has been reported that nisin and CO₂ atmosphere acted synergistically on the cytoplasmic membrane of *L. monocytogenes* by enhancing membrane permeabilization (Nilsson *et al.*, 2000).

Bacteriocins and pulsed electric fields:

Pulsed electric field (PEF) technology is a non-thermal process where microbial inactivation is achieved by application of high-voltage pulses between a set of electrodes (Vega-Mercado *et al.*, 1997). The effects of PEF resemble bacterial electroporation, but the higher intensity of this treatment causes severe damage to the bacterial cell membrane. Although this technology can only be applied to pumpable food products, it has gained attraction in recent years as an individual treatment or in combination with other hurdles such as bacteriocins. Since most bacteriocins act on the bacterial cytoplasmic membrane, the combined application of bacteriocins and PEF is expected to elicit increased bactericidal effects. Moreover, bacteriocins could also provide an additional hurdle against survivors from PEF treatments, such as sub-lethally injured cells or bacterial endospores. PEF could also be applied to extend the antimicrobial spectrum of bacteriocins, since PEF disrupts the bacterial outer membrane allowing bacteriocin molecules to reach the bacterial cytoplasmic membrane target. The efficacy of the combined treatments of PEF and bacteriocins in food preservation depends on several factors related to the PEF treatment (such as field strength, number of pulses, waveform or pulse duration), the food microbial load, composition and physiological stage, the added bacteriocin and other environmental factors (Wouters *et al.*, 2001; Bendicho *et al.*, 2002; Heinz *et al.*, 2002). All of these may have an influence on the numbers and types of bacteria surviving the combined treatment and most important, their proliferation during the shelf life

period of the processed food. For this reason, particular applications of bacteriocins and PEF must be studied in detail for each type of food and target bacteria.

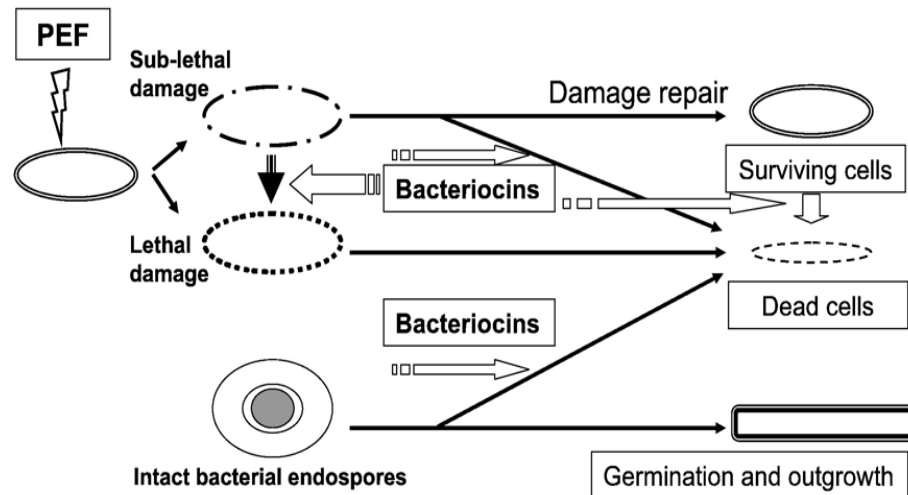


Figure: 2. Effects of Pulsed Electric Fields in Combination with Bacteriocins on Microbial Population

A synergistic effect was observed as the electric field intensity, number of pulses and nisin concentration increased both in liquid whole egg and in skim milk (Calderon-Miranda *et al.*, 1999a, b). *L. innocua* treated by PEF-nisin in skimmed milk exhibited an increase in the cell wall roughness, cytoplasmic clumping, leakage of cellular material and rupture of the cell walls and cell membranes (Calderon-Miranda *et al.*, 1999c). It has been reported recently that the efficiency of the combined treatment of nisin and PEF in liquid whey protein concentrate was strongly dependent on the sequence of application, since exposure to nisin after PEF produced a lower effect on *L. innocua* inactivation. This behaviour was mainly attributed to changes in the cell envelope and to modifications of the medium caused by PEF application (Gallo *et al.*, 2007). The application of nisin clearly enhanced the lethal effect of PEF treatment on other Gram-positive bacteria such as *S.aureus* in skim milk (Sobrinho-Lopez and Martin Belloso, 2006) and vegetative cells of *B. cereus* (Pol *et al.*, 2000).

Several studies have shown that the efficacy of PEF against Gram-negative bacteria can be enhanced by nisin. Although nisin was totally inactivated by PEF treatment in simulated milk ultrafiltrate media, a 4-log cycle reduction of inoculated *E. coli* cells was accomplished with nisin (ca. 1,000IU/ml) and three pulses of 11.25 kV/cm or 500 IU/ml for five pulses of the same intensity (Terebiznik *et al.*, 2000). Nisin-PEF inactivation of *E. coli* in simulated milk ultrafiltrate media was enhanced by water

activity reduction. Decreasing water activity to 0.95 with NaCl and applying PEF at 5 kV/cm (a non-lethal intensity when no other hurdle is used) with the further addition of nisin (1200 IU/ml) resulted in a 5-log cycle reduction of the bacterial population (Terebiznik *et al.*, 2002). Nisin also increased PEF effectiveness against *Pseudomonas aeruginosa*. At high PEF intensities (i.e., 11 kV/cm), the inhibitory effect of nisin increased with the number of pulses applied (Santi *et al.*, 2003). In conclusion, addition of nisin can improve the efficacy of PEF treatments against vegetative cells of foodborne pathogenic and spoilage Gram-positive and Gram-negative bacteria.

Bacteriocins and high hydrostatic pressure (HHP):

High hydrostatic pressure (HHP) is an innovative food processing and preservation method that causes injury and killing of microbial cells (Kalchayanand *et al.*, 1994; Farkas and Hoover, 2000; Patterson, 2000; Ray, 2002). During pressurization, the disruption of H-bonds, ionic bonds and hydrophobic interactions of the macromolecules adversely affects their structures and functions (Hoover, 1993). The sub-lethal damage is initiated by membrane phase transitions (Kato and Hayashi, 1999), affecting mainly ATP-generating and transport proteins. Cell death caused by HHP increases with pressure and so does the synergism with bacteriocins. Since most bacteriocins act on the bacterial cytoplasmic membrane it can be hypothesized that the observed synergy between bacteriocins and HHP results from cumulative damage to this structure. Several studies have described the combined effects of bacteriocins and HHP on bacteria. Nisin in combination with HHP showed strong synergistic effects against *L. plantarum*, *E. coli* and *L. monocytogenes* (ter Steeg *et al.*, 1999; Farkas *et al.*, 2003). Pediocin AcH also increased decimal reductions caused by HHP on food spoilage and pathogenic bacteria in peptone solution (Kalchayanand *et al.*, 1998b) and increased cell lysis in *L. mesenteroides* through cell wall degradation (Kalchayanand *et al.*, 2002). The synergistic activity of pediocin AcH in combination with nisin was greatly enhanced during pressurization (Kalchayanand *et al.*, 1998a,b, 2004a). A combination of nisin/pediocin AcH added to the plating medium was also effective on killing *Clostridium* spores induced to germinate by HHP treatment (Kalchayanand *et al.*, 2004b). Combining HHP and nisin (500 IU/ml) also increased inactivation of bacteria associated with milk (Black *et al.*, 2005). Similarly, the combination of lacticin 3147 and HHP increased the viability loss of *S. aureus* and *L. monocytogenes* in milk and in whey (Morgan *et al.*, 2000) and residual lacticin still showed inhibitory effect in the food, inactivating and preventing growth of sub-lethally injured cells. However HHP may have unwanted effects on milk components (Trujillo *et al.*, 2002), bacteriocin-HHP treatments could serve to decrease the intensity of HHP treatment without compromising microbial inactivation.

Microbial inactivation and Shelf Life comparison of 'Cold' Hurdle processing with pulsed electric fields and microfiltration and conventional thermal pasteurization in skim milk (Walkling-Ribeiro *et al.*, 2011)

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The application of non-thermal processes pulsed electric fields (PEF) and cross-flow micro-filtration (CFMF) continuous to be studied with the purpose of controlling microorganisms in milk. Thermal pasteurization (TP) is the established food technology for commercial processing of milk. However, degradation of valuable nutrients in milk and its sensory characteristics occurs during TP due to substantial heat exposure. Pulsed electric fields (PEF) and microfiltration (MF) both represent emerging food processing technologies allowing gentle milk preservation at lower temperatures and shorter treatment times for similar or better, microbial inactivation and shelf stability when applied in a hurdle approach compared to TP. Incubated raw milk was used as an inoculum for the enrichment of skim milk with native microorganisms before PEF, MF, and TP processing. Inoculated milk was PEF-processed at electric field strengths between 16 and 42 kV/cm for treatment times from 612 to 2105 μ s; accounting for energy densities between 407 and 815 kJ/L, while MF was applied with a transmembrane flux of 660 L/h m². Milk was TP-treated at 75 °C for 24s. Comparing PEF, MF and TP for the reduction of the native microbial load in milk led to a 4.6 log₁₀CFU/mL reduction in count for TP, which was similar to 3.7 log₁₀CFU/mL obtained by MF (P \geq 0.05), and more effective than the 2.5 log₁₀CFU/mL inactivation achieved by PEF inactivation (at 815 kJ/L (P<0.05)). Combined processing with MF followed by PEF (MF/PEF) produced a 4.1 (at 407 and 632 kJ/L), 4.4 (at 668 kJ/L) and 4.8 (at 815 kJ/L) log₁₀CFU/mL reduction in count of the milk microorganisms, which was comparable to that of TP (P \geq 0.05). Reversed processing (PEF/MF) achieved comparable reductions of 4.9, 5.3 and 5.7 log₁₀CFU/mL (at 407, 632 and 668 kJ/L respectively (P \geq 0.05)) and a higher inactivation of 7.1 log₁₀ (at 815 kJ/mL (P<0.05)) in milk than for TP. Microbial shelf life of PEF/MF-treated (815 kJ/L) and TP-treated milk stored at 4°C was analyzed over 35 days for total aerobic; *Enterobacteria*; *Yeasts* and *Moulds*; *Lactobacilli*; psychrotroph; thermophilic psychrotroph, mesophilic and thermophilic and *Staphylococci* counts. For both PEF/MF and TP-treated milk an overall shelf stability of 7 days was observed based on total aerobic counts (P \geq 0.05). Milk hurdle processing with PEF/MF at its most effective treatment parameters produced greater microbial inactivation and overall similar shelf stability at lower processing temperatures compared to TP. With higher field strength, shorter treatment time, larger energy density and rising temperature the efficacy of PEF/MF increased contrary to MF/PEF. Thus, PEF/MF represents a potential alternative for 'cold' pasteurisation of milk with improved quality.

Effect of HHP on *Staphylococcus aureus* in milk (Tabla *et al.*, 2012)

The combined effect of bacteriophages and high hydrostatic pressure (HHP) on *Staphylococcus aureus* Sa9 was evaluated in pasteurized whole milk under a simulated cold chain break, which was simulated by incubation of milk at 25°C for 48h. Four-hundred MPa was found to be the most suitable pressure to be used in combination with these phages. Two different levels of *staphylococcal* initial contamination (1 \times 10⁴ and 1 \times 10⁶ CFU/mL) were tested. A synergistic effect between HHP and phages was observed in both cases. Compared to each single treatment, the combined treatment

was able to reduce the initial *S. aureus* contamination below the detection limit (<10 CFU/mL). Bacteriophage performance in pressurized milk against *S. aureus* enabled milder hydrostatic pressure treatments, therefore phages can be regarded as a valuable hurdle on minimally processed food.

Cinnamon antimicrobial effect against *Salmonella typhimurium* cells treated by PEF in pasteurized skim milk beverage (Pina-Pérez *et al.*, 2012)

This study shows a possible synergistic effect of hurdle technology using a combination of Pulsed Electric Fields technology and a natural ingredient, cinnamon, on inactivation of *Salmonella typhimurium* in skim milk (SM). Firstly, different cinnamon concentrations (1, 2.5 and 5% (w/v)) were added to inoculated SM (10⁷CFU/mL) for quantitative study of the effect of the natural ingredient on microbial growth behaviour (bactericidal/bacteriostatic) at different temperatures (8, 25, 36°C). 5% (w/v) cinnamon supplementation of SM (SM-5%C) was bacteriostatic with regard to *S. typhimurium* growth according to μ_{max} [0.016 ((CFU/mL)/h) (8°C); 0.259 ((CFU/mL)/h) (25°C); 0.603 ((CFU/mL)/h) (37°C)] and λ [282.8 (h) (8°C); 15.38 (h) (25°C); 2.587 (h) (37°C)] values. Secondly, PEF treatments of 10, 20 and 30 kV/cm were applied, at treatment times ranging between 60 and 3000 μ s. All cinnamon supplementation levels (1, 2.5 and 5% (w/v)) had a synergistic effect within [0.171–0.989] log₁₀ cycles (p<0.05) due to non-thermal combination processing. The maximum synergistic effect was achieved by 10 kV/cm–3000 μ s PEF treatment with 5% (w/v) cinnamon SM supplementation. The maximum inactivation level (1.97 log₁₀ cycles) due to hurdle combination was achieved at 30 kV/cm–700 μ s in SM-5% C.

Conclusion:

There is definitely a real need for improved food preservation techniques, to meet the nutritional quality and safe processing of foods. Some improvements are being derived from the use of established techniques in new combinations and other improvements are being derived essentially from the development of new preservation techniques in a combined manner. A particular attraction of the newer techniques is that they act by inactivation rather than by inhibition. With regard to reducing the incidence of food poisoning disease, the introduction of effective inactivation techniques that lead to the elimination of the pathogens must be the ultimate target of primary food producers, processors, distributors and retailers and developments in this respect are also expected in the near future. A better understanding of the occurrence and interactions of different preservative factors (hurdles) in foods can form a powerful and logical basis for improvements in food preservation technologies. Although recently, there have been many studies that investigated the effect of combining hurdles in laboratory media and foods, the interactions of many hurdles are still not clear. This technology could be a better option for safe food processing along with nutritional qualities and further research is

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also needed to enhance its efficiency, safety or any changes in food products during its processing or addition of any substances to enhance the efficacy.

Hurdle Technology is a method of ensuring that pathogens in food products can be eliminated or controlled by combining more than one approach. These approaches can be thought of as "hurdles" the pathogen has to overcome if it is to remain active in the food. The right combination of hurdles can ensure all pathogens are eliminated or rendered harmless in the final product. This technology is an intelligent combination of hurdles which secures the microbial safety and stability as well as the organoleptic and nutritional quality and the economic viability of food products. The organoleptic quality of the food refers to their sensory property, which are its look, taste, smell and texture.

Examples of hurdles in a food system are high temperature during processing, low temperature during storage, increasing the acidity, lowering the water activity or redox potential, or the presence of bio-preservatives. According to the type of pathogens and how risky they are, the intensity of the hurdles this can be adjusted individually to meet consumer preferences in an economical way, without sacrificing the safety of the product.

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Impact of Farm Loan Waiving Scheme on Credit Management of Kumbakonam Primary Co-operative Agricultural and Rural Development bank

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Abstract

Cooperative Banking, which is now a century old, has a unique position in the rural credit delivery system of India. The needs of the borrower, particularly the needs of funds among farmers, are expanding in tune with changing agricultural environment. At the same time, the loan operation becomes highly complex and more challenging. Hence, to help farmers Government of India has formulated a cooperative credit system under the banner of Primary Agricultural Cooperative Societies (PACS). It is very notable record that the Government of Tamil Nadu has waived the loan amount to the poor farmer, availed from the Co-operative agricultural banks, under the scheme of Tamil Nadu Government Farm Loan Waiver scheme introduced in 2006. Realizing this fact, the present study has been formulated in order to assess the credit Performance of kumbakonam PCARDB in Thanjavur District before and after implementation of the farm loan waiver scheme. The Credit Management in terms of issue and recovery of loan to Farm Sector, Non Farm Sector as well as against Jewel by kumbakonam PCARDB before and after the implementation of Farm Loan Waiving Scheme has analyzed .

Key Words: *Credit Management, Farm Loan Waiving Scheme, PCARD Bank, Descriptive statistics, Non- Parametric Mann-Whitney 'U' Test.*

Introduction

Cooperative Banking, which is now a century old, has a unique position in the rural credit delivery system of India. Having made significant studies in the field of rural credit through its short and the long-term structures, it continues to play a crucial role in dispensation of credit for agriculture and rural development. Though commercial banks after nationalization and later on RRBs have entered the

rural areas, but cooperative banks still continue to enjoy an important place in the rural credit scenario. We have co-operative credit institutions at the Village level, Taluk level, District level, State level and National level. These institutions are well knit.

The needs of the borrower, particularly the needs of funds among farmers, are expanding in tune with changing agricultural environment. At the same time, the loan operation becomes highly complex and more challenging. Hence, to help farmers Government of India has formulated a cooperative credit system under the banner of Primary Agricultural Cooperative Societies (PACS). It is the PACS which has a direct interface with individual farmers, provides short term and medium term credit, supplies agricultural inputs, distributes consumer articles and arranges for marketing of produce of its members through a cooperative marketing society. The Primary Agricultural and Rural Development Bank in India across States under State Co-operative Agricultural and Rural Development Banks (SCARDBs) maintain different loan portfolios keeping in mind the needs of the farmers and rural people as well as the availability of funds to issue credit. In this scenario the Tamil Nadu Government implemented the Farm Loan Waiver Scheme in 2007.

In this study, an attempt has been made to evaluate the status of credit in terms of issue, recovery and net value of loan before and after implementation of waiving schemes in kumbakonam Primary Cooperative Agricultural and Rural Development (PCARD) Bank at Thanjavur District.

The issue, recovery and net value of loan to farm sector, non-farm sector and jewel loan is compared between pre and post-period of loan waiving scheme. As the number of observations (seven years in pre-period and two in post-period are small and does not follow any distributions, Mann-Whitney U test is used to compare the status of issue, recovery and net value of loan between two periods. The year in which the loan waiving scheme is implemented is excluded from the comparative analysis. Further, the trend and growth in issue, recovery and net value of agricultural and non-agricultural loan is also evaluated for the period of six years before implementation of the waiving scheme. The results of the analysis are tabulated and discussed hereunder.

Statement of the Problem

The share of the co-operatives in agricultural credit disbursed has declined over the years. The lower levels of business volume, relatively high overhead costs and increased competition from the commercial banks have contributed to the diminishing role of the agricultural co-operative institutions. The cooperative banks are struggling to conform to the banking norms and to mobilize adequate resources to meet the requirements of the farmers. The sluggish growth of agrarian economy and a series of poor crop seasons affected by adverse weather conditions have taken their toll on the co-operative societies that depend upon agriculture. In order to ascertain

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this problem this present study is undertaken to find out the Credit Management of kumbakonam Primary Co-operative Agricultural and Rural Development Bank before and after implementation of Farm Loan Waiver Scheme

Need and scope of the Study

In India, the Primary Co-operative Agricultural and Rural Development Banks are playing a major role in the socio economic development of the rural people, especially the poor farmers by way of providing loan facilities for agricultural production and marketing at very nominal interest and in special cases without interest. It is very notable record that the Government of Tamil Nadu has waived the loan amount to the poor farmer, availed from the Co-operative agricultural banks, under the scheme of Tamil Nadu Government Farm Loan Waiver scheme introduced in 2006. Most of the farmers in the villages have benefited under the scheme and it is also expected that the performance of the banks would be improved. Therefore it is necessary to undertake micro and macro level studies on the functioning of Primary Co-operative Agricultural and Rural Development Banks (PCARDB). Realizing this fact, the present study has been formulated in order to assess the credit Performance of kumbakonam PCARDB in Thanjavur District before and after implementation of the farm loan waiver scheme.

Objectives of the study

To find out the status of Credit Management of kumbakonam Primary Co-operative Agricultural and Rural Development Bank in Thanjavur District before and after implementation of Tamil Nadu Government Farm Loan Waiver Scheme.

Hypothesis

H0: There is no significant difference in the credit management of kumbakonam PCARDB between pre and post Farm Loan Waiving period.

Period of study

The study pertains to a period of ten years from 1999-2000 to 2008-2009.

Sources of data

The study is based on secondary data collected from the audited annual records of the study bank, published reports of the Registrar of Co-operative Societies, State and Central government, reports of various Committees on Co-operation, books, journals and newspapers relating to Cooperative Banks in Tamil Nadu.

Tools used for analysis of the study

Descriptive statistics such as mean, standard deviation, co-efficient of variation are used to ascertain the central tendency as well as level of consistency in the financial variables.

Compounded Annualized Growth Rate and Linear Growth Rate are used to find out the growth and trend in the variables.

The statistical significance of the growth and trend are ascertained using Student 't' test.

For assessing the effect of implementation of loan waiver scheme on the Credit Management of kumbakonam PCARDB a non- parametric Mann-Whitney 'U' test is applied.

Limitations of the study

- The study is based on secondary data and therefore, limitations of secondary data are applicable to this study.
- The period of study covers only ten years from 1999 – 2009.
- The study is confined to only one bank.

Table 1A: Trend and Growth in Issue, Recovery and Net Value of Farm Sector Loan before Implementation of Waiving Scheme in Kumbakonam PCARDB

(Amount Rs. In lakhs)

Year	Issue	Recovery	Total
Opening Balance			492.83
1999-00	61.52	45.59	508.75
2000-01	24.16	42.17	490.74
2001-02	27.02	40.66	477.10
2002-03	40.48	32.32	485.26
2003-04	39.73	42.62	482.37
2004-05	2.04	34.92	449.49
2005-06	0.10	37.61	411.98
Mean	27.86	39.41	472.24
SD	21.93	4.68	31.94
CV	78.69	11.87	6.76
CAGR	-57.23**	-4.28	-2.81***
t-Value	-2.86	-2.00	-4.14
LGR	-7.71**	-1.30	-13.13***
t-Value	-2.61	-1.68	-4.32

Linear Equation Model for Linear Growth Rate

Equation	58.69 - 7.71 t	44.62 - 1.30 t	524.75 - 13.13 t
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Significant at 5% level; *Significant at 1% level

According to the Table 1 A, the issue of Farm Sector Loan stood at Rs.61.52 lakhs in 1999-00 but declined to Rs.24.16 lakhs in 2000-01 before moving up to Rs.27.02 lakhs in 2001-02. Again in 2002-03, it went up to Rs.40.48 lakhs and declined heavily to Rs.2.04 lakhs in 2004-05 after stopping at Rs.39.73 lakhs in 2003.04.

The average of issue of loan to Farm Sector by Kumbakonam PCARDB stood at Rs.27.86 lakhs between 1999-00 and 2005-06. The issue of loan to Farm Sector declined remarkably at compound rate of 57.23 per cent (CAGR = -57.23, $t = -2.86$, $p < 0.05$) and linear rate of Rs.7.71 lakhs on an average every year LGR = -7.71, $t = -2.61$, $p < 0.05$) during the Pre-Waiving Period.

At the same time, the recovery of Farm Sector Loan with an average of Rs.39.41 lakhs was at Rs.45.59 lakhs in 1999-00 and reached a low at Rs.37.61 lakhs in 2005-06. The rates of decline, both compounded and linear rates, were insignificant, despite average recovery was higher than that of issue of loan to Farm Sector.

The net value of loan (total loan) to Farm Sector was Rs.508.75 lakhs in 1999-00 but significantly declined to Rs.411.98 lakhs in 2005-06 at CAGR of 2.81 per cent ($t = -4.14$, $p < 0.01$) and LGR of Rs.13.13 lakhs ($t = -4.32$, $p < 0.01$) during the Pre-Waiving Period under study.

On the whole, it is found that there was significant decline in the issue and net value of loan whereas the decline in recovery was not significant in Kumbakonam PCARDB before the implementation of Waiving Scheme to farmers.

As per Table 1B, the volume of Farm Sector Loan waived by the PCARDB in Kumbakonam was Rs.411.98 lakhs, leaving the net value of loan to nil.

Table1B

Status of Issue, Recovery and Net Value of FARM Sector Loan During and After Implementation of Waiving Scheme in Kumbakonam PCARDB

<i>(Amount Rs. In lakhs)</i>			
Year	Issue	Recovery	Total
Opening Balance			411.98
In the year of Loan Waiving			
2006-07	0.00	411.98	0.00
After Loan Waiving			
2007-08	0.04	0.00	0.10
2008-09	4.66	0.00	4.76

Mean	2.35	0.00	2.43
SD	3.27	0.00	3.30

During the Post-Waiving Period of two years from 2007-08 to 2008-09, the issue of loan to Farm Sector stood at an average of Rs.2.35 lakhs while there was no recovery.

Table 1C

Comparison of Issue, Recovery and Net Value of FARM Sector Loan Before and After Implementation of Waiving Scheme in Kumbakonam PCARDB

Loan Status		Mean (Rs. Lakhs)	SD	Sum of Ranks	Mann Whitney U Value	Z Value
Issue	Before	27.86	21.93	40.0	2.0	-1.46 ^{NS}
	After	2.35	3.27	5.0		
Recovery	Before	39.41	4.68	42.0	0.0	-2.06 ^{**}
	After	0.00	0.00	3.0		
Net Value	Before	472.24	31.94	42.0	0.0	-2.05 ^{**}
	After	2.43	3.30	3.0		

^{**}Significant at 5% level. NS - Not Significant

From the comparison of issue, recovery and net value of Farm Sector Loan between Pre and Post-Waiving Period, results of which are shown in Table 1C, it is found that issue of loan to Farm Sector was independent of the Waiving Scheme but implementation of Waiving Scheme significantly affected the recovery ($U = 0.0$, $Z = -2.06$, $p < 0.05$) and net value ($U = 0.0$, $Z = -2.05$, $p < 0.05$) of loan to Farm Sector between the two periods.

Table 2A

Trend and Growth in Issue, Recovery and Net Value of NON-FARM Sector Loan before Implementation of Waiving Scheme in Kumbakonam PCARDB. Regarding the status of Non-Farm Sector Loan by Kumbakonam PCARDB during the Pre-Waiving Period, it can be observed from the Table 2A that the average of issue of loan to Non-Farm Sector was Rs.33.29 lakhs. It stood at the high of Rs.87.83 lakhs in 2002-03 but gradually declined from Rs.35.49 lakhs in 1999-00 to Rs.0.03 lakhs in 2005-06, at CAGR of 30.33 per cent and LGR of Rs.5.97 lakhs.

On the other hand, the recovery of Non-Farm Sector Loan, which was Rs.41.66 lakhs on an average during the Pre-Waiving Period, declined to Rs.15.11 lakhs in 2005-06

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from Rs.53.45 lakhs in 1999-00. The rate of decline in recovery of Non-Farm Sector Loan was 15.79 per cent when compounded annually (CAGR = - 15.79, t = -2.85, p < 0.05) and Rs.5.43 lakhs on an average every year (LGR = 5.43, t = -2.96, p < 0.05). The net loan to Non-Farm Sector with an average of Rs.167.66 lakhs, declined at compound rate of 1.98 per cent and linear rate of Rs.3.18 lakhs, but the decline was not at mentionable level as both CAGR and LGR were insignificant.

The CV value at 96.08 for issue was much higher compared to that of recovery (CV = 35.28) and net value (CV = 13.17) of Farm Sector Loan. This shows that issue of Non-Farm Sector Loan was highly inconsistent in Kumbakonam PCARDB. Overall, it is found that there was significant decline in recovery of Non-Farm Sector Loan whereas the decline in issue and net value of farm sector loan was not at mentionable level for PCARDB in Kumbakonam.

Table 2A

(Rs. In Lakhs)			
Year	Issue	Recovery	Total
Opening Balance			198.97
1999-00	35.49	53.45	181.01
2000-01	16.66	50.54	147.12
2001-02	61.17	42.94	165.36
2002-03	87.83	50.25	202.94
2003-04	30.03	51.71	181.26
2004-05	1.85	27.61	155.49
2005-06	0.03	15.11	140.41
Mean	33.29	41.66	167.66
SD	31.99	14.70	22.08
CV	96.08	35.28	13.17
CAGR	-30.33	-15.79**	-1.98
t-Value	-1.43	-2.85	-0.78
LGR	-5.97	-5.43**	-3.18
t-Value	-0.98	-2.96	-0.73

Linear Equation Model for Linear Growth Rate

Equation	57.17 - 5.97 t	63.39 - 5.43 t	180.39 - 3.18 t
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**Significant at 5% level.

Table 2B shows the quantum of issue, recovery and net value of Non-Farm Sector Loan in the year of implementation of Waiving Scheme as well as during Post-Waiving Period.

Table 2B

Status of Issue, Recovery and Net Value of NON-FARM Sector Loan During and After Implementation of Waiving Scheme in Kumbakonam PCARDB

(Amount Rs. In lakhs)

Year	Issue	Recovery	Total
Opening Balance			140.41
In the year of Loan Waiving			
2006-07	0.03	4.72	135.72
After Loan Waiving			
2007-08	0.00	13.71	121.95
2008-09	0.00	5.61	116.34
Mean	0.00	9.66	119.15
SD	0.00	5.73	3.97

As per the Table, the recovery of Non-Farm Sector Loan was Rs. 4.72 in the year of implementation of Waiving Scheme. There was no issue of loan to Non-Farm Sector but the recovery was Rs.13.71 lakhs and Rs.5.61 lakhs in 2007-08 and 2008-09 respectively. On an average, recovery was Rs.9.66 lakhs and net Non-Farm Sector Loan was Rs.119.15 lakhs.

The results of Mann-Whitney U Test comparing the status of issue, recovery and net value of Non-Farm Sector between Pre and Post-Waiving Period are presented in Table 2C.

Table 2C

Comparison of Issue, Recovery and Net Value of NON-FARM Sector Loan Before and After Implementation of Waiving Scheme in Kumbakonam PCARDB

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Loan Status		Mean (Rs. Lakhs)	SD	Sum of Ranks	Mann Whitney U Value	Z Value
Issue	Before	33.29	31.99	39.0	0.0	-2.33**
	After	0.00	0.00	6.0		
Recovery	Before	41.66	14.70	39.0	0.0	-2.32**
	After	9.66	5.73	6.0		
Net Value	Before	167.66	22.08	39.0	0.0	-2.32**
	After	119.15	3.97	6.0		

**Significant at 5% level

It is understood from the Table that issue, recovery, net value of Non-Farm Sector Loan by Kumbakonam PCARDB were affected by the implementation of the Waiving Scheme. This is indicated by Z values, for the differences in issue (U = 0.0, Z = -2.33, p < 0.05), recovery (U = 0.0, Z = -2.32, p < 0.05) and net value (U = 0.0, Z = -2.32, p < 0.05), between two periods obtained from Mann-Whitney Test, being significant.

Table 3A

Trend and Growth in Issue, Recovery and Net Value of JEWEL Loan before Implementation of Waiving Scheme in Kumbakonam PCARDB

<i>(Rs. In Lakhs)</i>			
Year	Issue	Recovery	Total
Opening Balance			2.03
1999-00	0.00	2.03	0.01
2000-01	0.00	0.00	0.01
2001-02	3.88	0.25	3.63
2002-03	11.58	7.69	7.52
2003-04	11.86	12.24	7.14
2004-05	4.70	9.53	2.31
2005-06	11.55	7.17	6.70
Mean	6.22	5.56	3.90
SD	5.39	4.82	3.28

CV	86.55	86.63	83.93
CAGR	13.67	50.21	243.47**
t-Value	1.14	1.62	2.84
LGR	1.86*	1.66*	1.01
t-Value	2.50	2.49	1.99

Linear Equation Model for Linear Growth Rate

Equation $-1.21 + 1.86 t$ $-1.08 + 1.66 t$ $-0.13 + 1.01 t$

*Significant at 10% level; **Significant at 5% level

Pertaining to issue, recovery and net value of Jewel Loan by PACRDB in Kumbakonam, Table 3A shows that the issue of Jewel Loan was substantial at around Rs.11 lakhs in 2002-03, 2003-04 and 2005-06 while it was none in the first two years.

During 2001-02 and 2004-05, it was Rs.3.88 lakhs and Rs.4.70 lakhs respectively. The recovery of Jewel Loan was more than the average (Mean = 5.56 lakhs) in the last four years of the Pre-Waiving Period. The Total Jewel Loan, with an average of Rs.3.90 lakhs, was also higher than its average in 2002-03, 2003-04 and 2005-06. The rate of growth in issue and recovery of Jewel Loan was not at a remarkable level. But the linear trend for both issue (LGR = 1.86, t = 2.50, p < 0.10) and recovery (LGR = 1.66, t = 2.49, p < 0.10) were significant marginally at 10 per cent level. On the other hand, the growth in total value of Jewel Loan was significant (CAGR = 243.47, t = 2.84, p < 0.05) whereas the linear trend was insignificant.

Table 3B

Status of Issue, Recovery and Net Value of JEWEL Loan During and After Implementation of Waiving Scheme in Kumbakonam PCARDB

<i>(Amount Rs. In lakhs)</i>			
Year	Issue	Recovery	Total
Opening Balance			6.70
In the year of Loan Waiving			
2006-07	7.80	10.78	3.71
After Loan Waiving			
2007-08	4.92	5.09	3.54
2008-09	19.48	9.27	13.75

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Mean	12.20	7.18	8.65
SD	10.30	2.96	7.22

During the Post-Waiving Period, as shown in Table 3B, Loan to Jewel issued by the Kumbakonam PCARDB was Rs.4.92 lakhs against recovery of Rs.5.09 lakhs in 2007-08. In 2008-09, issue of Jewel Loan was higher at Rs.19.48 lakhs, compared to recovery of Rs.9.27 lakhs. Overall, during the Post-Waiving Period, the average issue of Jewel Loan (Mean = 12.20) was higher than that of recovery (Mean = 7.18).

From the comparison of Jewel Loan in respect of issue, recovery and net value between Pre and Post-Waiving Period, results of which are presented in Table 3C, using Mann-Whitney Test, it becomes apparent that Z value for issue, recovery and net value of Jewel Loan was insignificant.

Table 3C

Comparison of Issue, Recovery and Net Value of JEWEL Loan Before and After Implementation of Waiving Scheme in Kumbakonam PCARDB

Loan Status		Mean (Rs. Lakhs)	SD	Sum of Ranks	Mann Whitney U Value	Z Value
Issue	Before	6.22	5.39	25.0	4.0	-1.30 ^{NS}
	After	12.20	10.30	20.0		
Recovery	Before	5.56	4.82	27.0	6.0	-0.77 ^{NS}
	After	7.18	2.96	18.0		
Net Value	Before	3.90	3.28	26.0	5.0	-1.04 ^{NS}
	After	8.65	7.22	19.0		

NS – Not Significant

The insignificant Z value indicated that the issue, recovery and net value of jewel loan by Kumbakonam PCARDB was independent of the implementation of the Waiving Scheme.

Testing of hypothesis

Issue of FS	Recovery of FS	Issue of NFS	Recovery of NFS	Issue of Jewell loan	Recovery of Jewell loan
NS	S	S	S	NS	NS

There was significant difference in the issue of Non Farm Sector Loan, recovery of Farm Sector and Non Farm Sector Loans. Hence the hypothesis (iii), **“There is no significant difference in the Credit Management of Kumbakonam PCARDB between Pre and Post Farm Loan Waiving Period,”** is rejected. Instead it is concluded that there was significant difference in the Credit Management of Kumbakonam PCARDB before and after implementation of the Waiving Scheme.

Findings and conclusions

- ❖ There is significant difference in the credit management of Kumbakonam PCARDB before and after implementation of waiving scheme.
- ❖ It is found that there was a significant decline in the issue and net value of loan whereas the decline in recovery was not significant in Kumbakonam PCARDB before the implementation of waiving scheme to farmers.
- ❖ It is found that issue of loan to farm sector is independent of the waiving scheme but implementation of waiving scheme has significantly affected recovery and net value of loan to farm sector between two periods.
- ❖ There is a significant decline in recovery of non-farm sector loan whereas the decline in issue and net value of farm sector loan was not at mentionable level for PCARDB in Kumbakonam.
- ❖ There has been a significant decline in net value of non-farm sector loan in Kumbakonam PCARDB after implementation of waiving scheme.

The Credit Management in terms of issue and recovery of loan to Farm Sector, Non Farm Sector as well as against Jewel by kumbakonam PCARDB before and after the implementation of Farm Loan Waiving Scheme has analyzed. From the discussion of the results of the analysis, it is concluded that there was a decline in issue, recovery and net loan to Farm Sector and Non-Farm Sector Loan during the Pre Waiving Period. It is further understood that there was significant reduction in issue of Farm Sector and issue and recovery of Non-Farm Sector loan after the implementation of Farm Loan Waiving Scheme in kumbakonam PCARDB at Thanjavur District. There was no remarkable difference in the issue and recovery management of Jewel Loan between Pre and Post-Waiving Periods. The issue, recovery and net value of jewel loan by Kumbakonam PCARDB is independent of the implementation of waiving scheme.

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