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Impact of Economic Reforms on Stock Market Behaviour: A Short-Term Perspective

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Abstract

In 2012, the world economy is still showing signs of recovery and moderate growth in its performance. But amidst this, Indian security markets though seemed to be affected by recession, have shown no signs of remorse and have been seen to reach new heights. Between September 3rd - October 4th, Indian stock market indices showed phenomenal Bull Run breaching new heights. Majority of the analysts attribute this uptrend to the recent economic reforms announced by the union government and the steps taken by the RBI following the announcements. This study examines the impact of these announcements on the Indian stock markets. Twelve major indices of Indian stock markets listed on Bombay Stock Exchange (BSE) and National Stock Exchange (NSE) and eight retail sector companies were considered for the study. The study concludes that the Indian stock markets are semi strong efficient and impact of economic reforms and the measures by RBI were found to be not factored in the prices of these indices in the short run.

Key words and Phrases: *Economic Reforms, Liberalization, Recession.*

Introduction

The economic reforms of 1990's led to the growth and progress of the country. This is evident from the phenomenal growth in services, manufacturing, mining and other sectors. Investors were seen to move from traditional fixed deposits to investing in stock markets. Foreign Institutional Investments (FIIs) brought momentum in the primary and secondary markets. In addition, strict regulatory measures brought transparency and security into the system.

Growth and stability are two faces of the same coin. For a stable economy, the concerted efforts of the government, central bank and other regulatory agencies are required in strengthening the expectations as well as achieving supernormal growth. It is generally perceived that stock markets are weak form efficient and semi strong efficient. Any news is factored into the prices reflecting market efficiency. This is an indication of transparency and safety of the stock market. The Indian stock markets (Bombay Stock Exchange (BSE) and National Stock Exchange (NSE)) recently witnessed

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phenomenal growth during September 3rd- October 4th, 2012. The market indices listed on Bombay in particular showed phenomenal uptrend during this short period of time. The trading activity of FIIs also reached new heights during this period. These recent trends can be attributed to the collective efforts by Indian government in the form of economic reforms as well as Reserve Bank of India's (RBI) initiatives to boost liquidity into the economy. Against this background, this paper attempts to examine the principles of semi-strong form of market efficiency. It also examines whether the recent announcements of economic reforms were incorporated into the stock prices in advance, thus making actual announcements insignificant or whether the announcements took the markets by surprise thus enabling abnormal profits.

The study is divided into six sections. The first section presents the overview of the recent reforms in the brink of the economic conditions, followed by review of literature, research design, analysis and discussion and conclusion in subsequent sections.

Section 1: The State of Economy and Economic Reforms: An Overview

The Index of Industrial Production (IIP) data was released on September 12th, 2012. The IIP number is an indicator of the performance of industrial production of three key sectors namely manufacturing, mining and electricity. These indicators have been negative over the years signalling the partial slowdown of the real economy. Analysts attributed this deterioration to the government's policy paralyses and slowdown in the corporate capital expenditure. Weak domestic demand and slow external growth are essentially the key drivers for this state of affairs. In fact, the industrial output remained almost flat registering a positive growth of mere 0.1 percent (September, 2012) when compared to negative 1.8 percent in August, 2012. On the other hand, consumer goods output as well as consumer non-durables sector were seen to be sluggish. Consumer durables output grew at 1.4 percent in July as compared to 9.0 percent a year ago. Consumer non-durables grew at a mere 0.1 percent. The electricity growth fell almost by half to 2.8 percent from nearly 6.4 percent. Global investors were also worried with the failure of Northern, Eastern and North-eastern

grids in July 2012 which affected around 600 million people across the country. IIP data also reflected the contraction of mining and manufacturing output. Mining scandals and consequential banning of several mining companies have adversely impacted the sector. Most importantly manufacturing sector has not shown signs of recovery from the previous year which fell by another 0.2 percent. The output of eight out of twenty two manufacturing industries grew in July, against fourteen industry groups in June. The production of natural gas contracted itself by 13.5 percent, further affecting the manufacturing sector. The growth in sales of commercial vehicles dwindled from 21 percent (August, 2011) to 3.6 percent (September, 2012). Basic metals which have the highest weightage in manufacturing IIP, posted a poor growth of 1.0 percent. Global recession led to contraction in merchandise exports by 14.8 percent in July. Over the years, it is observed that the global recession and lack of political will slowed down the growth rate of Indian economy.

On September 12th, 2012, the Government led by Prime Minister Dr. Manmohan Singh announced on liberalising the retail sector and broadcasting and the aviation sectors. Along with these, a slew of other reforms such as reduction of withholding tax on long term infra bonds to 5 percent and the launch of Rajiv Gandhi Equity scheme were announced. The latter would allow retail investors with less than ten lakh rupees annual income to invest into stock markets. On September 17th, RBI took a cautious stance by reducing the Cash Reserve Ratio (CRR) ratio by 0.25 percent thereby reducing the CRR to 4.5 percent. This reduction released Rs.17,000 crores of primary liquidity into the system. The repo rate and reverse repo rates were unchanged at 8.0 and 7.0 percent respectively. RBI actions supplemented the efforts of the government. Further, the government on October 4th, 2012 announced significant policy initiatives: liberalizing the insurance sector by raising foreign investment limit from 26% to 49%, giving statutory status to pension regulator by passing the Pension Fund Regulatory and Development Authority bill, revamping of companies law by providing framework for corporate social responsibility (CSR) and specifying the role of independent directors, revamping the Competition (Amendment) Bill by bringing all regulators under the

law and providing greater autonomy to the Forward Markets Commission.

Against this background, a need was thus felt examine the impact of concerted efforts of the government and central bank of India on the stock prices performance. The study also intends to know to what extent the markets are efficient and whether the announcements were incorporated into the share prices in advance. If markets are efficient, the new information will be will be factored in the prices and an individual or institutional investors cannot make abnormal returns by adopting different trading strategies. But, if the markets were not semi-strong efficient, it would allow managers to make abnormal profits by adopting trading strategies.

Section 2: Review of literature

The important studies undertaken so far to review the impact of economic reforms are presented hereunder.

Fama (1987) examined the capital markets based on the market efficiency and divided the markets into three categories depending on the efficiency of the markets. The first form of efficiency namely weak form efficiency rejected the influence of past data on the future prices. Weak form efficiency observes that one cannot make abnormal returns observing the correlation between the past and future prices. Second form of the efficiency points to the impact of events on the stock prices. According to the theory, the events cannot be judged in analysing the point of entry and exit in the stock markets to make abnormal returns. Third and last form of efficiency, points to the impact of influence of insider trading information in making abnormal returns in the markets.

Fixing the agenda for financial sector reforms, Baruva (1997) observed that there is a need to establish vibrant securities markets where financial assets are efficiently priced, based on their risk and return attributes to provide correct signals to the economy for investment decisions in the real sector.

Swarup and Verma (1998) have examined the importance of the stock exchange reforms during the period 1992-97 and their impact on capital market development as perceived by intermediaries. The study finds that the reforms have resulted in a fair, transparent and strong regulatory structure for the efficient and smooth functioning of the capital market. However, it finds that liquidity has been a major problem in the stock markets and proposes that the Indian regulatory framework needs to shift its focus from correction to prevention stage.

Dev and Jain (1999) find that the equity cult has no doubt developed but it is not based on pure information, fundamentals and rational behaviour of investors. Besides, the policy pronouncements of the Government and SEBI too have their impact on the market." The authors are of the opinion that the reforms can, to a great extent, bring vibrance to the market.

Balasubramanyam and Mahambre (2001) found a decline in debt / equity ratios in majority of industries, especially in new firms, which was seen as a consequence of financial reforms.

Chakraborthy (2001) finds the inflow of private foreign capital (foreign direct investment, portfolio investment and external commercial borrowings) increased sharply since 1993-94. With the opening of the Indian stock market to FII and allowing private corporate sector to issue global depository receipts (GBRs) in 1993, portfolio investments entered as a new category into the private foreign investment in India in the nineties.

Bimal Jalan (2002) is of the opinion that there has been progressive intensification of financial sector reforms and the financial sector as a whole is more sensitized than before to the needs for internal strength and effective market as well as to the overall concerns for financial stability.

Khanna (2002) examined the impact of capital account liberalization on Indian capital market (1989-2002) and found that the entry of international capital flows have helped to provide greater depth to domestic capital market and reduce the systematic risk of the economy.

Chaturvedi & Upadhya (2004) observed that per capita income (PCI) has consistently recorded higher growth during the post-reforms periodic as compared to pre-reform period. Though the poverty ratios have fallen, disparity is widened.

Siggel and Agarwal (2009) observe that economic reforms of 1991 were helpful to most industries by increasing access to foreign technology and cheaper capital goods and raw materials. It is further felt

that improvement in infrastructure and more flexible labour laws will facilitate further growth of India's manufacturing sector.

The Economic Time Bureau (2012) reporting the Morning Star Investment Conference in Mumbai on 01.11.2012 writes that the government announced a slew of reforms since mid September (2012) which hosted market sentiments and helped a tepid sensex gain 6%. Some of the measures included allowing FDI in multi-brand retail, hiking FDI limit in insurance, a bailout package for decript state electricity boards and a 5% hike in diesel price. Among the emerging market cluster, India has been one of the best performing markets around 19% since the beginning of this year (2012). Excess global liquidity has helped Indian shares as foreign investors have pumped in $ 18 billion since January this year (2012).

Ahluwalia observed that the recovery from the 1991 crisis was exceptionally shift and the post-stabilization period (1994-95 to 1997-98) showed a significant acceleration in growth compared with the growth rate before reforms. The reforms involved a radical reorientation of foreign investment policy. The presence of FIIs which invested a total of around US $ 9 billion in the stock markets is an important force which will push the capital market to come close to international standards.

It is clear from the preceding review of literature that, a number of studies have examined the impact of economic reforms on the economy with a broader perspective with a longer time frame. The immediate impact of the reforms on the behaviour of stock markets has not been examined. To be able to conduct an immediate impact study, the sequence of events immediately after announcement of reforms has to be tracked. Obviously the time horizon for the inquiry would be short term. To fill up this gap, the present study has been undertaken to examine the impact of the recent reforms on stock markets in particular. A research on immediate impact of these recent reforms with short-term perspective is not yet undertaken except for the discussions made in the Morning Star Investment Conference in Mumbai on 01-11-2012. The signals that the reforms offer to FIIs is also an important issue to be examined as their perceptions and flows do impact on the Indian stock market behaviour. Hence this study assumes significance. These reforms for gearing up the economy were, however, found compelling consequent on announcement of IIP data reflecting the poor performance of the economy. To facilitate the reforms process, RBI too announced liquidity measures. Thus the issues preceding reforms (IIP data) and the issues proceeding reforms (liquidity measures of RBI) are together considered in understanding this impact study. The impact of the recent economic reforms is conducted from three perspectives:

1. Volatility and abnormal gains of select retail sector companies during the period of study

2. Broader and sectoral indices performance during the period of study

3. An overview of FII trading activity in response to these events.

Section 3: Research Design

Fama (1987) divided the capital markets into three form of efficiency, mainly weak form of efficiency, semi-strong form of efficiency and strong form of efficiency. The present study aims at testing the principles of semi-strong form of market efficiency by examining the impact of government economic reforms and Reserve Bank of India (RBI) steps on selected stocks and indices listed on BSE and NSE. The study tries to examine whether the announcements or events are incorporated into the stock prices, thus making actual announcements insignificant or whether these announcements took the markets by surprise by allowing for earning abnormal profits by trader adopting various trading strategies.

3.1 Objectives of the Study

The study is undertaken to fulfil the following objectives:

A. To evaluate the volatility and abnormal gains associated with select retail sector companies and stock market indices using Event study methodology

B. To trace the movements in broader and sectoral indices consequent to the announcement of reforms and after.

C. To examine the impact of reforms on the size of FII trading.

3.2 Hypotheses of the Study

The parametric t-test for the equality of the means for the abnormal returns before and after the announcements was tested on eight retail sector companies and twelve (Broader and sectoral) indices listed on BSE and NSE. The hypothesis tested with is:

H_0: There is no difference in mean of abnormal returns before and after the announcement date

H_1: There is difference in mean of abnormal returns before and after the announcement date

3.3 Data Requirements of the Study

Economic reforms of 2012 concentrated mainly on FDI in retail sector, aviation sector and automobiles sector and thus a representative sample of eight listed retail companies and representative sectoral indices were considered for the study.

The eight retail sector companies considered are;

Pantaloon Retail Limited, Cantabil Retail Ltd, Trent retail Ltd, V2 retail Ltd, Shoppers stop Ltd, Store one retail Ltd, ITC ltd, Raymond Ltd.

The six sectoral indices considered for the study are as follows:

BSE Auto, BSE Consumer Durables (BSE CD), BSE Metal, CNX Auto, CNX FMCG and CNX Metal.

The companies and indices were short-listed for analysis after applying the following criteria:

a. The companies and sectoral indices should be true representation of the respective sector and industry respectively.

b. Daily closing stock price data over a period of 45 days before the announcement date and 15 days after the announcement date is available from the database.

Methodology

This study is based on Event Study Methodology (Brown and Warner, 1985). Event study methodology is based on the concept of market efficiency. If the markets are efficient, security prices would be able to reflect all currently available information, and thus price changes will reflect only new information. Thus importance of an event is understood by examining the price changes during the period in which the event occurs.

Event Study Methodology describes the technique of empirically assessing the impact of a particular event on a firm's stock price or industry's average stock price represented by indices.

The event study methodology enables to compute cumulative abnormal returns (CAR) of the respective share indices during the days surrounding the announcement. To statistically understand whether there was significant difference in the distribution pattern of abnormal returns before and after the announcement, parametric t-test was conducted. If there existed possibility to gain abnormal returns due to the announcement, then the markets can be said to inefficient.

Analysing the impact of any particular event is difficult, since stock prices respond to wide range of macroeconomic news such as forecasts of corporate profitability, Gross Domestic Product, inflation rates, interest rates, global news etc. Isolating the part of a stock price movement that is attributable to a specific event is always a challenge.

To isolate the stock price movements from the specific event, general approach followed is to find a proxy for what the stock's return would have been in the absence of the event. The abnormal return due to the event is estimated as the difference between the stock's actual return and this benchmark. The approach followed in this study, is to find the normal returns using the asset pricing model such as the CAPM. The researchers often use the 'market model' or the single- index model, which holds that stock returns are determined by a market factor and a firm-specific factor.

The stock return, r_{it}, during a given period t, would be expressed mathematically as

$$\bar{r}_{it} = \alpha_i + \beta_i \bar{r}_{mt} + \xi_{it}$$

where

$\bar{r}_{it}$ = expected return of stock price returns on day t

$\bar{r}_{mt}$ = Market's rate of return during the period

β_i = systematic risk component or it measures sensitivity to the market return

α_i = Intercept term or average return of the stock in case of zero market return

ξ_{it} = white noise error term on day t with zero mean and constant variance

The deviation of actual return from the expected return is regarded as the abnormal return. The determination of the abnormal return in a given period is expressed mathematically as shown below;

$$AR_{it} = r_{it} - (\alpha_i + \beta_i \bar{r}_{mt})$$

Where, AR_{it} = abnormal return of stock 'i' on day 't'

r_{it} = actual return on stock 'i' on day 't'

The abnormal return is the stock's return over and above what one would predict based on broad market movements in that period, given the stock's sensitivity to the market.

The parametric 't' test for the equality of means for the abnormal returns before and after the announcement date is conducted to test the hypothesis of no difference in the means of abnormal returns. The Parametric 't' test was conducted to test for the equality of means at 95 percent level of significance, for the abnormal returns during 15 days prior and 15 days after the announcement date. The two tailed critical 't' value was found to be 2.20 which was compared with the t-statistic to accept or reject the null hypothesis.

In the methodology, 14th September, 2012 was considered as the "event day". 30 days surrounding the event day (15 days before and 15 days after the event) has been denoted as "event window". 15 days prior to the last day of the event window (-16 to -30 days from the event day) has been considered the "estimation window/benchmark period". BSE Sensex or NSE CNX Nifty was taken as proxies for the overall market.

Section 4: Analysis and Discussion

The analysis and discussion of the impact of recent economic reforms is approached through the following points:

4.1 An overview of FII trading activity

4.2 Broader and sectoral indices performance during the period of study

4.3 Volatility and abnormal gains of select retail sector companies during the period of study

4.1 Impact on FII trading

Year 2012 has been called as a revival period. FII activity as seen in Table 1 and Figure 1, confirms the fact the net purchases (in crores) has been positive and growing in the year 2012. The FIIs' trading activity in the month of September (2012) has surpassed all levels with net purchases/sales of over Rs 20,800 crores which is the highest amount received over two years except in the month of February 2012.

FII TRADING ACTIVITY IN INDIA

Figure 1: Foreign Institutional Investors trading activity between January 2011 to September 2012.

Source: http://www.moneycontrol.com/stocks/marketstats/fii_dii_activity/index.php

The reasons for FIIs flows in September, 2012 can be mainly attributed to three important events:

i. Announcement of IIP data on September 12th,

ii. Announcement of Economic reforms by government on September 14th and,

iii. Announcement of liquidity measures by RBI on September 17th, 2012

Date	Gross Purchase	Gross Sales	Net Purchase / Sales
Sep-12	68,789,70	47,981.89	20,807.81
Aug-12	45,533.62	37,786.51	7,747.11
Jul-12	47,179.02	41,276.07	5,902.95
Jun-12	40,956.28	38,161.60	2,794.68
May-12	46.301/71	49,057.97	-2,756.26
Apr-12	37,723.69	39,387.05	-1,663.36
Mar-12	63,999.11	57,472.38	6,526.73
Feb-12	76,648.78	53,412.40	23,236.38
Jan-12	52,903.37	43,434.23	9,469.14
Dec-11	38,711.73	41,098.87	-2,387.14
Nov-11	43,094.11	49,602.82	-6,508.71
Oct-11	44,233.02	42,390.55	1,842.47

Sep-11	50,283.64	53,372.51	-3,088.87
Aug-11	45,395.78	56,954.98	-11,559.20
Jul-11	50,802.29	46,520.79	4,281.50
Jun-11	53,473.22	50,810.46	2,662.76
May-11	53,777.46	57,482.83	-3,705.37
Apr-11	49,090.25	49,085.85	4.4
Mar-11	52,192.02	44,215.13	7,976.89
Feb-11	57,097.91	64,311.30	-7,213.39
Jan-11	57,526.07	66,429.67	-8,903.60

Table 1: Foreign Institutional Investors trading activity during period January 2011 - September 2012.

Source: www.moneycontrol.com

A micro look into September month as shown in Figure 2 clearly shows FII trading activity gaining momentum from September 12th 2012. The confidence seen among the global investors after September 12th was seen to be the highest over a period of five years.

FII TRADING ACTIVITY (SEPTEMBER 2012)

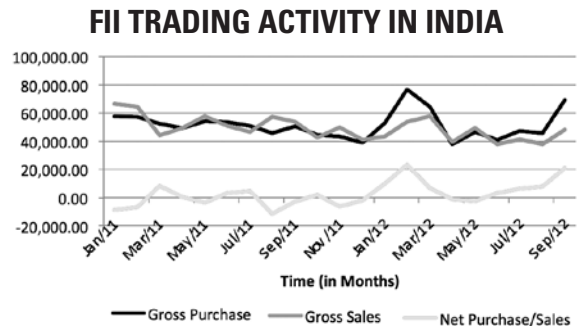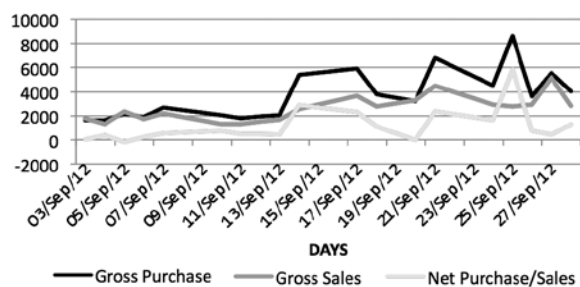**Figure 2:** Foreign Institutional Investors trading activity (September 2012)

Source: http://www.moneycontrol.com/stocks/marketstats/fii_dii_activity/index.php

4.2 Broader and sectoral indices performance during the period of study

The response of markets had been very positive by the announcement of series of initiatives by the union government as well as the central bank. Figure 3 indicates that Sensex performed phenomenally well in September, 2012. Sensex trading at 17,354 points (September 3rd, 2012) reached a milestone of 18,000.03(September, 12th, 2012) and 19,000(October 4th, 2012) in a very short time frame. This uptrend was also supported by volumes.
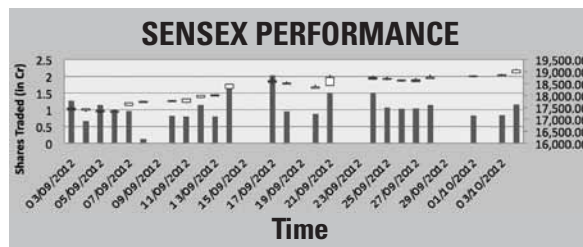
Figure 3: Sensex Performance for the period September-October, 2012.

Source: Bseindia.com

As shown in figure 4, the major indices traded on BSE and NSE such as BSE Sensex, S&P CNX Nifty, BSE/NSE Mid-cap index and BSE/NSE Small-cap index breached their resistance levels for the first time. Equity markets between September-October, 2012 witnessed sharp gains on account of stronger liquidity inflows. This led to strengthening of the rupee. According to NDTV and money control, Indian markets have received around $3.5 billion in net purchases and still lot of money is awaited. On October 5th, 2012, the rupee strengthened itself to Rs.51.70 compared to 53-55 levels a few months ago.
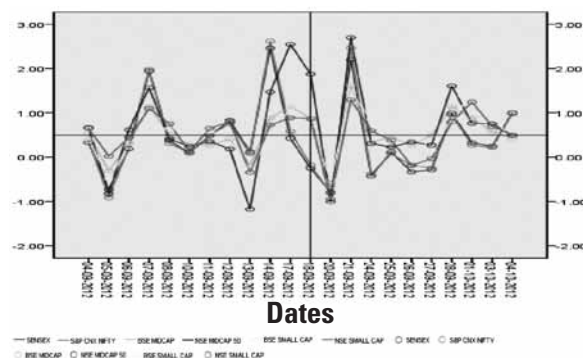
Figure 4: Major BSE and NSE broader indices performance for the period September 3rd - October 4th, 2012.

Source: Bseindia.com

The performance of the sectoral indices mainly traded on BSE and NSE namely auto, consumer durables, energy, metal, consumer goods is shown in figure 5. From the figure we can observe that the returns of the indices have changed significantly after the event day. The returns few days before and after the announcement day show extraordinary spike in the returns. But the impact has to be statistically proved to be significant.
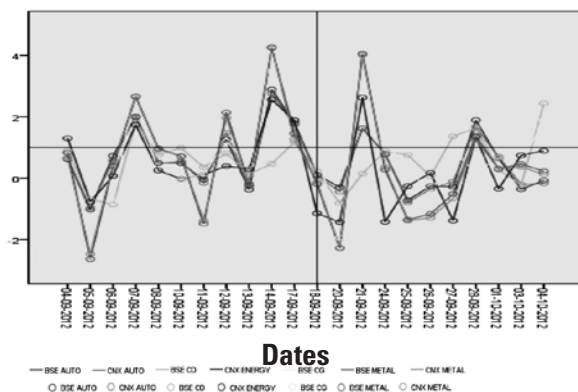
Figure 5: Major BSE and NSE sectoral indices performance for the period Sept. 3rd - Oct. 4th, 2012.

Source: Bseindia.com

The performance of various indices can be observed by the descriptive statistics, as shown in table 2. On any single day between September 3rd to October 5th, 2012, indices showed a maximum return ranging between 2-4 percentage. Especially these returns were observed either on September 14th (in expectations of measures) or September 17th (on the day of announcements).

Performance of Various Indices Between September 3rd - October 5th, 2012					
	N	Minimum	Maximum	Mean	Std. Deviation
SENSEX	22	-.793	2.459	.42227	.869708
S&P CNX NIFTY	22	-.916	2.618	.44491	.919421
BSE MIDCAP	22	-.650	1.614	.51782	.516557
NSE MIDCAP 50	22	-1.176	2.699	.65341	1.002522
BSE SMALL CAP	22	-.529	1.464	.54695	.516280
NSE SMALL CAP	22	-.954	1.298	.50068	.542579
BSE 100	22	-.849	2.348	.46791	.833854
NSE 100	22	-.873	2.369	.46855	.839484
BSE 500	22	-.756	2.176	.46818	.742018
NSE 500	22	-.794	2.230	.47545	.762847
BSE AUTO	22	-1.025	2.890	.54068	1.010893
CNX AUTO	22	-.964	2.756	.53086	.991715
BSE CD	22	-.863	2.436	.57223	.838340
CNX ENERGY	22	-1.429	2.626	.34609	1.209690
BSE CG	22	-2.539	4.119	.79800	1.672972
BSE METAL	22	-2.639	4.249	.46605	1.773505
CNX METAL	22	-2.477	4.276	.43595	1.748498

Table 2: Performance of various indices between Sept. 3rd - Oct. 4th, 2012.

Source: Authors

As observed in the table 3, the returns for the indices over the event period September 3rd to October 5th ranged between 7-18 percent in a matter of one month.

Rate of Returns obtained during Holding period September 3 to October 5, 2012	
INDICES	PERCENTAGE RETURNS
SENSEX	9.63
S&P CNX NIFTY	10.16
BSE MIDCAP	12.00
NSE MIDCAP 50	15.29
BSE SMALLCAP	12.72
NSE SMALLCAP	11.58
BSE-100	10.74
NSE 100	10.75
BSE-500	10.76
NSE-500	10.93
BSE AUTO	12.48
CNX AUTO	12.24
BSE CD	13.29
CNX ENERGY	7.73
BSE CG	18.76
BSE METAL	10.41
CNX METAL	9.70

Table 3: Rate of returns of various indices during the holding period Sept 3rd - Oct 4th, 2012.

Source: Authors

4.3 Volatility and abnormal gains of select retail sector companies and sectoral indices during the period of study

4.3.1 Cumulative average abnormal returns of retail companies

As observed from table 4, 15 days prior to announcements till the actual date of the announcement, the average abnormal return was equivalent of -0.56 percent per day. After the announcement, the five days preceding abnormal returns are -4.63 percent, 0.59 percent, 0,84 percent, -1.84 percent and -1.56 percent per day. It is noteworthy to observe that, on the day of the announcement, the abnormal return was -2.65 percent.

For the 15 days after the announcement, the cumulative average abnormal return was -0.726 percent per day.

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This trend in fact points to the negative reaction of the retail sector companies to the announcement made by the government. Statistically, the cumulative average abnormal returns are significantly equal to zero. This reflects upon the important fact that, market expected the announcement and adjusted the prices accordingly. Thus, information was already integrated in the share prices before the actual announcement on the event day. Figure 6 shows the cumulative average abnormal returns of all the retail companies. There is thus no chance for making abnormal profits by making use of the announcement and henceforth, it can be inferred that market is semi-strong efficient.

Days	Pantaloon Retail Ltd.	Cantabil Retail Ltd.	Trent Retail Ltd.	V2 Retail Ltd.	Shoppers Stop Ltd.	Store One Retail Ltd.	ITC Ltd.	Raymond Ltd.	Cumulative Average Abnormal Returns
-15.00	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.003873	0.00000	-0.00048
-14.00	0.02280	-0.04111	-0.00757	0.00067	0.01186	0.02758	-0.014999	0.01981	0.00238
-13.00	0.02920	-0.00393	0.00303	0.01874	-0.00348	0.07343	-0.024587	0.01716	0.01370
-12.00	0.01985	-0.00030	0.00013	-0.00563	-0.01103	0.04035	-0.023258	-0.01186	0.00104
-11.00	-0.00943	-0.02770	0.00353	-0.02186	-0.00617	-0.04374	-0.018388	-0.02886	-0.01908
-10.00	-0.01648	-0.01021	0.00284	0.00001	-0.01508	-0.06911	-0.019289	-0.03505	-0.02030
-9.00	-0.00243	-0.04585	0.00302	-0.02733	-0.02563	-0.02370	-0.011385	-0.04317	-0.02206
-8.00	-0.04519	-0.03267	0.00758	-0.02084	-0.04088	0.01027	-0.022050	-0.05986	-0.02545
-7.00	-0.04749	0.01209	0.00045	-0.07856	-0.01962	0.01763	0.006951	-0.05303	-0.02020
-6.00	-0.02276	-0.09829	0.01558	-0.05442	0.00458	-0.21559	0.013474	-0.05823	-0.05196
-5.00	-0.03043	-0.04156	-0.00140	-0.14326	0.01097	-0.36988	0.014369	-0.05683	-0.07725
-4.00	-0.07391	-0.03570	0.00907	-0.07699	-0.00181	-0.16996	0.013024	-0.07232	-0.05107
-3.00	-0.03803	-0.02316	0.01609	-0.13584	0.00250	0.07225	0.006742	-0.06733	-0.02085
-2.00	-0.06538	-0.01603	0.01284	-0.18107	-0.00047	0.06496	0.003794	-0.06306	-0.03055
-2.00	-0.04675	0.00185	-0.00887	-0.17017	0.00748	0.02071	0.004323	-0.06668	-0.03226
0.00	-0.04959	-0.05334	-0.04759	-0.24258	0.01010	-0.06145	0.027726	-0.04482	-0.05769
1.00	-0.23554	-0.04578	-0.04242	-0.34679	-0.05096	-0.15361	0.086263	-0.07285	-0.10771
2.00	-0.21108	-0.06015	-0.01262	-0.32992	-0.04191	-0.04482	0.082663	-0.10562	-0.09043
3.00	-0.21423	-0.04770	-0.00288	-0.30654	-0.06235	0.07754	0.068901	-0.10587	-0.07414
4.00	-0.20270	-0.05516	-0.01149	-0.33847	-0.04042	-0.07137	0.064341	-0.10291	-0.09477
5.00	-0.25467	-0.08532	-0.04258	-0.35162	-0.06926	-0.10251	0.084875	-0.12172	-0.11785
6.00	-0.35572	-0.09435	-0.04499	-0.36110	-0.11301	-0.01741	0.067914	-0.15310	-0.13397
7.00	-0.41472	-0.08997	-0.05501	-0.36844	-0.09832	-0.07182	0.056149	-0.14430	-0.14830
8.00	-0.44224	-0.09926	-0.06478	-0.40165	-0.09678	-0.04113	0.042550	-0.16053	-0.15798
9.00	-0.40411	-0.10063	-0.07150	-0.38402	-0.10251	0.02103	0.029804	-0.15866	-0.14632
10.00	-0.38884	-0.10297	-0.05465	-0.36825	-0.08657	0.0081	0.027156	-0.15923	-0.14157
11.00	-0.40603	-0.09653	-0.03745	-0.37769	-0.06369	-0.00492	0.041170	-0.15767	-0.13785
12.00	-0.37522	-0.10131	-0.02370	-0.35460	-0.05806	-0.01926	0.031012	-0.13285	-0.12925
13.00	-0.41434	-0.11797	-0.02821	-0.35726	-0.08213	-0.02343	0.025436	-0.13112	-0.14113
14.00	-0.41050	-0.11272	-0.02273	-0.35224	-0.08149	0.02987	0.011566	-0.16289	-0.13764
15.00	-0.38440	-0.10973	-0.01627	-0.35668	-0.08626	0.00106	0.008258	-0.15993	-0.13799

Table 4: Cumulative average abnormal returns around event day for select retail companies.
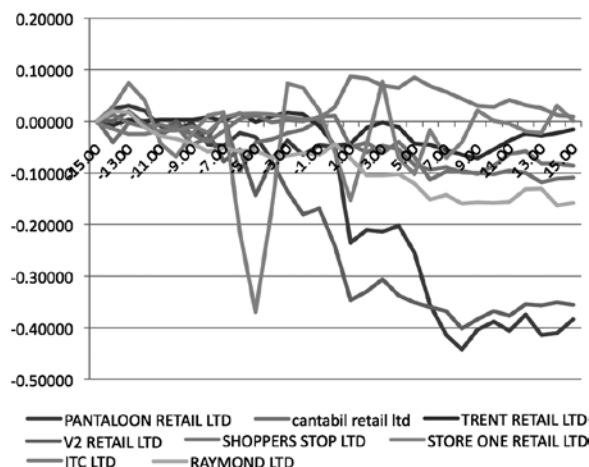
Figure 6: Cumulative abnormal returns of all retail companies. **Source:** Author

The parametric t-test results for equality of the means at 95% level of significance, for the abnormal returns 15 days before and after the announcement of economic reforms is shown in table 5.

	Mean Before Announcement	Mean After Announcement	Variance Before Announcement	Variance After Announcement	T-Statistic	T-Critical Two Tail	Acceptance/ Rejection of Null Hypothesis
Pantaloon Retail Ltd.	-0.002	-0.022	0.001	0.004	1.159	2.145	Acceptance
Cantabil Retail Ltd.	0.002	0.000	0.002	0.000	0.564	2.145	Acceptance
Trent Retail Ltd.	0.000	0.002	0.000	0.000	-0.325	2.145	Acceptance
V2 Retail Ltd.	-0.010	-0.008	0.002	0.001	-0.170	2.145	Acceptance
Shoppers Stop Ltd.	-0.002	-0.006	0.000	0.001	0.814	2.145	Acceptance
Store One Retail Ltd.	-0.019	-0.011	0.006	0.002	-0.330	2.145	Acceptance
ITC Ltd.	0.000	-0.001	0.000	0.000	0.273	2.145	Acceptance
Raymond Ltd.	-0.004	-0.008	0.000	0.000	0.571	2.145	Acceptance

Table 5: Parametric t-test results for abnormal returns 15 days before and after announcement. **Source:** Author

It can be observed that, for all the eight retail companies the null hypothesis is accepted. This leads us to conclude that there is no difference in the mean of the abnormal returns prior to and after the announcement of the bonus issue. This is also consistent with cumulative abnormal returns chart as shown in Figure 6. Thus though announcement of economic reforms news was a surprise for the markets, the retail sector companies did not appear to be surprised.

It was thus felt a necessity to understand the impact of the announcement by few representative industries. Indices reflect the true impact of news upon an industry due to favourable/unfavourable news.

4.3.2 Cumulative Average Abnormal Returns of Select Sectoral Indices

Though event study methodology revealed no much difference in the mean returns for the retail companies,

it was found necessary to study the impact of the announcements on different industries. In order to study the impact on a particular industry of interest, a representative index representing each industry was considered for the study. The indices considered are BSE Auto, BSE Consumer Durables (BSE CD), BSE Metal, CNX Auto, CNX FMCG and CNX Metal.

An overall performance of broader and sectoral indices of BSE and NSE are shown in figure 7 and figure 8. At first sight, the returns seem to be more volatile after the event day.

BSE INDEX RETURNS
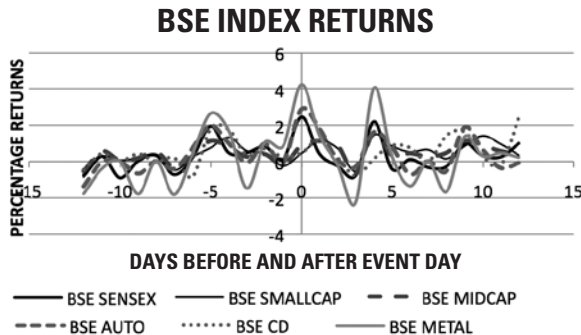
Figure 7: BSE Indices returns for the period Sept. 3rd - Oct. 4th, 2012

Source: Author

NSE INDEX RETURNS
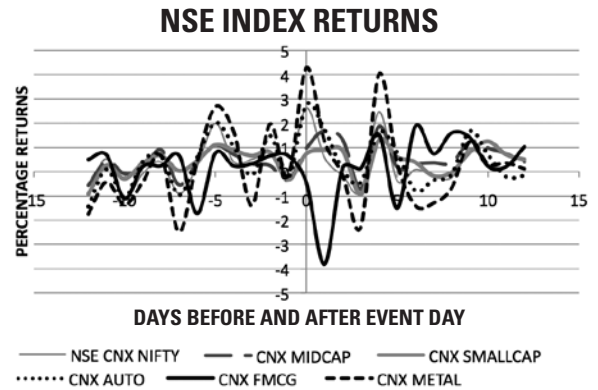
Figure 8: NSE Indices returns for the period Sept. 3rd - Oct. 4th, 2012

Source: Author

The difference between the mean returns (After mean returns-Before mean returns) for the major indices as shown in table 6 is seen to be positive after the event day. This observation reflects upon the possibility of abnormal returns by using trading strategies after the announcement date. To prove whether these mean returns were statistically different or not, event study methodology was conducted on specific sectoral indices and parametric t-test was conducted. The result are shown in table 6 below.

Indices	Difference Between After and Before Mean Returns	Parametric T-Test Results for Difference in Means Before and After	Parametric T-Test Results for Difference in Variances Before and After
Sensex Returns	0.082170811	Acceptance of Null Hypothesis	Acceptance of Null Hypothesis
BSE Smallcap Returns	0.487181401	Rejection of Null Hypothesis	Rejection of Null Hypothesis
BSE Midcap Returns	0.360012059	Acceptance of Null Hypothesis	Acceptance of Null Hypothesis
BSE Auto Returns	0.234291523	Acceptance of Null Hypothesis	Acceptance of Null Hypothesis
BSE CD Returns	0.278186743	Acceptance of Null Hypothesis	Acceptance of Null Hypothesis
BSE Metal Returns	0.276714762	Acceptance of Null Hypothesis	Acceptance of Null Hypothesis
NSE CNX Nifty	0.152480982	Acceptance of Null Hypothesis	Acceptance of Null Hypothesis
NSE Midcap	0.510774129	Acceptance of Null Hypothesis	Acceptance of Null Hypothesis
NSE Smallcap	0.213461706	Acceptance of Null Hypothesis	Acceptance of Null Hypothesis
NSE Auto Returns	0.177548695	Acceptance of Null Hypothesis	Acceptance of Null Hypothesis
NSE FMCG Returns	0.121666484	Acceptance of Null Hypothesis	Acceptance of Null Hypothesis
NSE Metal	0.209001009	Acceptance of Null Hypothesis	Acceptance of Null Hypothesis

Table 6: Difference between after and before mean returns for the event window. **Source:** Authors

The parametric t-test for equality of the means and variances at 95 percent level of significance, for mean returns during 15 days prior and 15 days after as shown in Appendix 1 and 2, after the event day suggests that the null hypothesis is accepted for all indices considered for the study.

Abnormal returns for the period Sept. 3rd - Oct. 4th, 2012 were also calculated.

The difference between the mean abnormal returns (After mean returns-Before mean returns) for the twelve indices was seen to be positive for the event window (Sept. 3rd - Oct. 4th, 2012) as seen in Table 6 and Figures 8 and 9. It is noticeable that the returns for auto and metal indices listed on BSE and NSE were negative but it is statistically significant.

BSE ABNORMAL RETURNS

Figure 9: BSE Indices Abnormal returns for the period Sept. 3rd - Oct. 4th, 2012.

Source: Authors

Indices	Difference Between Abnormal Returns After and Before The Event Day
Sensex Returns	0.001769652
BSE Smallcap Returns	0.313332722
BSE Midcap Returns	0.178070388
BSE Auto Returns	-0.043850106
BSE CD Returns	0.122770645
BSE Metal Returns	-0.196278901
NSE CNX Nifty	-0.149363065
NSE Midcap	0.313494342
NSE Smallcap	0.025902425
NSE Auto Returns	-0.112796098
NSE FMCG Returns	0.095292408
NSE Metal	-0.279241527

Table 7: Difference between after and before mean abnormal returns for the event window.

Source: Authors

NSE ABNORMAL RETURNS
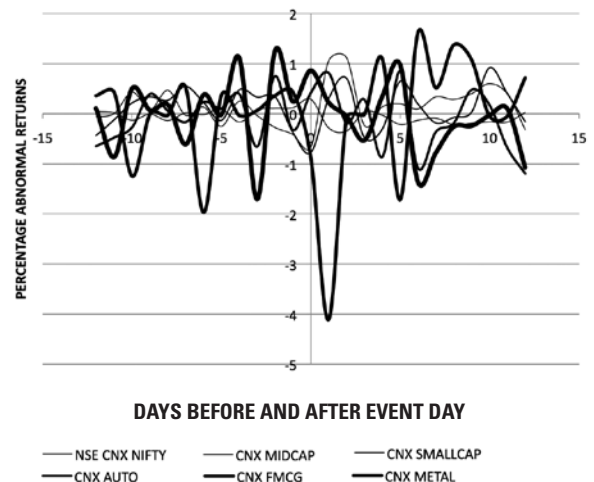
Figure 10: NSE Indices Abnormal returns for the period Sept. 3rd - Oct. 4th, 2012.

Source: Authors

As shown in Table 6, the t-test for the equality of the means at 95 percent level of significance, for abnormal returns during 15 days prior and 15 days after the event day suggests that the null hypothesis is accepted for all the indices considered for the study. This concludes that there is no difference in the abnormal returns prior to and after the event day. The announcement on

economic reforms on September 14th, 2012 and the RBI action on September 17th, 2012 were already factored into the stock prices.

Thus the parametric t-test suggests acceptance of the null hypothesis that 'there is no difference in the distribution pattern of the return between before and after the announcement of economic reforms by the government and actions taken later by RBI.

Section 5: Conclusion

Announcement of positive or negative news theoretically should have an impact positively or negatively on the stock markets. But in reality, it will not hold good. The stock markets tend to predict the announcement of the news through various forward looking (leading) indicators. IIP data are forward looking indicators revealing the health of the major industries such as mining, manufacturing, electricity and other important industries. A positive outlook by this indicator would help understand the health of the economy, which in turn, gives a clue to RBI to take appropriate steps initiating in its key indicators such as cash reserve ratio (CRR), Repo rates and Reverse repo rates. The study however supports the hypothesis that the Indian stock markets to a larger extent are semi-strong efficient.

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Analysis of the Indian Art Industry: An Organizational Perspective

B. Shekar*

Abstract

Creative cultural industries are those that produce tangible or intangible artistic and creative outputs, and which have a potential for wealth creation and income generation. All cultural industries use creativity, cultural knowledge, and intellectual property to produce products and services with social and cultural meaning. Industries that make use of cultural assets and skilled creative people can significantly benefit from the use of online social networks.

Creative industries are typically characterized by a high level of product differentiation. For example, no artwork is like any other. Some of the products are reproducible, while others are not. The high degree of product differentiation is linked to symbolic content and also to the fact that cultural products contain some aspect of novelty that implies product innovation.

Key Words & Phrases: *Intangible output, Intellectual Property, Cultural Assets & Product Differentiation.*

The Study: A Brief

There have been many studies earlier in the areas of economic impact of arts [1] and usage of new technologies in arts [2]. However, the scope of the aforementioned research has been restricted to the USA and Europe. The Indian art ecosystem, especially its organizational aspects has not been studied in-depth. Individual galleries such as Saffron Art in India [3] have been researched. However, the entire art ecosystem has not been studied from the organizational perspective. We have attempted a realistic assessment of the visual art ecosystem in India and attempted to understand how online offerings can contribute to art entrepreneurship, especially its dual impact on propagation of art and economic growth.

The study was restricted to online portals, specifically to those that were able to harness cultural and artistic talents and instill a sense of art, art appreciation and simultaneously becoming economically viable. A website in the form of a social network and its preference among stakeholders in the art industry was the area of focus. We studied an organization that has helped retain and propagate a specific traditional art form. How it has helped by making it contemporary and viable in terms of marketing and design. The specific aspects for its success were studied.

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The field of contemporary art is seen to be for a select few. As an investment option, it is often seen as an area for the niche elite. Only a few artists gain prominence. The method behind art appreciation and valuation is a very complicated process. A close-knit society for contemporary art works like a clandestine group. Online forums working in tandem with galleries and art hubs in India may help in making the art world more accessible to buyers. This may also bring in the much-needed transparency in the field of arts and eliminate hidden surcharges.

We also delved into questions: Is there an option for the young and the not so wealthy to look at investment options in art? Statistics show growth in the returns from art is much higher than returns from any other asset. It has also been able to weather the recession that seems to have hit other sectors hard worldwide. Auction houses have made it their closed fortresses. Can art buying and trading be made simpler?

We felt an online art house and more affordable rates would help target art at the middle class level. With the emergence and adoption of internet based social networks, increase in income levels, greater interest and paucity of time for cultural artifacts the success of cultural entrepreneurship is going to depend on online offerings in the future. A counter point weakens the hypothesis - the experience/touch-and-feel aspect of the arts remains to be a big factor that dissuades consumers/users of such offerings in a developing nation such as India.

Different art galleries were studied. 'Depth interviews' with experts and veterans in the industry also helped us understand details better.

Categories of Art and Art Buyers

This paper predominantly pertains to the sale of modern and contemporary visual arts also known as fine arts. Created on aesthetic rather than decorative grounds, fine arts is to be understood and responded to on its own, without relation to anything else.
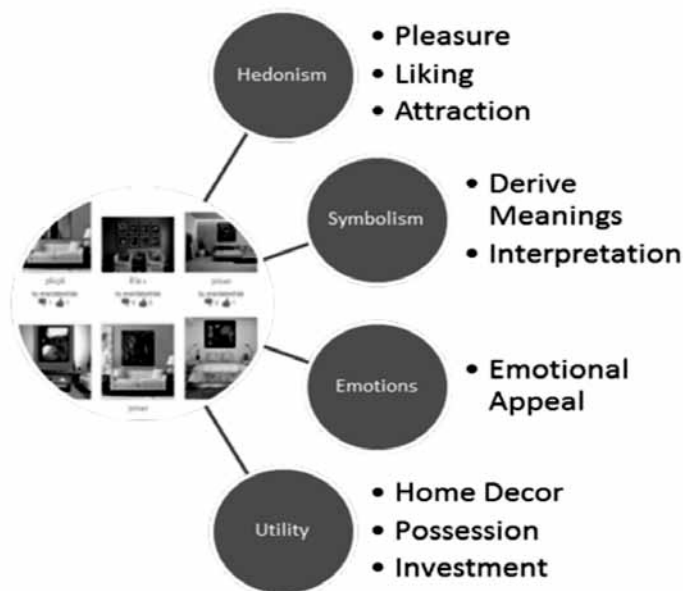
Figure 1: Art Buyer Categories based on the Motivation to buy art - Obtained from interviews [4].

We have done art buyer categorization essentially to help segment the buyers based on psychographics, which will help target the buyers better based on the art categories discussed earlier. It may also help entrepreneurs position their offerings better. This categorization depicted in Figure 1 is arrived at based on interviews with art buyers, art enthusiasts and art gallery owners. We ascertained art buyers as they are currently. We tried to elicit their motivations to buy art. Abstracting out a general art buyer we tried to track down his/her intentions in buying art.

Characteristics of an art buyer and reasons why they buy, include: Hedonism, attraction and the pleasure derived from the art-work. It can also be a combination of emotions and sensory stimulus as against a pure pleasure-orientation. Emotional appeal defines another category of buyers, who feel direct and pure sensory stimulus – anger, fear, pain etc. Symbolism: Translation from the cognitive to abstract based on the interpretation and meaning derived, is a category we could identify as motive for the buyer. Utilitarian reasons include possession for status, as an investment option – monetary reasons, and as home décor – for decoration and as a means of making things aesthetically pleasing.

Although not completely compartmentalized, there is a broad level categorization that can be done for the buyers of art. There are the wealthy and passionate art collectors. Art collectors tend to use words such as beauty, attractive, pride and aesthetics, enhancing status etc. Associating with the finest creative minds increases their own self worth and their projected worth in the society.

For some collectors it is an obsession to collect art (hoarding behavior) leading to repeat purchases. The availability of wealth is another important factor leading to art buying in order to decorate the house and beautify it. Adding more glamour to beauty as one art collector put it!

Some buyers appreciate art and see it as an investment option; this includes corporate honchos. There are also buyers who see art purely as an investment option; for the increase in the valuation and they buy works of specific artists because their market value tends to go up the most. Investment schemes are formed for art selection, art consultation and art advisory services such as by Religare Art Initiative – www.religarearts.com

Among the occasional buyers there are a few who get emotionally attached after seeing a certain artwork and they tend to love the aesthetics of the art work and thus buy it in order to possess it – these buyers are not repeat buyers. These occasional art buyers predominantly buy for home decoration or sometimes for gifting purposes. This number is now increasing with disposable incomes and residential complexes coming up at an ever-increasing pace. Bulk buyers are a separate category and buying happens through interior decorators or people assigned within an organization. Refer to Exhibit 3 given in Appendix for fine-grained details.

Apart from demographics and art-buying needs (demographics and psychographics sections of Exhibit 2 given in the Appendix), characteristics that define art buyers include the following. Often they like to often visit and gather at parties and socialize over drinks. Art buyers often are interested in several other performance arts activities such as viewing plays and music or dance recitals. Some of them are on the other hand very reclusive and introverted, as they like to stay in solitude and contemplate. Many are industrialists' wives who are naturally wealthy. Many of them may have diverse buying needs or indulge heavily in shopping or in gardening at home etc. Some of them have unique collecting habits and are connoisseurs of good things in life. These are based on perceptions and observations of the authors.

Analysis of Sales of Art

Traditionally the two most prominent modes of organized selling of art have been through art galleries and physical art auctions houses (auctions) apart from private sales.

Figure 2: Markets for Fine Art [3].

The art market supply chain is shown in Figure 2

Ten years ago, Saffronart, an online store for lovers of art was started. Art websites online have since then caught on as they provide the benefit of increasing reach to a greater number of buyers. Art fairs such as India Art Summit which started in 2008 (now an annual fair) are another very recent phenomenon spurring art sales.

Offline Sale of Art

Art works are usually with the art gallery on consignment basis. So there is flexibility in terms of display and showcasing and contracts are used. Artists from different locations rarely come together and interact.

Apart from gallery, middlemen exist in the industry - connecting artists to galleries with their knowledge of the artists and art styles, they may also act as curators at times. Greater dependence is on trust, although contracts and agreements exist.

Key artists get famous and have international auctions and command higher prices for their work and are then promoted by the art galleries. Many art galleries may potentially try to attract such an artist. Artist loyalty comes into play here unless there is an exclusivity in the contract on the sale of an artist's works, which is a rarity these days. Loyalty among art collectors is definitely another aspect.

Exhibitions are often held for individual and group of artists. However, there is no artificial speeding up or any effort towards productivity, which may lead to degradation of quality. As mentioned, partnerships exist between different stakeholders, and this leads to benefits of such social capital including information, artworks and allied services, emotional support, socio-political influence – in essence weak ties and social organization-like structure.

Art galleries give artists independence and yet the artists cooperate with the gallery to sell their works. Therefore, it is a mutually beneficial symbiotic relationship.

Online sale of art

Online sales comprise of display of artwork on websites. Fixed price sales of art prints and artworks (standard e-commerce model using a transaction gateway) and online auctions for bids online are the modus operandi. Mobile auctions along with website-based auctions are the norm. A new development has been entire art-fairs being conducted online using rich graphical website technologies and 3D look and feel (VIP Art Fair – January 2011). Such fairs are for the internet-savvy and are international in nature due to the prevalence of high-speed internet connectivity. High-resolution images are sent out via e-mail to potential buyers/ patrons who often buy. Gallery repute and the artist are most important when buying online as per inputs of art galleries.

Many world famous auction houses have online presence: Sotheby's, Christie's, Deviantart etc.

Indian Sites: although highly fragmented with hundreds of art galleries, the Indian art industry has only a few prominent online ones including Saffronart, IndianArtCollectors, Artjini, Artflute, Indian Art Collectors, IndianArtIdeas etc. More details of some of the aforementioned art galleries are part of Exhibit 1 given in the Appendix.

Art Transaction Processes

Transactions in the art world comprise of buying and selling of art. Artists and art entrepreneurs sell their artworks. The price of the artwork is either determined by the artist or in collaboration with the art entrepreneur as a fixed price. References for this pricing could be artists of the same style or genre. At times when it is not possible to determine the price of a piece of art, auctions are conducted to determine the worth of a piece of artwork especially if it is a new style of art. These auctions then go on to determine the relative worth of an artist's artwork. The auction results become a reference for setting the base price for future auctions. Often secondary art pieces are auctioned. An art collector possessing an art-collection, sells off some of his artworks to potential buyers or collectors, and this maybe done through an auction house or a gallery!

Analysis of the Survey and Interviews

We floated a survey to elicit answers on the art buyers' approach to buying art. The survey comprising of questions on mode, frequency, interest in art and art

buying, along with ratings for current parameters they look at before buying. Online buying parameters and online features were rated by the survey takers. Interest in socializing in online social network oriented website was also probed. This gave us an overview of the buyer's preference about the online medium and possibilities of innovation in that area. This survey was conducted in-person (offline) and online. People surveyed were artists, art buyers, IT/ITES and Marketing professionals and they are active users of Facebook or other online social networks.

We may aggregate the need categories based on the above statistic as:

- Status needs
- Home Décor
- Emotional connect to art/Passion for arts
- Impulse Buy/Loved Artwork

Online Art Buying - Salient features abstracted from survey

As per survey results put forth to art consumers and potential buyers the needs vary as follows:
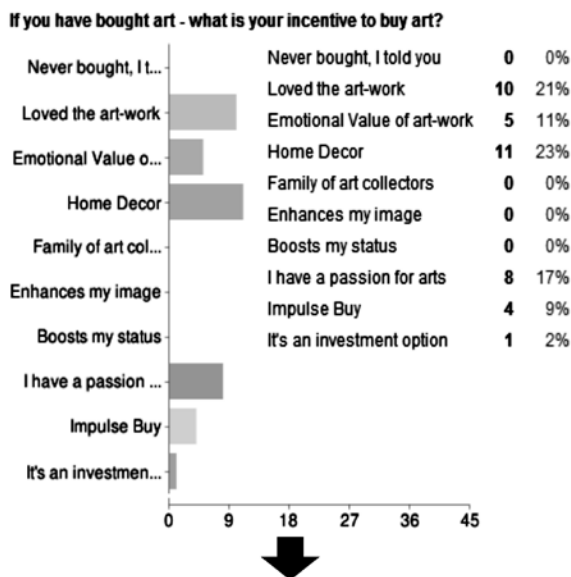
Figure 3: Needs and Benefits of Art

We found that a majority of the survey takers buy art because they love it or they prefer it as an accessory for home décor (See Figure 3). Availability of details and ease of use of websites are high priority for online buyers. This shows self-learning is quite significant for the buyers as they browse a website. Art gallery brand is not as important as the art galleries themselves make it out to be. In addition to ratings and comments, (social interactivity and knowledge angle) assurance of authenticity is very important for the art buyer.
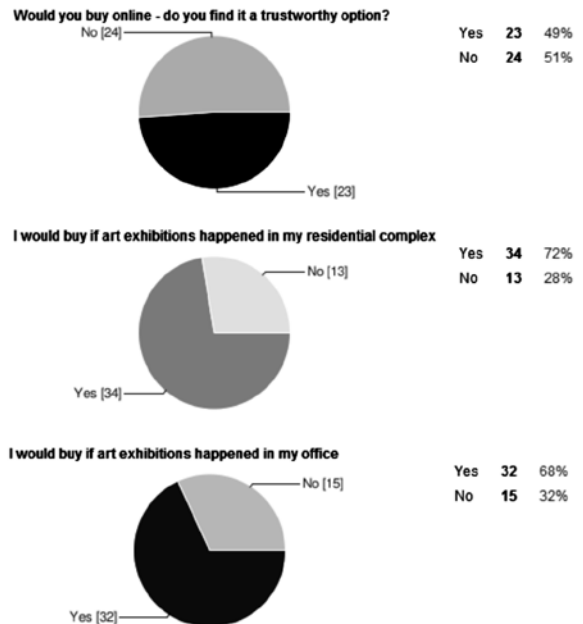
Figure 4: Some Relevant Customer Survey Results

A predominance of art buying for home decoration purpose is well reflected in the survey (Figure 3). Art buyers would prefer to purchase art through art galleries rather than the Internet mainly because of the missing 'touch and feel' aspect of seeing the art in front of them (Figure 4). However, they have a preference for self-learning and gathering knowledge from art websites and critic's reviews and comments. Interactivity has to be tempered with hassle free navigation and low complexity. We surmise that audio and video podcasts such as recorded talks streamed on the internet etc. can help increase buyer engagement (i.e. time spent) on the art gallery websites or on online social networks. This is evidenced in the conducted interviews.
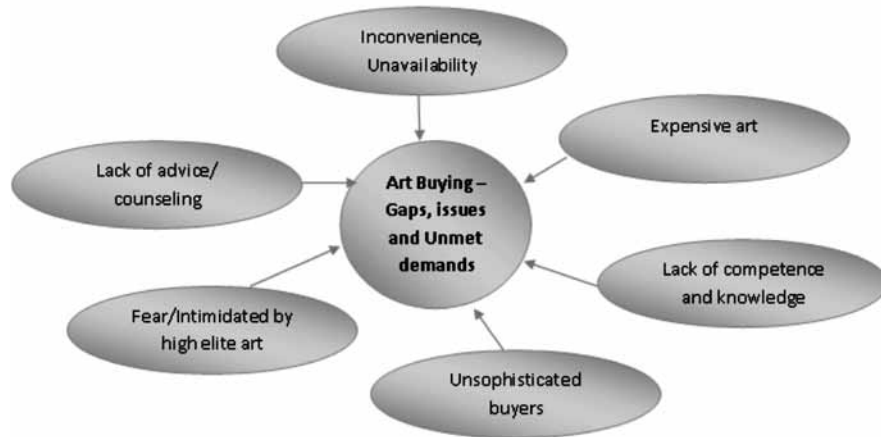
Figure 5: Unmet Needs and Issues - Extracted from Interviews

Artists seem to be open to using online websites and social networks but the art galleries need to set up the infrastructure in their view. This will help augment their sales from art exhibitions and auctions.

Art entrepreneurs have already started using some of the online methodologies to sell art. Some currently have up to 50% of their sales via the online mode. Authenticity being a key area, they would like to see some mechanism to register artworks online.

Buyers are keen to utilize online mechanisms for gaining knowledge and interacting with like-minded people. Few are of the opinion that it can only act as a preliminary stage. However, some art buyers have embraced online buying by means of viewing high-resolution images.

Art critics seem to be strong supporter of online social networks and discussion forums that will help popularize contemporary art as some organizations are doing. Critics under the umbrella of FICA (one such organization in India) are actively participating in the online discourse.

Figure 5 captures some of the key issues that have been extracted from the interviews regarding the gaps and unmet needs in the art buying process. In actuality, some of these issues deter art buying and as a result art acquisition is lower than the possible potential.

Often the art world is viewed as one for the elite crowds and acts as a psychological barrier creating a niche market as intended. Also as a result of the lack of competence in buying art and advice on artists and artworks, it is seen as a risky investment. The prohibitive costs go on to eliminate many potential buyers who otherwise have an interest in arts and love certain pieces. They may prefer to buy art reprints (printed copy of the originals) as an alternative.

Affordable original Indian art is looked-into on by certain art galleries such as Kynkyny in Bangalore as being a differentiator. It is yet to catch up in a big way in the market.

Conclusion

Creative industries thrive on creativity and autonomy is our conclusion. This unique nature of art galleries and cultural enterprises has some lessons from the organizational perspective. This is particularly beneficial to knowledge intensive organizations in general. The nature of command and control that needs to be broken to become more innovative in such organizations is what makes the application of this analysis particularly useful.

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Appendix

Exhibit 1: Art Galleries Online (from relevant websites mentioned in the column titled 'Art Galleries')

Art Galleries	Number of hits	About Them	Offerings	Price range	Types of art	Analysis
www.deviantart.com	5.5 million	Connection and communication between artists and fans on a massive scale. deviantART represents a breakthrough for the promotion and exposure of otherwise stranded artists in all corners of the globe.	www.deviantartsummit.com; Free and Premium membership; Welcome mail is really impressive and colorful, with options to sell artwork, write a journal, and buy stuff; the user becomes a "Deviant"	>$1	Categories offered - Digital Art, Photography, Traditional Art, Film & Animation, Contests, Cartoons & Comics,	Browse Ad Free Access the Archives with wayback Premium Profile Page Widgets Easy to use Journal Skins Create Journal Polls $60 Discount on Corel Painter 11 Become a Beta Tester
Artjini.com	368	India's largest online art store brings to the Indian consumer, for the first time, more than 150,000 poster images, tapestries and canvas transfers.	canvas, tapestries	Rs.900 to Rs.50,000. 90% range Rs.1500-Rs.3500	Good categories like Animation, Education, Famous faces, Fashion, Humor, Animals...	Option to frame
Artflute.com	1000	Artflute is an endeavor to build India's first Indian Contemporary Art community; Associated artists - 635; Number of artworks - 2500	Painting, Sculpture, Prints, Photography or Digital/Computer art, drawings, art collectibles; Select by color option - unique option, Custom service option Category of art by master experts	Rs.4,000 to Rs.120,000; Mostly in 20,000 to 40,000	Style - Abstract, Figurative, Landscape, Still-life, semi-abstract	Spotlight artist, social networking possible using orkut, FB, blogger, in.com. newsletter,
Saffronart.com	30	Founded in 2000, One of the most comprehensive and definitive sources of modern and contemporary Indian art, Saffronart provides a platform which enables access to purchase, view and become involved in the development of Indian art globally.	Auctions, Online sales, Exhibitions. Services - Art advisory, Art Storage, Appraisals and valuations, Mobile bidding Personal favorites,	Paintings - Rs.4500 to Rs.1crore Jewellery - Rs.25000 to Rs.1 crore	No particular categories	
Indianartideas.com	20	Endeavor to create a collaborative platform where Art lovers/collectors and Artist can share their experiences and collections You can buy artworks directly from the artist and benefit from the dramatically lower service commissions charged by Indian Art Ideas.	Option to choose by palette color option; Paintings and sculptures; Collectors can sell their collections as well	Rs.3000 to Rs.13,65,000	Style - Comtemporary art, modern art, traditional art, sketching Subject - People, scenic, places, religion, animals, botanical, abstract	Affiliating with them - Introduce an artist, you will receive 5% commission on the sale price for the first one year. Referral - Recommend a piece of art and you will receive 3% commission on the sale price

Exhibit 2: Segmentation Analysis Data (based on demographic and psychographic section of the conducted survey)

	Segment 1	Segment 2	Segment 3	Segment 4	Segment 5	Segment 6	Segment 7	Segment 8 (Special category)
Demographic								
Age	26-40 yrs	26-40 yrs	26-40 yrs	26-60 yrs	26-40 yrs	26-40 yrs	26-40 yrs	Experience:1-3 and > 5years
Gender	Male & Female	Male	Male & Female	Male	Male & Female	Male	Male & Female	Perceive that they can charge their clients more if art is displayed
Income	Rs.5L to Rs.25L	Rs.5L to Rs.25L	Rs.5L to Rs.25L	More than Rs.25L	Rs.5L to Rs.25L	Rs.5L to Rs.25L	Rs.5L to Rs.25L	Willing to seek expert advice before buying art for their clients
Education level	Engineering & Management	Engineering & Management	Management & Science	Engineering	Engineering & Management	Engineering & Science	Management & Science	Interior Designers
Geography	All India	Bangalore	Bangalore	Mumbai	All India	Bangalore	Bangalore	Would be willing to go premium customized art-work
Behavior								No special preference for online display of art
Follow the art market	No	Some of them	No	Yes	No	No	No	
Bought art online	Yes	Yes	Yes	Yes	No	No	No	
Spending ability on Art	Rs.1000 - Rs.20000	Rs.200 - Rs.5000	Rs.1000 - Rs.5000	Rs.20,000 - Rs.100,000	Rs.200 - Rs.20000	Rs.200 - Rs.5000	Rs.1000 - Rs.5000	
Importance priority	Furniture Books Utility goods Entertainment	Books Furniture Entertainment Furniture	Entertainment Books Furniture Utility goods	Books Art Sports Goods	Utility goods Furniture Books Entertainment	Sports Goods Furniture	Utility goods Books Furniture Entertainment	
Art buying preference location	Residential complex & Office	Residential complex & Office	Residential complex & Office	Offline, Galleries	Residential complex & Office	Residential complex & Office	Residential complex & Office	
Psychographic	Sincere	Excited	Competence	Sophisticated	Sincere	Excited	Competence	Interior Designers
	Down to earth Honest Cheerful	Daring Spirited Imaginative	Reliable Socially active	Charming Upperclass	Down to earth Honest Cheerful Socially active	Daring Spirited Imaginative	Reliable Socially active	

- 100% feel that art enhances the look of interiors
- 70% perceive that clients of Interior designers can be charged more if there is art displayed
- 80% of the Interior Designers feel the lack of expertise in Art and will be willing to seek advisory services

Would you prefer to buy customised art for a higher cost?
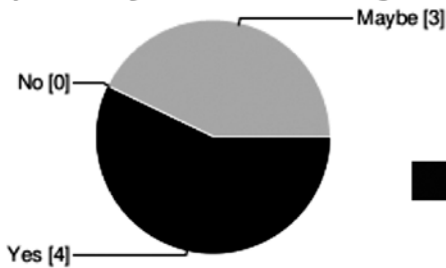
Yes	4	57%
No	0	0%
Maybe	3	43%

Maybe [3]
No [0]
Yes [4]

Possibility to charge a premium

How important is art to you when compared to all the different design decisions that you take as an interior decorator?
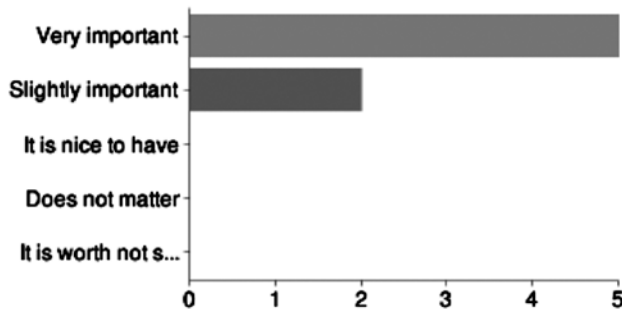
Very important	5	71%
Slightly important	2	29%
It is nice to have	0	0%
Does not matter	0	0%
It is worth not spending	0	0%

Very important
Slightly important
It is nice to have
Does not matter
It is worth not s...

100% of Interior Designers feel Art is important. A sure target

Strategies for Sustenance of Market Share: A Study of Operating System Products

Basanna S. Patagundi[1]

1.0: Introduction

Operating system is one of the most important components in computers. Every computer system requires a microelectronic chip called central processing unit (CPU) plus operating system (OS) software. The OS directs instructions requested by the application software, while the CPU performs numerical computations. More importantly, CPU and OS are almost always combined in fixed proportions: one of each is needed per system (Baseman et.al. 1995)[1]. Operating system is technically indispensable component in most of the IT hardware.

Software is a set of programmes which contain a set of instructions to be executed by the computer. There are two main categories of software, namely, application software and system software. Application software is a set of programmes that enable an end user to make use of computer. Microsoft word is application software which facilitates users' word processing requirements. System software contains a set of programmes that control and manage the operations of computer hardware and other resources connected with computer. Application and system software belong to two different eco spaces yet highly interrelated.

Operating system is one of the critical system software.

Operating systems are designed for Desktops/Laptops and Servers. The major players in operating system software market are Microsoft, Linux and Mac. Under Desktop category, Microsoft (MS) and Mac are considered to be major players (Linux does not have much presence). In server category, it is mostly MS and Linux. Mac's presence in this category is considered to be very less. Microsoft was considered to be a major player in operating system market. It had nearly 95% of the market share. Steve Ballmer, CEO of Microsoft sees two major competitors for Microsoft -- the open source software movement and advertising-supported software. According to Ballmer, the threat is not from the companies, but it is from the business model evolved by these two companies. "Right now, the emblem of the first one is Linux and the emblem of the second one is Google. But it's not the *companies,* it's the *phenomena* that present the greatest challenge to Microsoft" (Knowledge @ Wharton, 2007).[2] The other major players in the operating system market are Apple and Linux. Apple has been one of the major competitors for Microsoft right from its inception.

The cyclical trend shows that the operating system

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products started with hardware integrated and open source applications.

Then the trend moved to license based OS. It was an era of commercialization. A group of developers came together and started GNU project to counter commercialization. However, they were able to successfully develop the open source OS by early 1990's. During this time organizations started experimenting the open source OS. Due to its robustness most of the organizations started adopting it. Meanwhile, Apple MAC also improvised OS versions which were technically very sound. The acceptance of variants of OS of Linux and Apple Mac lead to the decline of Microsoft dominance. Market share is an indicator of the decline of Microsoft OS.

Therefore, the trend of Operating system is moving back to the 1970's where, most of the applications were hardware integrated and open source applications.

Free/Open source Software (FOSS) licensing has influenced proprietary software, the trend in operating system is moving towards open source operating system (Valmaki and Okanen, 2005)[15]. Open source operating system has converted operating system market from monopoly to oligopoly (Bitzer, 2004)[16]. All these contemporary issues and history of operating system shows that there is paradigm shift in the operating system software market. The paradigm shift has an impact on strategy framework of system software market, since the paradigm shift drives the future. Organizations have to design strategies that will enable them to face the challenges in future arising out of paradigm shift. Adoption of open source operating system has low total cost of ownership as compared to proprietary software (cybersource, 2004)[17]. In general, business models act as a tool that enables organization to combat the changes in organizational setting. Business model is reinvented or redesigned according to the changes in external environment. Re-inventing or redesigning of a business model is a challenging task since it is dealing with uncertain future. However, it is inevitable for strategic managers to plan for future and equip organization to face challenges of future. Alignment of business models with organizations' goals, objectives and strategies is essential for organization (Raman Casadesus-Masanell and Joan

Ricart, (2011).[18] The paradigm shift in operating system software market has indicated the need to strategically evaluate the business environment in operating system software market. The paradigm shift can be visualized and evaluated through business model. Offering, activities, and revenue logic and value network are key components of business model. Firm level response to changes will influence business model design (Rajala, 2009).[18] The present study evaluates the strategic direction of this market and firm level response to the changes in the operating system software market.

2.0 Summary of Literature Review

The literature strongly supports the fact that there is changing structure in operating system software market. Customer's preference to switch over operating system could be a new trend in operating system software. The literature review shows that there has been extensive research on open source software and proprietary software. A few studies have made an attempt to analyze the business models of proprietary and open source software organizations. The existing literature provides a restricted and a generic view of the operating system products and the business models adopted by operating system software markets.

The literature review leads into a few of the fertile areas of further probe and research in view of the changing operating system market structure. They are:

- Role of hardware integrated operating system;

  - The current literature considers only two dimensions in operating system software market, viz, open source and closed source. Operating system software market is not restricted to only two dimensions but expands to third dimension of hardware integrated operating system. Apple MAC is the incumbent hardware integrated operating system playing a significant role in operating system. Traditionally, it was only proprietary and open source operating system software which were considered to be major players. Impact of open source operating system software on competitiveness by Valmaki and Okanen (2005) was one of the few studies which considered the hardware integrated operating system as one of the major players in operating

system software market. This study focuses on licensing policies, market share and operating system features. Marc Douglas Dillard (2000) studies the impact of compatibility between Microsoft and Apple Mac, the study does not include open source operating system. Apart from these two major studies, the other literature focuses only on open source and closed source operating system.

- Critical features of operating system software

  - Operating system software belongs to system software. The current literature makes very little contribution to system software. The analysis of software features are focused on application software than system software. One of the reasons could be direct interaction between application software and users. However, system software is a backbone to run application software more efficiently and effectively. A few of the studies focuses on identifying features of software in generally, viz,Davis eta l(2001) identifies that the bundling of features is one of the economic forces to influence software design. Kekre et.al (1995) identify critical features of software based on IBM products usage experience. The features of operating system are critical for its acceptance by customers. The studies identifying critical features of software provided limited view of system software features.

- Business model(s) for operating system software market

  - Numerous studies have been undertaken in the area of business model yet there is gap in the basic framework of defining business model. Business model in software industry is one of the areas being still explored. Rajala (2009) made a seminal contribution identifying the components in software business model. Schief & Buxmann (2012), Bonaccorsi et.al (2006), Kontio et.al (2005) made significant contribution in identifying classification and components of business model in software industry. Krishnamurthy (2003) provided overview of business model of open source software with specific reference to

operating system. The current literature does not include the components from integrated operating system business model. However, integrated operating system business model has a major impact on operating system software market.

- Strategic framework required to enhance strategic decisions in operating system software market

  - Most of the literature found focused on evaluating the strategies of Microsoft and open source software. Majority of the studies in open source operating system focused on the economic perspective. The Economic dimension from organization, market and individual were the key components in the strategic analysis of open source software. The studies restricted to view the industry from market competition theory and viewed the market from oligopoly or monopolistic perspective. Microsoft's strategies were predominantly viewed as anticompetitive strategies. The strategies were evaluated with reference to a few products of Microsoft. Baseman, et al (1995), Fisher (200), Whinston (2001), Economides and Katsmakasm (2006), McCracken (2008) critically evaluate the strategies adopted by Microsoft. Van De ven and Garud (1989) identifies industry emergence in software market. Lerner and Totole (2002), Deng et.al (2003), Bitzer (2004), Valmaki and Ojanen (2005), Besseb (2005) and Campbell-Kelly & Garie-Swartz (2007) analyzed the strategies of open source operating system and its impact on software market. Across all literature considered, the strategic analysis study revolved around Microsoft and open source operating system and failed to capture hardware integrated operating system. The presence of hardware integrated operating system has significant influence on operating system product and market dynamics.

The literature review indicated changing business environment of operating system software market. Literature in context revolved around open source and Microsoft. The recent trend in operating system software market is the success of Apple MAC. The earlier studies have not considered factor of Apple MAC

operating system. This operating system represents a unique phenomenon of hardware integrated operating system.

The literature in context analyzed company specific business models. However, business model for Industry is of strategic importance to analyze the industry dynamics that results in the stability in the market. A few studies were identified which analyzed business models with reference to software industry. One of the important components that lead to product success is the features offered by a product/service. The product success might lead to stability in the market. There have been many studies that identified the features of generic software, however, system software is different product platform from generic software. Hence, it is required to understand the critical features required for operating system software.

The current literature does not capture the comparative analysis of three business models of major players in operating system software market. Therefore, there is a need to study and understand the examine structure of operating system products industry and critically analyze the current business environment with respect to the major players in the industry.

In the present business environment, customer value proposition and competitive advantage are a few of the vital factors to sustain market share and profitability. Since the underlying assumption of customer need identification states that, the customers' needs have to be understood thoroughly and offer the product/ service that befits the customer needs. The product/ service must aim at creating value, in economic terms customer must get the value/benefits more than or equal to what (s) he pays. One of the methods to create value is optimal value chain. The layers in the optimal value chain might turn into a competitive advantage, if the organization is successful in creating customer value. A business model will help determine and integrate all these factors and evolve a successful business organization.

Therefore, it is pertinent to study the operating system software business model and critically examine the ways of sustenance of market share in the system software market.

3.0 Research Design

The table- 3.1 shows the average operating system market share of three major players who dominate the market. This data is compiled based on the market share data from four sources namely Net share, Stat owl, Stat counter and w3counter. As shown in table-3.1 Microsoft has lost nearly 10.5% of the market share between June 2007 and March 2013. It was a dominant player holding nearly 95% of the market share for a long period of time. Linux's average market share has increase by 0.01% from 1.31 between June 2007 and March 2013. However, Apple Mac's average market share has increased from 3.9% to 7.5%. The market share for Apple Mac has increased by 3.6%. The last column in the table above is Herfindahl Index (H.I.) which is an indicator of the trends in the state of competition of the industry. The computed H-Index during May 2007 was 0.89. This is an indication of the presence of a dominant player. The H-Index during March 2013 is 0.71. The changing pattern of dominance in the market share is clearly evident form the H-Index. The table-3.1 also shows the volatility involved in the market share for operating system products.

	Microsoft	Apple Mac	Linux	H- Index
May-07	94.3	3.9	1.3	0.89
May-08	93.9	4.3	1.4	0.88
May-09	92.6	5.6	1.1	0.86
May-10	90.0	7.5	1.3	0.82
May-11	87.8	8.5	1.0	0.78
May-12	86.4	9.3	1.1	0.76
Mar-13	83.8	7.5	1.4	0.71

Table 3.1: Average Brandwise Market Share of Operating System Product

Source: Author

3.1 Statement of the Problem

Microsoft was the market leader for last two decades. However, there has been decline of Microsoft is losing its market share in Operating System software market, whereas market share of one of the major players in the market, Mac has been increasing during the same period. There has been a sharp decline in terms of units as well as value from 2000 onwards. The table-3.1 shows the decline in average market share

of Microsoft Operating System. During the same period of time Apple and Linux have gained the market share. These three major players in Operating System(OS) represent three unique business models. Microsoft represents a proprietary model, Apple represents hardware integrated model and Linux represent open source model. The table -3.1 indicates that there is a possibility of market shift from proprietary to either hardware integrated or open source business model for operating system products. The changing pattern of dominance in the market share is clearly evident from the H-Index. Therefore, there is a need to analyze and attribute reasons for the changing structure in the market. Hence, this research.

3.2: Research Objectives

The broad objectives of this study are:

- To assess customers' experience of features of operating system products;
- To identify and explain the existing business model(s);
- To examine potential of open source Operating system;
- To design industry strategic framework that may result in sustenance of growth in operating system software market.

3.3: The Design of the Study

The research problem is to examine the shift in the market share from Microsoft to the products of other companies such as Linux and Apple Mac. The time series analysis of the trend in the market shares indicates structural changes that are being experienced in the market. The aim of the research is to examine structural changes in the operating system products and to analyze market conduct of the major players who are effecting these changes.

3.4 The Target Group

Operating system is highly a technical product. Therefore, the target group has to be technically sound. The customers of operating system can be classified as enterprise and home segment customers. Generally, Enterprise customers are more informed about operating system as compared to home segment customers, since

the performance of enterprises' product performance might be dependent on the operating system.

Hence, the target group selected for the research is enterprise users. The enterprise users in information technology industry use operating system product extensively. Therefore, the research focuses only on the enterprise users in information technology.

3.5 Population and its Characteristics

The characteristics of the target group identified are mentioned below:

1. Demographic Characteristics

The demographic Characteristics for both target groups are listed below:

- **Age:** Above 20
- **Gender:** Both Male and Female
- **Qualification:** Diploma/Any Graduation/ Post Graduation/PhD with IT/Computer Science as one of the courses or specialization
- **Employment Status:** Employed in IT organization or a Student of Computer Science/IT

2. Roles of Target Group in Organizations

The list below contains the roles played by target group of Users of OS products in organization:

- IT professional who is working in a IT based organization
- Any professional who is working either in software application design, coding/programming or testing
- Hardware engineers
- Network Engineers
- Database Administrators
- Desktop/Server support engineers
- system administrators
- A person who has technical knowledge acquired through education (like Computer graduates) or practice (working IT Professional)

3.6. The Sample Size Determination

The population of the study is unknown. Therefore, proportion of gender from pilot study is used as the basis of estimating sample size. Alpha is considered to be at 0.01 level of significance.

The determined sample size is mentioned below:

p = 0.67   q = 0.33 $\boxed{?}$ = 0.054

p = Male Proportion   q = Female Proportion

$$n = \frac{(2.58)^2 \times 0.33 \times 0.67}{(0.054)^2}$$

= 505

Gender Based Sampling

In reality, i.e., after the conduct of survey the p & q values turned out to be .63 & .37 respectively. The post facto determination of sample size at is 532. The actual sample size is 554. Thus, the sample size is adequate for the study to derive the results. The sampling adequacy has been analyzed by KMO. This is described in the data analysis section.

The sample size is determined based on gender proportion. Pätz (2011)[1] identified that the gender influences software product, in particular software design . It is believed that the logic of source code may not have any gender influence but the software design and usage will be influenced by gender. There are numerous studies which measured the impact of gender on technology. Most of the studies have found that gender influences the technical product similar to any other consumer products. The technical product such as operating system will also be influenced by gender. Mainly, the usage and utility of operating system might have gender impact. According to Dataquest and IDC survey report of 2012, women workforce in information technology industry constitutes 22% as compared to 26% in 2010. According to Govt. of India census 2011, 68.4 percent of the workers are males and 31.6 percent females. The gender ratio of pilot test consisted of 1/3rd female and 2/3rd male respondents. The gender proportion of the pilot study formed the basis of calculating the sample size for the study. However, similar trend of proportion was reflected in the final data sets of survey. The details of the demographic data of the survey is discussed in data analysis section. The instrument was hosted online at http://www.freeonlinesurveys.com/. The link of the survey was sent to the sample identified. Network sampling technique was used to collect the data. The link of survey was shared by e-mail. E-mail database of employees working in IT companies was obtained and e-mail was sent requesting to complete the survey online. E-mail selection was totally unbiased and random.

3.7 The Sample Selection Process

The survey is a combination of web based survey and selection by reference database. (Referential sampling). The procedure in reference database involves, identification of one reference in unit (in person) at random and move towards searching for others through references. The randomness of selection is ensured by accepting without bias but with a reference base. The leads given by the referee has ensured us technical soundness of the respondents and is within the framework of defined target population.

3.8 The process of Instrument Development

The instrument was developed to capture the experience of using operating system products. The features of OS products were used as parameters to measure the experience of users. The instrument also measured the brand equity and user preference of open source over proprietary operating system.

The instrument was developed initially for system administrators. Since Operating System is highly technical product, system administrators were identified. Web based survey was conducted. The respondents were contacted through online professional network, Linked-in. The web survey was sent to more than 1,00,000 members on professional network. The response for this survey was very minimal. However, there were a few constructive feedbacks from a few of the members of this network. Based on the feedback the instrument was refined. One of the significant feedback given by respondents was to include the variants of Linux in brand rating and brand evaluation. The option of "open source operating system" was added in the instrument to capture the variants of Linux operating system. The common feedback was that the questionnaire is lengthy. The questions had to be pruned to capture the essential information. However, total numbers of responses were close to 25 with a regular follow up. Therefore, target group had to be extended beyond system administrators and modified instrument suiting to the extended group. Since OS is a technical product,

the members in the extended target group had to have technical knowledge and experience. The population and sample was identified based on the characteristics of technical knowledge of the target group. The details of the characteristics of the target group is mentioned in section:4 above. Once the instrument was constructed, a subject matter expert was consulted to review the exhaustiveness of instrument. Based on feedback from subject expert(SE), the instrument was modified again and a pilot test was conducted. Subject expert provided many suggestions to improve the instrument. SE found that the instrument is too lengthy and the it may fail to capture required information. The earlier instrument captured the information of proportions of Hardware such as desktop, laptop and servers, domain experience, exhaustive list of features across three brands. The question on proportions of hardware had to be removed for two reasons, one, respondents may resist giving this information due to confidentiality and two the proportions may not provide an insight of usage of operating system at the aggregate level. However, the current usage of operating system on hardware was retained. The exhaustive list of features had to be pruned for all three brands and retain the significant features. The features were classified into categories listed below;

1. Usability

2. Interface

3. Value for money

4. Customer support

5. Data security

The instrument is appended in Annexure-4. The pilot test results were satisfactory to proceed further to collect data.

3.9 Limitations

The limitations of the research design identified are mentioned below:

- **Experiential Data:** The study has captured the product usage experiential data. The experiential data may be biased due to the problems encountered by customers. Therefore, the customers response might have been influenced by these problems.

- **Geographical Constraint:** The present Study captured majority the experiential data from sample based in Bangalore.

- **Focus of the Study:** The present study has focused more on the switch over preferences and the perception data about product performance. The other parameters such as value chain, distribution channel components have not been covered in greater detail.

- **Comparative Analysis:** The study considered only three major players, namely, Microsoft, Apple and Linux for the analysis. There are other players who were also contributing to the changing structure of system software market, however, the role of these players have been ignored due low market penetration of these players.

- **Information of Linux:** The financial data on Linux was not directly comparable with Microsoft and Apple due to the nature of business model adopted by Linux. Therefore, one of the largest distributors of Linux, Redhat's financial data was used for the purpose of comparison.

- The present study covers operating system products for desktop, laptop and server hardware. The Mobile operating system segment is not considered which was in a nascent stage when the present research started. During the research mobile operating system gained tremendous momentum, however, the present study restricted operating system for only desktops, laptops and servers.

- Target group have not been contacted in person.

- It is assumed that the instrument is filled in by the target group in top of mind or straight reflection.

4.1 Business Models in Operating System Software Market

Business model establishes linkage between strategy planning and implementation. It transforms strategies into action. The taxonomies of Business models are enormous, yet the definite framework of a business model fails to exist. Traditionally, business model was a tool to identify the revenue generating activity. However, business model consisted of many dimensions that positively influenced organizations.

Burkhart et.al (2011)[1] made a seminal contribution to business model literature. The study identified gaps in the business model literature, viz, lack of knowledge of interdependencies between the components of business model, lack of structured and comparable visualization of business models, less empirical studies on appropriate tools and criteria to evaluate business models. Raman Casadesus-Masanell and Joan Ricart (2011)[2] state that alignment of business models with organizations' goals, objectives and strategies are essential for organizations. Richardson (2008)[3] opines that Business models establish linkage between strategy formulation and strategy implementation.

According to Drucker, a good business model answers questions such as, who is the customer and what does the customer value? How do we make money in this business? What is the underlying economic logic that explains how we can deliver value to customers at an appropriate cost?. The Business model design and product-market strategy are compliments not substitutes (Zott & Amit, 2008)[5]. Magretta (2002)[6] opines that business modeling is the managerial equivalent of the scientific method you start with a hypothesis which you then test in action and receive when necessary. A Business model is widely distinct from strategy. It has a strategic importance due to its impact on business performance. Business model can, however lead to competitive advantage Afuah and Tucci (2001)[7]. Hence, business model components and its design gain strategic importance. Business model can be specific for organizations or an industry. Though there is no standard definition of a business model. A few of the components that are core to business model can be identified as:

- A set of activities in the firm
  - Value chain
  - Value creation process
- Revenue generating process

The concept of business model can be examined from activity based view. An organization consists of a set of activities. The ability of a firm to integrate all activities efficiently and effectively might lead to competitive advantage. The ultimate objective of integrating activities in organization is to serve the customers

better by making high quality products/services available. Activity based view considers perspectives of all stakeholders in the organization. The first set of components consists of activities that are required in making product/service and second part consists of making services/products available to customers.

Business models in software industry are unique in many ways. One is uniqueness of value chain of software industry. Secondly, software product users are manufacturers of software for open source based software. The changes in the product are identified & modified by customers themselves under open source software environment.

Operating system software belongs to system software category. System software is created and made available to customers in various forms. The entire process is examined from activity based view which covers the activity of creating system software and making system software available to customers.

4.2 Existing Business Models for OS Products

The system software is developed by software developers. The software is developed on technology platforms. Software developers write program/ source code using programming languages. Generally, software is sold through licenses. The license indicates validity of product purchase and authorizes the product usage. Operating system (OS) products are generally sold using licenses. The licenses are used to protect intellectual property rights that define the conditions of usage of software purchased.

Source code is a set of programs that constitute a software product. Access to the source code is main differentiator in the business models adopted by major players in operating system software market. There are two broad categories based on access provided to source code. They are Open Source Code and Closed Source Code.

4.3: Open Source Code

In this category source code is open for access to users. This holds good for both corporate as well as home users. The users can download the source code, make necessary changes or customize according to their requirements and install on hardware. However,

a few of the software are governed by General Public License (GPL) for the usage of open source code in the commercial products. The open source code concept was proposed and started by Mr. Richard Stallman who started GNU project. The aim of this project was to develop free and quality software.

4.4: Closed Source Code

Closed source code does not provide access to the source code to the users. Users have to buy software as a package and install on hardware. The users buy the software through licenses. The licenses and products vary depending on the corporate or home users. However, some of the software are developed using open source code, but they are required to acknowledge the usage of open source code in their product.

4.5: Business Model for Open Source Code

The source code is written by a group of programmers. These set of programmers develop the source code generally, out of their passion. Open source code is considered to be more secured and highly reliable, since the code is written and tested by a number of programmers. The code is tested under various platforms and applications. If any errors/bugs are found, it is resolved by programmers. The issues identified will be discussed on the network and solution to the error/bugs is identified. The programmers are connected with each other through online network platforms such as discussion forums, blogs and other membership based websites. The modified code is made available to customers as soon as the errors/bugs are fixed. Therefore, the code is considered to be more authentic and secured. The source code is made available on the internet and is open for download for all users. If there are any problems with the code, it is brought to the notice of the programmers through online network. Generally, the users of open source code OS have technical background and have basic knowledge of programming and hardware. Broadly, three categories of business models in open source code can be identified as mentioned below.

1. Direct download;

2. Purchasing Packaged open source code operating system; and

3. Sponsored open source code operating system.

4.5.1: Direct Download

In this mode, users directly download the source code from internet. The source code is made available on the internet. The users can get customer support from third party vendors at a cost.

4.5.2 Purchasing Packaged Open Source Code Operating System

In this category, different versions of the source code are bundled together and are made available to the users by vendors. The users have to pay for the bundled product. Generally, the bundled product includes CD (compilation of source code), users guide, installation guide etc,. The users also do have a option of purchasing support services from the same vendor. In this model, though the source code is available free of cost, the package has to be purchased at a cost. Redhat, Suse etc, adopt this category of business model.

4.5.3: Sponsored Open Source Code Operating System

A few of the hardware manufacturers' sponsored open source code operating system by supporting open source application products. These organizations have resources to develop open source code operating system and other applications which will be compatible to their hardware. The hardware manufacturers will be treated as ambassadors of open source code operating system. For instance, IBM established the Linux Technology Center (LTC) as the primary vehicle to participate in the Linux community. IBM and the LTC have established four goals for participation in the Linux community (IBM Systems and Technology Group, 2010):

• make Linux better;

• expand Linux's reach for new workloads;

• enable IBM products to operate with Linux; and

• increase collaboration with customers to innovate in ways IBM cannot do by itself.

Hardware manufacturers like IBM and HP develop hardware which is based on Linux operating system. In addition, the application software of these organizations are compatible with Linux operating

system. The hardware is loaded with open source operating system and is sold either directly or through distribution channels.

4.6 Closed Source Code

In this category, we have broadly two classifications:

1. OS sold to customers as a separate package and

2. OS integrated with hardware.

4.6.1: OS Sold to Customers as a Separate Package

In this category, the users have to purchase the OS license separately in addition to the hardware. This category also includes OEM licenses, where users will receive pre-loaded operating system with the hardware purchased. Microsoft Windows operating system predominantly adopts this mode of selling operating system to customers. The licensing policy varies for home and corporate customers. The software package for corporate customers will have many features that are required and used at the organizational level under various technical projects.

4.6.2: OS Integrated with Hardware

In this category, the users need not buy OS separately. The OS is embedded with the hardware. This hardware is, generally, compatible with only a few numbers of applications. Mac OS X follows this model. The OS supports only hardware of Apple. The OS is not much different for corporate and home customer segment. Since, the OS is integrated with the hardware; it is designed in such a way that it is compatible with most complex hardware specifications. This category will have end-to-end product.

4.7: Revenue Generation in System Software

The revenue is generated through licensing and customer support. Licensing is the main source of revenue. However, Licensing in software is a complex issue. It has many legal implications. Software patenting is another aspect of licensing which deals with intellectual property rights of creating software. The licensing and patenting have implications on internal and external environment of organization. Internally, it influences the features and functionality of software and externally it influences the software distribution and usage. Therefore, implications of software and patenting on internal and external environment are enumerated in the following section. The external environment is examined through international trade and TRIPS agreement.

4.7.1: Licensing of Software

License in software context is authorizing an individual or organization to use software. End user license agreement is a legal document that authorizes the use of software. According to International Licensing Industry Merchandisers' Association, License is an agreement through which a licensee leases the rights to a legally protected piece of intellectual property from a licensor – the entity which owns or represents the property — for use in conjunction with a product or service. The general definition of licensing of software indicates that the users do not buy licenses, but buy the rights/authority to make use of software. Software buyers cannot be owners of software unlike consumer products.

World intellectual property organization(WIPO) identified three categories of technology licenses, namely,

1. Licenses may be for certain intellectual property (IP) rights only (e.g. a license to practice an identified patent or to copy and distribute a certain work of authorship).

2. Licenses may be for all the IP rights of any kind that are necessary to reproduce, make, use, market, and sell products based on a type of technology (e.g. a license to develop a new software product that is protected by patent, copyright, trademark and trade secret law)

3. A license may also be for all the IP rights necessary in order to create and market a product that complies with a technical standard or specification (e.g. a group of enterprises has agreed on a technical standard to ensure interoperability of devices—the group agrees to pool their IP rights and license to each other all rights each will need to manufacture and sell the product).

Current System software uses all three categories of licensing. Windows and Mac OS uses licenses to protect its intellectual properties of source code of

operating system. Windows engages IP protection with group enterprises. For instance, Windows and Intel agree to produce interoperable hardware and software. They pool their IP rights and license to each other to produce processors that are compatible with Windows. Mac OS also follows the same structure of license agreement. System software license can be viewed from two prospective, one licenses for development and the other is license to use system software.

4.8: International Trade and Business Model

Business model essentially deals with value creation and distribution of product or service. Operating system products are truly global products. The product is conceived and designed by technical engineers across various countries. The product is exchanged across borders. The product exchange can be complete software or semi finished software. Therefore, the value creation and distribution activities of system software products are across borders. The policies of international trade will have an impact on value creation and distribution of system software. Therefore, it is essential to examine the relationship between international trade and business model. There are many countries involved in the exchange of system software. System software is a technology product. The international trade of technology is mostly governed by World trade organization.

World Trade Organization (WTO) is a body established to manage standards and policies for international trade. In order to cater to the trade policies for technology, Information technology agreement (ITA) was formed. US, Europe and Japan countries were technology oriented countries post 1990's. They had many agreements related to manufacturing of semiconductor and other computer related technologies. These countries were able to foresee that technology will be one of the drivers of global economy. Hence, they contemplated having technology agreement for easier exchange of technology.

Information technology agreement (ITA) was a significant trade agreement signed by 14 WTO member states This was the first sectoral agreement to be successfully negotiated between developed and developing countries, It was also the first agreement to fully liberalize trade in a specific sector. After the Uruguay Round, ITA provided participants to completely remove duties on information technology (IT) products covered by the Agreement. There are currently 74 participants – representing 7 per cent of world trade in IT products.(Information technology agreement, 1996)17.

The product categories identified by the ITA are:

• Computers,

• Semiconductors,

• Semiconductor manufacturing equipment,

• Telecommunication apparatus,

• Instruments and apparatus,

• Data-storage media and software, and

• Parts and accessories.

The policies of ITA are directly related with system software. ITA might identify standard features of software and all the organizations competing have to consider standard features and develop product. Standardization of product features would affect the product offer in turn will have an impact on business model.

Development based on the existing application.

4.9 Proposed Conceptual Business Model

Business model of system software market has been analyzed from internal and external environment. The internal environment was evaluated based on value creation process, taxonomy on business model evaluation. The external environment was evaluated based on distribution channels, revenue generation, licensing, legal perspectives and international trade. The analysis on these parameters indicates that business model of system software market comprises of value creation and distribution components which significantly affect players of market. The value creation belongs to internal environment and distribution corresponds to external environment.

1. Internal Environment

The core value creation is through writing code. The code is generated through either users or technical engineers recruited by organizations. The details of the core value creation is discussed in the model below:

2. External Environment

The external environment influences users to a great extent. The external environment deals with licensing and distribution of software. These two factors affect the usage of software. There is lack of clarity on software licensing and patenting in the international trade context. The software is truly a global product. The international community must address this issue and establish clarity on software patenting and licensing. This is directly linked with distribution and features of system software. The clarity on these issues can be established by creating techno-art policies. The policy must identify the standard features for software. These standard features are confined to the inter-operability functionality. If there are standardized features, then the software developing organization can develop software based on the standardized features. This will also solve the issues related to antitrust legal hurdles and anti-competitive strategies. The above is proposed conceptual business model. The model has two value chains, one upstream value chain and secondly downstream value chain. The upstream value chain consists of value creation through writing of source code and downstream value chain pertains to the distribution of software. The components of proposed conceptual business model are explained below:

3. Source Code Generation

Source code generation is the basic activity in system software. Source code consists of instructions to computer to perform a specific task. The source code can be open source or closed source. Open source provides access to source code where as closed source does not provide access to source code.

1. Distribution

System software is made available to customers through various channels. It adopts traditional distribution channel strategies of direct retailing or independent retailing. For instance, Apple has direct retailing as well as independent retailing. Open source system software can be distributed through online or through independent retailing such as Redhat, Suse etc. The system software is also integrated with hardware and sold to customers.

2. Licensing Distribution

Licensing distribution provides the legal framework of usage and distribution of system software. The license can be distributed as a free download yet governed by GPL or non GPL. GPL and non-GPL have been discussed in section 6.3. OEM licenses are computers with pre-loaded operating system. Retail licenses cover paper licenses or licenses which are sold independent of hardware as a commercial of the shelf software. Licensing distribution will have direct relationship with revenue generation.

5.0 Support

Support includes installation, training, troubleshooting and documentation. System software is a technical product which demands for technical support to install and use the software. Hence, this is a important component in system support. This is one more source of revenue to organization.

The data collected from the primary source through survey has been analyzed in this section. The data analysis has four main sections namely, reliability tests, frequency analysis, factor analysis and multiple regression results. The reliability tests have been conducted to assess the reliability and validity of responses and the scaling techniques used in the instrument. Frequency analysis is used to reflect the user experience and preference of switch over of operating system. The demographic data of respondents have been enumerated has well. Factor analysis has been used to identify the critical features of operating system as reflected in the survey. Multiple regression results have been used to discuss the conceptual equations developed and to test hypotheses. The data was collected through instrument.

5.1 Data Reliability

Primary data was collected through survey online and offline. The reliability test results are enumerated below.

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.949	0.945	94

Table 5.1: Cornbach's Alpha Reliability Statistics

Cronbach's alpha is 0.945. This indicates that there is consistency of responses and instrument will give similar results when administered to the same respondents at different times. Alpha of 0.945 is a good representation of consistency. Statistically, alpha value of 0.7 and above is considered to be highly reliable data set.

5.2 Respondents Demographic Data Analysis

The demographic representation of respondents is described below:

Age Group of Respondents

More than 1/3rd of respondents represented the age group (in yrs) of 25-29 followed by the age group of 30-34 constituting of 28% respondents. Respondents of age group 20-24 and 35-39 were 11% and 19% respectively. The age group of 40-44 and more than 44 had minimum respondents of 5% and 2% in the survey. The age group of 25-39 represented more than 2/3rd of the survey respondents. Coincidently, maximum workforce in IT industry also belongs to the same age category.

Gender Representation of Respondents

The gender composition of the respondents was 1/3rd and 2/3rd respectively. Male respondents constituted 63.48% of respondents and female constituted 36.52% of respondents. Generally, IT workforce is composed of more male than females. The same trend also is reflected in the gender composition of the survey respondents.

Education Qualification of Respondents

Close to half of the respondents were under graduates followed by 41% of the respondents with post-graduation. Most of the undergraduates were engineering graduates, since IT industry prefers to hire engineering graduates than any other undergraduate streams. Respondents with diploma constituted 8% and PhD 1%.

Work Experience of Respondents

The work experience of the respondents was similar to the age group composition. Work experience of 0-15 years constituted nearly 92% of the respondents. Most

of the respondents were at entry level or middle level of their career. More number of respondents were from 0-5 years of work experience. Only 3% of the respondents had more than 20 years of experience and 5% of the respondents were representing 16-20 years of work experience.

Usage of Operating System on Hardware

Microsoft is predominantly used operating system across all hardware. However, the presence of Linux operating system is visible on server. Though the percentage of respondents using Linux operating system on servers is less than Microsoft, still its presence is visible as compared to other players. Mac operating system's presence is not as visible as Linux visibility.

In sum, Microsoft is still the widely used operating system across all hardware. The breakup of usage of operating system across desktops at home, desktops/ workstations at office, laptops and servers is mentioned below. The usage pattern of Microsoft Windows reflects the trend of market share data.

The above diagram shows the preference of switching over of operating system from the current operating system. Most of the respondents would like to switch over operating system from the current operating system except on servers. Half of the respondents do not want to switch over operating system on servers, where as close to 50% of the respondents preferred to switch over operating system for desktop/ workstations at office and laptop at office. Close to 38% of the respondents wanted to switch over to a new operating system at home. The data above indicates that more number of customers prefer to switch over operating system on computers at home, office and laptop at office as compared the switch over preference on servers. However, the switch over trend indicates that the customers are ready to switch over operating system and use the operating system other than the current operating system being used. Majority of the respondents are using Microsoft Windows operating system across all hardware and most of the respondents would like to switch over the operating system. This is an indication that the customers would

like to experience the operating system other than Microsoft Windows operating system.

The above graph shows preference of the respondents who wanted to switch over operating system from current operating system. Linux OS was the most preferred operating system for Servers, desktops at home and office. Nearly 54%, 34% and 43% of the respondents who wanted to switch over to other operating system preferred to have Linux operating system on servers, desktops at home and at office respectively. Respondents who wanted to switch over operating system on laptops preferred to switch over to Apple MAC OS.

This is in indication of a customers' preference shift towards Linux operating system and Apple Mac. The customer lock-in established by Microsoft is locked-out and is losing critical mass. The existing literature shows that a superior technology can lock-out the customers and erode the critical mass. In the context of technology, first mover advantage will establish lock-in; however, the superior technology will override the first mover advantage and lock-out.

The above graph shows the buying preference of respondents of open source and proprietary operating system. 41% of the respondents preferred to purchase open source and 56% of the respondents preferred to purchase proprietary. Though more number of respondents preferred to buy proprietary operating system, the trend could be moving towards open source. This trend is visible in the switch over preference. The preference to buy proprietary operating system could be due to the preference to use Apple Mac operating system. The market share of last five years also indicates the trend of preferring Apple Mac operating system. The preference of open source is not negligible as well. However, the proprietary software is preferred more than open source operating system.

5.3 Critical features of Operating System

Exploratory factor analysis is used to identify interdependency and cluster of operating system features. This clustering help identify critical features of operating system and bundle them appropriately in the product.

KMO sampling adequacy is 0.933 which is an acceptable range of adequacy. Large KMO values are good because correlation between pairs of variables can be explained by other variables. The significance value of Bartlett's test of sphericity is 0.00 <= 0.005. These two measures indicate that there is adequate sample and the responses are valid and suitable to run factor analysis.

The first component consists of features of interface. The features namely ability to support legacy application software, ability to support multiprocessors, better interface to work on multiple platforms and ability to support multiple file types and bit structures. The features correspond to the features of interface. These features are related to the ability of operating system to support multiple platforms. These features enable the software developers to leverage the benefits of various platforms of software development.

The second component consists of compatibility and data security. Compatibility is reflected as an attribute of interface. The compatibility of hardware and software is a critical feature of operating system. Operating system acts as an interface between hardware and software. The other feature significant in the second component is data security. The data residing in the computer has to be safe and is not vulnerable to intrusion. The data protection is another important features that has to be provided by operating system.

The third component is related to usability. The attributes of usability captured are ease of use and installation. Graphical user interface is a tool for users to interact with hardware and software. A better GUI will always facilitate users to use computer system at use. The feature of ease to install is a result of a good GUI. The ease to install is a significant feature because operating system is a technical product and it needs to be as simple as possible for users to install and use it.

The factor analysis revealed that interface; ease of use and data security are critical features of operating system. These are the perceived significant features of operating system.

The operating system establishes the linkage between hardware and software. Therefore, interface is a critical component of operating system. Most of the respondents

preferred to switch over operating system from the current operating system. Therefore, the interface plays a significant role in establishing appropriate interface which supports existing hardware, software and legacy applications. Ease of use feature helps customers to quickly adapt to the operating system and have a better usage experience. This also reduces the total time required to learn new operating system and install it without any technical glitches. Operating system is a technical product which might be complex to install and use. Therefore, the features of ease of use and better graphical user interface helps users to overcome the constraint of using technical product.

Data security is a major concern for enterprises. There are many software applications that ensure data security. However, operating system provides the core function of data security and back up. The other software applications prevents unauthorized intrusions, however operating system's function protects data and provide backup.

5.4 Conceptual Equations

The conceptual equations conceived and tested are mentioned below.

- **Market Share** = f (Sales)
- **Sales** = f (Business Model)
- **Business Model** = f (Customer value proposition, profit formula, key resources & processes)
- **Customer Value Proposition** = f (perceived utility of product)
- **Perceived Utility of Product** = f (product features, product up gradation/innovation)
  a. **Product Features** = f (Usability, Interface, value for money, customer support, data security)
  b. **Product up Gradation/Innovation** = f (Revenue, market share, R&D, gross profit)
- **Profit Formula** = f (modes of revenue generation)
  - **Gross Profit** = f(Revenue, release of new versions, R&D, market share, market share growth)
- **Key Resources & Processes** = f (Brand equity, channel management, Value chain)

- **Brand Rating** = f (product performance, brand preference to buy, features)
- **Brand Choice** = f (brand rating, brand preference, product performance)
- **Channel Management** = f (licensing, access to source code, mode of distribution)
- **Value Chain** = f (source code generation, distribution, customer support)

5.5 Multiple Regression Analysis

Multiple regression model has been developed based on the conceptual equation below:

1. **Perceived Utility of Product** = f (product features, product up gradation/innovation)
   a. **Product Features** = f (Usability, Interface, value for money, customer support, data security)
   b. **Product up Gradation/Innovation** = f (revenue, market share, R&D, gross profit).

The dependent variable, perceived utility of product is measured through the rating of the performance of product. It is assumed that rating of the performance of product is an indicator of perceived utility of product. Therefore, the rating of the performance of product is considered to be a dependent variable and the classification of product features namely, usability, interface, value for money, customer support and data security are considered to be independent variables influencing dependent variables.

Multiple regression analysis has been used with stepwise general linear regression model under each brand of study. The results of regression based on the primary data sets are presented in T-1 for Microsoft Windows.

The tests explain multiple functional relationships between perceived utility of the product which is function of product features and product up-gradation. The data on product features are captured in the dataset through variables such as usability, interface, value for money, customer support and data security. The tests suggests a multiple co-relation value of 0.467 with an adjusted co-efficient of determination of 0.213. The std. error of 0.34 is suggestive of a

moderate deviation of variability on a five point scale. The ANOVA for general linear model rejects H0 of no significant differences across independent variables influencing the dependent variable at p-value 0.000. The influence of usability is statistically significant at 1%level, introduction of new features is significant at 5% level, the customer support is significant at 5.6% level, and the cost of buying appears to be relatively less 2.9% level. The overall results in terms of the utility of the product of Microsoft are clearly evident from the significance levels of usability, interface, and value for money and customer support. The Microsoft users however, are skeptical about the data security. The aspect of data security was deleted by stepwise regression as statistically not significant.

The general linear model results for Linux operating system was analyzed. The multiple correlation is computed at 0.195 and the coefficient of determination is 0.036. The std. error of estimate is relatively higher at 0.997. The result of test of hypothesis of no significance differences is rejected at p-value 0.00. The stepwise regression analysis supports the hypothesis that Linux operating system supports more number of applications which is statistically significant at 0.00 level. Linux as an operating system supports more number of applications because of its business model of open source access. This is a significant variable that is enabling Linux to take its roots in business. Linux releases more number of versions which are utility oriented versions with open source access. The value for money is derived through enabling the support of applications by Linux. The usability, interface, customer support and data security are considered as variables making no significance. The data suggest that openness to operations of a system will lead to better versions, better use and ease of use. Linux is influencing customers by its access to source code and by enabling utility to be derived in an open space. The openness of access is a factor to reckon with for better utility. The general linear model of utility for Apple Mac OS X was analyzed. The multiple co-relation and determinant co-efficient are at 0.230 and 0.051 respectively. The std. error of estimate at 1.061 evidences relatively higher level of variability as compared to Microsoft and Linux. The hypothesis of no significance differences between functional variables and utility is rejected at p 0.000 level. The users of Apple Mac OS X consider Mac OS X as providing good and fast customer support. Customer support is a significant influencer in deriving utility of product. All other influencing features such as usability, interface, and value for support and data security are not the influencing factors with respect Apple Mac OS X.

The perceived utility of operating system from features perspectives differs across Microsoft Windows, Apple Mac OS X and Linux operating system. The features of usability, customer support and value for money are significantly influencing proprietary operating system, value for money feature significantly influences open source operating system and customer support feature significantly influencing hardware integrated operating system's perceived utility.

The analysis enables us to conclude that Microsoft Windows has more influencers such as value for money, customer support and usability while Linux and Apple Mac OS X are in the market because of open access support and customer support respectively.

Product up Gradation/Innovation = f (income, market share, R&D, gross profit)

The number of product version released is considered either as an upgraded or an innovative product. This variable is considered as a function of income, market share, R&D and gross profit. The method of multiple logistic regression best fits in when we have proxy variables regressed for assessment. The null hypotheses of no influence of profit, income, expenditure on R&D and market share influencing product innovation have been tested against alternate hypotheses of each one of these making strong influence.

Microsoft

The equation is regressed on time series data. Logistic regression method is used to regress the equation. The summary of significance values is mentioned below.

The regression results for Microsoft Windows are presented in table 5.24. The score statistics of chi-square is suggest that gross profit, income, expenditure on R&D and market share influences innovation at 2.9% level, 2.4% level, 2.9% level and at 1.7% level

of significance respectively. There appears to be higher influence of market share on innovation although profit and income levels and expenditure on R&D makes dent on number of versions released. The results speak of the strategic concern of Microsoft in retaining its monopoly power. One of the ways to hold on to consumers is regular replacement of innovated versions of software to derive higher utility. This will augment income levels and hence consequential effects on profit and income. Market share may get stabilized making other innovators difficult to capture the market. Microsoft as a company has made its brand influence on end users by repeated innovations and the timely release. All the null hypothesis have been rejected at varied levels of significance and hence has led to above interpretations.

The functional relationships between product innovation and independent variables such as income, gross profit, expenditure on R&D and market share have been tested for Apple Mac OS X products. The method of multiple logistic regressions gave out the results. The results of the analysis suggest us that none of the regressors have made significant influence on number of versions released by Apple Mac. There is an inherent strategic confusion with Apple Mac. Given the market situation Apple Mac would have either gone for head on with Microsoft in competing with their products or could have considered spending more on R&D for deriving consumer utility of products. It appears Apple Mac has not been able to make much R&D innovation which has lead to less number of versions being released. The released press information by Apple lead us to the conclusion that Apple concentrated more on diversified products other than the one released by Microsoft. The strategy of Apple Mac of capturing iPhone, iPod markets is deliberate in extending the influence of their products to end users. This strategic shift helped Microsoft acquire better market power in their product market area. Apple Mac has a sizeable share of the market which is consistently increasing over years but not statistically significant. For example market share of Apple Mac has increased from 3.9% in May 2007 to 7.5% in March 2013. During the same period Microsoft had a decline in market share from 94.3% in May 2007 to 83.8% in March 2013. Given the trend that we have in increasing market share of Apple Mac, it is likely to take more than a decade for Apple Mac capture high market share from Microsoft.

The results of the innovation function for Linux operating system has been built up with the same functional construct. The number of versions released by Linux operating system is hypothesized by significantly influenced by market share, income, R&D expenditure and gross profit. The researcher faced the problem of data set for Linux because of the business model constructed by them. It was noticed that Linux operates through its distributors as a part of the business model. The data on the variables of interest were culled out from one of the highly rated distributors, Redhat of the Linux operating system. According to http://www.wikinvest.com/ Red Hat currently maintains about 60% of the Linux market for software products The primary dataset as reveled by users in the survey is 51.63% which is closer to the market influence of Redhat as a distributor of Linux operating system. As such, it has been decided to use the data of Redhat on number of versions released profit, income, R&D and market share are considered a good approximation to Linux performance.

Redhat is one of the highly rated distributors of Linux operating system. According to Linux.com, Redhat is one of the top most Linux operating system vendors across enterprise category. The tests shows number of respondents(in%) preference of Linux distributors

More than 52% of the respondents preferred to use Redhat's Linux operating system. Hence, the financial information of Redhat is considered as proxy data for Linux operating system.

The statistical analysis of this proxy function for Linux operating system is interesting. All the null hypothesis of no significant influence of market share, income, expenditure on R&D and gross profit are rejected in favor of respective alternatives at 1.1% level, 0.6% level, 0.7% level and 0.6% level respectively. Unlike Apple Mac, Linux product innovation function is on par with Microsoft operating system function. The levels of significance of the regressors lead us to the idea that Linux is going to be a sharper threat to Microsoft Windows in the years to come. The distributors of Linux if used more aggressively may in the years diminish the

influence of Microsoft Windows. It has been noticed that Linux OS had 1.3% of market share in May 2007 which marginally increased to 1.4% in March 2013.

Given the way Linux OS having more number of innovation products would pose threat to Microsoft Windows stronger that Apple Mac in the years to come. The analysis is clearly suggested of consistent decline in market share of Microsoft and the efforts to retain it. The results are apparent in making distinction between influences of Apple Mac on the Market against Microsoft which at present appears to be moderate although, Apple Mac has Market share next to Microsoft. Linux although has 1.4% market share will surely pose stronger threat to Apple and Microsoft by their distributors who appear to be penetrating than others of Microsoft and Apple. The distribution model of Linux is, however distinctly different from that of Apple Mac and Microsoft. Apple Mac having a different strategy of diversification is likely to be less competitive to Microsoft as compared to Linux who appear to be aggressive and need to be more aggressive to break the monopoly of the Market power of Microsoft. The analysis proves that business models form a construct in influencing market conduct of organizations.

Perceived utility of operating system is captured through features influencing perceived performance operating system and number of versions released. The features influencing perceived performance of operating system varies across three brands. Below table summarizes the features influencing brands.

The results for perceived utility of operating system from features perspective was based on perceptual data. Ease of use feature for Microsoft Windows could be due to huge customer base. Microsoft Windows was one of the early movers in the system software market. Hence, the product standards were strongly influenced by Microsoft. Due to first mover advantage, it was able to capture huge customer base and bundle standard features in Windows. The users quickly adopted the product and got used to the features of Windows. The users are accustomed to Windows and find Windows easy to sue as compared to other operating systems.

For a technical product such as operating system, needs strong customer support. The support may be required derive the optimum utility of product. Microsoft provides support through subscriptions. Customers have to pay for the subscriptions and get technical support from Microsoft. Whereas, for Apple Mac OS X, the support is generally bundled with the purchase cost for a specific period of time. The customers can subscribe for the support through maintenance or service contract to avail the support services.

Value for money is another feature that influences perceived utility of operating system. The customers perceive that Microsoft Windows and Linux provide value for money by bundling many features with operating system product.

The second component of product up gradation was captured through time series data. The dependent variable for product up gradation was captured through number of versions released. The independent variables considered were Market Share, R&D expenditure, Income and gross profit. The summary of logistics regression results is provided below

The variables significantly influencing number of versions were same for Microsoft Windows and Linux operating system. The variables which influenced number of versions are market share, R&D expenditure, Income and Gross profit. Theses variable did not significantly influence Apple Mac OS X. There could be other variables that could influence Apple Mac OS X number of versions. Number of versions released by Apple during last five years were very less as compared to Microsoft and Linux. This could be one of the reasons for the failure of identifying the variables significantly influencing number of versions.

The regression results indicate that the perceived utility of operating system is in general significantly influenced by Ease of use, customer support and value for money features and the number of versions or product up gradation is significantly influenced by market share, R&D expenditure, Income and gross profit.

Profit Formula = f (modes of revenue generation)

1. **Gross Profit** = f(Income, release of new versions, R&D, market share, market share growth)

The results of the profit function are presented here. The functional equation is : Gross profit is a function

of revenue, release of new versions, R&D, Market share and market share growth. It is assumed that each regressor is independently influencing profit function.

An assumption is that Market share and market share growth are two derived variables considered independently influencing profit function. The effect of multi co-linearity between market share and market share growth has not been tested. However, the correlation co-efficient is computed and the results have been carefully analyzed. The correlation coefficients have been summarized below:

The significance of correlation coefficient using t-statistic gives value of t 136.58, 117.88 and 28.6 which is significant 0.00% level for Microsoft, Apple Mac and Linux respectively.

The correlation between market share and market share growth is 0.413. Since the level of r is an indication of multicollinearity, it is carefully assessed for analyzing the results.

The tests gives the results of multiple regression analysis under general linear model. The multiple value of 'r' between dependent and set of regressors is 0.862. The co-efficient of determination is 0.688. The power of the general linear model has explained 68.8% of the variation for Microsoft data. The results of multiple regression suggests that all independent variables that is regressors are statistically significant at varying level of p-values. Market share, Market share index (growth), income and expenditure on R&D are statistically significant at 4.7%, 4.4%, 1.1% and 0.2% levels respectively. Given these results, it is not surprising that the hypothesis of no influence of regression co-efficient (regressors) is rejected in favor of all regressors independently influencing profit at 0.00% level. Interestingly, significance of market share index is negative at 4.4% level. For Microsoft, it can be stated that level of significance of decline in market share is statistically evident and is likely to make a strong impact on Microsoft's profits in the years to come. While, Microsoft is making efforts to augment income, by spending heavily on R&D its market share is consistently declining. The equation of multiple regression with profit as regressent is a sure indicator of decline in monopoly market power of Microsoft.

Much more can be read by analyising profit functions for Apple Mac and Linux.

The general linear model is relatively better with multiple R at 0.946 and coefficient determination 0.866 when compared with Microsoft. The regression results highlights some surprises. Market share and market share growth are not statistically significantly influencing profits. The expenditure on R&D and income and the base of the regression equation are statistically significant at 0.00%, 8.8% and 0.4% respectively. The Apple Mac has a strong base but different from that of the base of Microsoft. The profits base of Apple Mac is statistically significant and is greatly influenced by income and expenditure in R&D. This exposes the efforts of Apple Mac by spending on R&D and income is not sufficient to increase the levels of market share. The analysis of variance results indicate that not all regressors have the same influence on profit which is true. While Market share and market share growth are not influencing profits, R&D and income are influencing profits at high levels. Apple Mac may resort to one of the two strategies. They may decide on spending more on R&D with definite focus on new products in a time frame. Apple Mac can also think of expanding market for the present products by expanding customer base. A concerted effort to expand market base and R&D simultaneously may yield better market share and better growth. The company may think of strategic plan to make profit function on par with Microsoft. The results however, This general linear model function has multiple R of 1.0 and determinant co-efficient at 0.99. The analysis of variance of no significant differences between the regressors on the regressant is rejected at 0.000 level of significance. This leads us to a further look at the table and the levels of influence of regressors on profits. The table suggests that expenditure on R&D and income of Linux (Redhat) is statistically significant at 0.000% levels. The number of versions released by Linux is not statistically influencing profit. Mere access to source code may not yield results. There should be concentrated efforts by Linux for better access to its users. In, addition Linux should encourage its users to come out with better possible versions which may make users dependent on developing need based versions for the market. The numbers indicate that Linux is not

making such strategic efforts. There is a need to woo its distributors for them to further influence the end users of Linux. The profit share of Linux is statistically significant to its market share at 10% level. The level of significance to us suggests that Linux is potential threat to MS. But the potentiality being not intensive, Linux could be an intensive potential threat to Microsoft by enabling multiple versions of new products play in the market. While all the three brands, Microsoft, Linux and Apple are popular in terms of awareness, it is only Microsoft which in conversion more effective than other two. Numbers favor Linux which has the potential to break Microsoft monopoly power, given the fact that Apple Mac continues with its diversified strategy.

The Regression Equation for Brand Rating

Brand Rating = f (product performance, brand preference to buy, product features)

The rating of any brand is normally influenced by product performance, brand preference to buy and feature of the product. The features that are recognized for a software product are usability, interface, data security, value for money and customer support offered by product vendor. The data we collect on such variables are not per say perception data sets. They are experiential data sets based on which brand equity analysis can be performed. The rating of brand is assumed to be influenced by above variables. The rating of a brand represents in total equity of that brand in the market.

The brand rating is assumed to be proxy for brand equity. It represents brand through product features, performance and preferences. The analysis carried out here is based on experiential data recorded on five point scale based on the rating of statements. The users of all three brands are a domain of target population.

The analysis done provides the results of brand rating function for Microsoft Windows. The equation has multiple co-relation co efficient of 0.654 with an adjusted co-efficient determination of 0.422. The standard error of estimate is relatively low at 0.575. The equation estimated under general linear model has rated overall performance and brand preference to buy Microsoft as statistically significant at 0.00% level of significance. The Microsoft operating system provides more features and hence more value for money. The users claim it to be true at 7.9% level of significance. Microsoft Windows support for more number of application is negatively significant at 10% of alpha .i.e. MS Windows does not support more number of applications as compared Linux and Apple Mac. As regards security in terms of data recovery and back up Microsoft operating system is accepted as relatively better than the other two systems Apple Mac and Linux at 0.0% level of significance. (T-19). The features of product, performance, and preference to buy do not have the same level of significance. The null hypothesis of same level of effect for product performance, brand preference to buy and product feature is rejected at 0.0% level of significance (F-ratio 80.967). However, the stepwise regression leads us to conclude that customer support in terms of the external support given by the organization is not statistically significant. In addition, the usability of the product is considered not a highlight of Microsoft. While the brand rating for Microsoft is based on features, number of applications and security, the usability and customer external support are deterrent because of non recognition of these factors by Microsoft. The strength of Microsoft as a brand would improve as long as efforts are made to open horizon of usability and special efforts are made to derive customer support which in turn will lead to better value for money. The results are clear on the customer drift of Microsoft to the other two brands, Mac and Linux. The clarity has emerged because of the models of delivery and use.

The regression results show the multiple correlation co-efficient and the co-efficient of determination (adjusted) stood at 0.529 and 0.268 respectively. The standard error of estimate is 0.761. The results of the general linear model have two domains. The first domain is negatively significant influence of Apple Mac with respect to "not less expensive OS products", negatively significant data recover and security measure and no support for multiple application of development platforms. Any customer would always think of cost in relation to the other available products in the market. In addition to this factor, the security and retrieval of data are critical for ensuring the customers. Apple Mac has not made enough efforts in the area of data security. Customer development for multiple application of an

OS is a critical as the product itself. Apple Mac has not made any dent in this area.

The positively significant domains are, overall performance of Apple Mac, customer are happy as regards overall performance. As such, they prefer to buy Apple Mac in relation to the other two brands. The Apple Mac provides more features as compared to the market dominant Microsoft at a p-value of 0.2%. the Apple Mac ability to support legacy application is recognized at 1.7% level of significance. These are the strengths on which Apple Mac can sustain upon with appropriate multiple applications, better provision for security and working on costs in relation to costs of Microsoft and Linux products. The ANOVA result has signified varying levels of the influence of these factors in both positive and negative senses. Concerted efforts are advised to make Apple Mac most preferred in relation to the other two brands.

The brand equity equation for Linux operating system is presented. The result is characterized by multiple r at 0.61, adj. co-efficient determination at 0.31 and std. errors of estimate at 0.04. The variability of Linux operating system features are more relatively unstable when compared with Apple Mac and Microsoft. Given this relative higher instability, Linux has three positive features to work with, they are usability, customer support and preference to buy Linux. The ease of use of Linux OS products is statistically significant at 1.7% sig level. The overall performance and brand preference are highlighted at 0.00% sig. level. The customer support Linux OS provides is negatively highlighted at 5.5% level of significance. Mere access to Linux OS is not treated as high level of customer support. On the contrary, the customers have perceived it as a sluggish way of access to Linux OS. This has to be removed by providing easy and ease of access by inducting human technical support. This measure will make Linux better preferred for buying and will induce overall performance more than what it is at present.

The ANOVA (t-stat) results state not all are well with Linux OS although Linux OS has better overall performance. The dependence on Linux OS on the customers by making it more user friendly and better ease of access will lead to Linux being a strong system in the market. The market share of Linux OS is mainly because of easy to work with, customer support which is a differential deterrent need to be made an integrative support for end users.

The overall analysis of brand equity suggests that all three brands continue to be more powerful with the striking performances. The main differential of performance are value for money, customer support, usability for Microsoft, Usability and customer support for Apple Mac and customer support for Linux OS. The common factors across all three brands are in the relatively low level of customer support. Efforts have to be made by Apple and Linux to drift market share of Microsoft towards these two brands by appropriate location specific customer centric market policies and strategies.

The Regression Equation for Brand Choice

Brand Choice = f (overall performance of brands, brand rating, brand preference)

Stepwise regression is used to regress the above equation. The equation is run for all three operating systems and across servers, desktops at office & home and laptops.

The functional relationship of brand equity is with respect to three parameters. i.e. brand choice is assumed to be a function of brand rating, brand preference and brand performance. On the assumption that each one of these variables influence brand equity independently, under general linear model, stepwise regression was carried out. The results of the regression for server operating system were analyzed.

The multiple correlation is estimated at 0.404 and the adjusted co-efficient of determination is 0.157. A standard error of estimate at 1.088 suggests relatively high degree of variability in the regression matrix. The results exposes the influence of brand choice for server operating system under the study. The overall performance of Microsoft and preference of Microsoft are statistically significant at 0.000 % sig. level. The users prefer Apple Mac at 8.8% sig. level. There is some hesitation of people in buying Apple Mac as against Microsoft. The preference for Linux is negatively statistically significant at 0.00 % level. The negative aspect of level of significance could be related

to the operation of the business model of Linux. The users prefer Linux and yet they prefer to buy Microsoft or Apple Mac because of ownership status they acquire when they buy them. The negativity of non-ownership is a factor to reckon with in business. Linux is seems to be user friendly than the other two, i.e. Microsoft and Apple Mac and yet the non-ownership of the product at a price by Linux is perceived to be a deviation from the normal model of the business. One of the two possibilities can be explored. First, Linux may toe the lines of Microsoft or Apple and be a straight competitor in the business. Alternatively, the Linux can continue to have the present model with a variation in accepting consumer product for commercialization in the open market. The consumers/users perceive the use of a product with a brand seal from Linux apriori. The Linux is following now a model of a posteriori, which is not accepted as a normal mode of business. The ANOVA results indicate acceptance of the hypothesis of significance of all regression co-efficient at 0.00 % level. The result of ANOVA is suggestive of high level of significance of Microsoft and Linux in a negative sense and reasonableness of significance of Apple Mac. The think tank in these three companies may like to revisit to recast their positions for holding on consumers to their respective brands. In sum, the brand equity of all three brands is established by their respective consumers who use one or all the brands for their professional excellence.

The regression for desktop for brand choice function is presented and shows The multiple correlation estimates under general linear model is determined at 0.503 with adjusted co-efficient of determination 0.249. The std. error of the estimate of 0.790 is relatively smaller as compared to estimate of server. The influence of Microsoft and Linux are statistically significant positively and negatively for Microsoft and Linux respectively at p-values of 0.00%. There is a positive and significant brand preference of Microsoft. The brand preference for Linux is negative and statistically significant for desktop which is similar to the results for servers. There is one more evidence to show that Linux business model needs a change. The same trend may lead to faster decline in sales if ownership of the product is not recognized. The customer sentiment of

ownership reflects the value that he pays. However, utility orientation of Linux products should continue. In order to have faster reach of Linux products, there is urgent necessity of molding business model similar to or competitively more advantageous than that of business model of Microsoft. The analysis of variance testifies strong preference both for Linux and Microsoft and Linux strength affecting negatively. Branding alone cannot lead to best performance. The product utility and performance will influence branding. The results indicate that the way business is done matters. The ownership of Linux product matters because of the relative strength of the results of influencing variables on branding here. For the desktop, brand has only two brands namely, Microsoft and Linux. Apple MAC is not considered by users as statistically acceptable.

Laptop is model of computer which has more market potential and has utility of easy mobility. The use of laptops has changed the complexion of modern industries and more so industries in the service sector. Laptops are proving user friendly and amenable for multitask jobs across industry population. The brand choice function results for laptops are examined using general linear stepwise regression model. The analysis indicates that multiple correlation coefficients is 0.433 and adjusted coefficient of determination is 0.190. The std. error of estimate of 0.64 indicates the strength of results as compared server and desktops. The Linux and Microsoft are considered to be significantly influencing brand equity in addition to the rate of brand of Microsoft operating systems. The users would like to buy Microsoft operating systems for laptop and the rating of Microsoft operating system higher than that of Linux. The Linux brand however, continues to negatively influence brand equity at 3.8% of p-value. The consistency in negative influence is a warning signal for Linux. The implication is, in the years to come, Linux should be able to develop Laptops with a better utility and better access with ownership of new products or consumers recognized by Linux itself. The ANOVA exhibits high level of significance of co-efficient at p-value of 0.00%. The case in point here is strong positive evidence towards Microsoft followed by strong evidence towards Linux as a part of brand equity. The results indicate that it is not enough if one company or

product acquires brand status, the acquisition of brand however, should lead to positive sustenance in terms of holding onto consumers for a relatively longer period of time.

The brand choice function for desktop or laptop home users were analysed. The multiple correlation co-efficient followed by adjusted coefficient determination 0.362 and 0.124 respectively. The standard error of estimate is 0.760 which is relatively stable for home users. The home users prefer Microsoft at 0.00% level of significance because of its performance where as Linux home users prefer Linux brand and rate Linux operating system 0.3% and 0.4% of p-values respectively. i.e. home users perceive on par with Microsoft. Yet it is felt that Linux has its negative connotation associated with brand preference model. The acceptance of Linux brand positively is a welcome sign. The SOHO (small office home office) people who possibly earn at home prefer Linux. A simple strategic change by Linux similar to or a better ownership version may lead to quicker market penetration for Linux. The ANOVA results reflect the similar trend of significant and differential rates of influence of Linux and Microsoft with respect to home users. The use of computer physical version, laptop or desktop is only a physical change in the system in use. The software which is developed with Linux has opened up un parallel opportunities for each one of the users. The Microsoft operating system enables only rhetoric use of system itself while Linux is for all adaptation use of the system.

Negative influence of Linux operating system calls for further investigation on the factors leading to the negative influence. The factors negatively influencing were identified through features provided by Linux, feature provided by competing brands of Microsoft and Apple and perceived overall performance of, brand rating of and preference to purchase Linux ,Microsoft and Apple Mac. The brand preference to buy Linux was regressed with the variables that were presumed to negatively influence Linux operating system. The results of the regression are presented below.

The user experience and perception have been analyzed for brand preference. The brand preference is presumed to be influenced by usability, interface, value for money, customer support and data security. The results of the regression is presented shows

Multiple regression r value to be 0.370 and coefficient determination is 0.99. The customers perceive that Microsoft is relatively more secured and provides good and fast customer support (at 19.4% and 16.5% p-value respectively). The Microsoft is perceived to be restricting number of applications more expensive, less supportive to application software and is not supportive to legacy application software. Microsoft has its own negativity in built with its users, although it is secured and provide good customer support. In the case of Linux, it provides good and fast customer support and not easy to work with (at 12.7% and 44.7% of p-values respectively). Linux does not support much multiple file types and many application development platforms. The fact that Linux is perceived to be not easy to work with is a pointer towards the need for changing business model and product features. The ease of working with Linux is accepted if customer access is made easier and faster and accessible across space. Microsoft operating system does not support application development platforms, it is however, more easy to work with. Microsoft operating system does not provide more features however, it supports more applications, each application support will have to be at a high cost at this point in time in the market. The support to legacy application software is acceptably true on most of the application.(with p-value 5.7%). The discomforting features do not however, make it a low brand. This has caused negative influence on Microsoft which has made users to move towards Linux and Mac respectively. The brand rating of Mac is higher than that of MS operating system and Linux. Given these varying results, it is obvious to get null hypothesis of no equal influence of regression co-efficient rejected at 0.00% level of significance.

Brand preference to buy Linux = f(overall performance of Linux, Microsoft Windows and Apple Mac, Brand Preference to buy Microsoft Windows and Apple Mac, Brand rating of Linux, Microsoft Windows and Linux)

The overall performances of, brand rating and purchase preference of Microsoft Windows, Apple Mac and Linux have been presented . The brand preference to buy Linux has been regressed on performance and brand rating with high multiple r of 0.88 and adjusted co-efficient determination at 0.339. The std. error

of estimate is relatively least at 0.683. The overall performance of all Microsoft and Linux are significant statistically at 0.00% level. There is a tilt in brand preference to buy Microsoft towards Linux and Apple Mac respectively. It is here we find the brand rating of Microsoft is shaken and is taking a beating at 3.5% level of significance(p). The overall result is that all the three brands are established in the market. The brand power of Microsoft is drifting towards, Linux and Apple Mac respectively. The analysis has proved that the business model of Linux needs a thorough relook and must be in tune with present competitive positions. The way strategic shift may be attempted will be presented in policies, strategies and action in the next chapter.

The results show brand preference to buy Linux operating system as dependent variable and Linux features namely, usability, interface, customer support, value for money, data security as independent variables. The stepwise general linear regression has multiple regression r value of 0.144 and estimated standard error of 0.835. Stepwise regression process has removed the features of data security, usability and customer support which were statistically insignificant. The results indicate that value for money was influencing positively and the interface had statistically negative influence on brand preference to buy Linux operating system. Customers perceive that Linux operating system provides value for money (p-value of 3.3%). This could be due to the business model adopted by Linux operating system. The source code is accessible by users and has the feature of customizing the source code according to their needs and requirements. Therefore, the customers might feel that there is value for money to buy Linux operating system. However, the interface feature of Linux operating system is negatively influencing the brand preference to purchase Linux operating system (coefficient value of -0.177 and p value of 1.1%). It is perceived that the operating system does not provide appropriate interface with other software and hardware. This could be one the major constraint for users to adopt Linux operating system. The present information technology integrates hardware and software across many platforms. Therefore, the interface features is a significant factor that influences the customers purchase preference.

6.1 Summary of Key Findings

The findings of the study have been summarized below

- There is a change in the structure of system software market. The dominant position of Microsoft is eroding. The monopoly power of Microsoft is being reduced to a great extent and the market is moving towards triopolistic market structure. This is clearly evident in H-index of market share of three major players. Microsoft, Apple and Linux are considered to be the major players in the market with products Windows, MAC OS X and Linux OS respectively.

- The brand power of all three brands, namely Windows, MAC OS X and Linux has been established in the study.

- Microsoft Windows operating system is widely used operating system across Servers, Desktop/Workstations, Laptops and Desktops at home. Microsoft Windows still dominates its presence across the hardware. Microsoft Windows has maximum presence in home segment, followed by desktops/workstations, Laptops in office and minimum presence on Servers. Linux has maximum presence on Servers followed by desktops/workstations, laptops in office and minimum presence in home segment. Apple Mac OS X has negligible presence on servers, it has maximum presence in home segment followed by Laptops, desktops/workstations respectively. The dominant position of Microsoft can be attributed to its first mover advantage resulting in customer lock-in and critical mass of customers/end users.

- Most of the customer would like to switch over to a new operating system from current operating system except for servers. Most of the customers (nearly 50%) would like to switch over operating system for desktops/workstations and laptops at office. Even the home segment customers would like to switch over (nearly 38%) to a new operating system. However, less number of customers would like to switch over on servers. The servers segment predominantly represents enterprise customers. The servers manage critical applications of the enterprise. Therefore, the switch over under this

segment is dependent on technology strategy and roadmap of enterprises. However, the customers in the other segment namely desktops/workstations at office & home and laptops would like to experience a new operating system.

- Overall performance of Apple Mac has been rated higher than the other two operating systems namely Microsoft Windows and Linux operating system.

- Majority of the customers would like to buy proprietary operating system than open source operating system.

- Interface; ease of use and data security are the critical features of operating system products.

- Overall performance of Microsoft operating system is significantly influenced by ease of use, value for money and customer support. The ease of use could be influenced by the first mover advantage. The first mover in a market establishes standard in the market and Microsoft was successful in establishing the standard features of operating system and the customers are used to and familiar with the standard feature. Therefore, the customers perceive that ease of use is a significant factor influencing overall performance of Microsoft. Value for money feature is measured through the perception customers about number of features provided by Microsoft Windows and cost to purchase Microsoft Windows. The customer perceive that Microsoft Windows provide more number of features and is available at low cost viz a viz the number of features bundled with Microsoft Windows. Many vendors have integrated Microsoft operating system into their hardware or software applications. Since the customer base of Microsoft is huge(more than 80% of market share), the vendors would like to capitalize on the customer base of Microsoft by developing hardware and software applications which are compatible with Microsoft Windows. Along with the integration, the vendors also develop expertise in providing support to Microsoft windows based applications. Microsoft also provides customer support using a specific agreement with customers at a cost. Generally, customers who buy Microsoft also subscribe for customer support by paying additional cost. The

customer support is essential for operating system, since it is a highly technical oriented product.

- Overall performance of Apple MAC OS X is significantly influenced by its facility of providing quick and good customer support. A technical product like operating system needs customer support to derive better utility and optimum benefits. MAC OS X is hardware integrated operating system. Therefore, customers might need more support in order to derive the utility of product.

- Overall performance of Linux operating system is significantly influenced by its feature of supporting more number of applications. Customers perceive that Linux OS had the ability to support many applications software. This could be due to open source business model followed by Linux. In the open source business model, users access source code and further develop applications. Therefore, Linux might provide a feature of supporting many applications. This feature is listed under category of interface.

- Linux has released more number of new versions of operating system followed by Microsoft Windows and Apple Mac OS X. Release of new versions indicate the rate of innovation in the company and also reflects research and development performance.

- The innovation/update factor of Microsoft Windows is significantly influenced by gross profit, income from Windows operating system, expenditure on research and development and the market share.

- The innovation/update factor of Linux operating system is significantly influenced by Redhat gross profit, income from Linux operating system, expenditure on research and development and the market share of Linux operating system.

- Unlike Microsoft and Linux, market share, income, gross profit and R&D expenditure did not significantly influence the number of versions or innovation of Apple Mac OS X.

- Microsoft's gross profit was significantly influenced by market share, market share growth index, Microsoft income and Microsoft R&D. Close to 50% of the revenue of Microsoft is earned through Windows operating system products.

- Over 20% of the revenue of Apple is generated through sale of Mac products. The gross profit of Apple is significantly influenced by income and expenditure on research and development of Mac product.

- Similar to Microsoft, Linux gross profit (gross profit of Redhat is used as proxy) is significantly influenced by Linux market share, market share growth index , number of new versions released, income and expenditure on R&D by Redhat significantly influences the gross profit of Linux operating system.

- Brand choice of operating system for servers is significantly influenced by overall performance of Microsoft Windows and brand preference to purchase Microsoft Windows, Apple Mac and Linux. However, the brand preference of Linux operating system is negatively influencing. The performance of Windows is directly related with perception of suitability of operating system for servers.

- Brand choice of operating system on desktop/workstation is significantly influenced by overall performance of Microsoft Windows and brand preference to buy Microsoft Windows & Linux operating system. The brand equity of Apple Mac OS X does not influence the perception of users about the suitability of operating system on desktop/workstation.

- Brand choice of operating system on laptops is significantly influenced by overall performance and brand rating of Microsoft Windows and brand preference to purchase Microsoft windows and negative influence Linux operating system.

- Brand choice of operating system for desktops/laptops at home is significantly influenced by overall performance and brand preference to buy Microsoft Windows and Linux operating system respectively.

- The interface feature of Linux has to be improved substantially. The data analysis indicated that the lack of interface was negatively influencing brand choice of Linux operating system on hardware. The ease of use and the interface provided by Microsoft and Apple Mac was perceived to be appropriate by users as compared to Linux operating system.

- Brand equity of Microsoft was significantly influenced by Microsoft Windows performance, brand preference to purchase Microsoft Windows and features of value for money and data security. Interface feature negatively influenced brand equity of Microsoft. Users perceived that Microsoft does not support many applications with appropriated interface. The features of customer support, usability did not have statistically significant influence on Microsoft operating system brand equity.

- The brand equity of Apple Mac is significantly influenced by performance, brand preference to purchase and features of data security, interface and value for money. The users perceived that Apple Mac is expensive but provides many features. Usability and customer support did not have statistically significant influence on brand equity.

- The brand equity of Linux OS was significantly influenced by performance of Linux OS, brand preference to purchase Linux OS and features of usability and customer support. The customer support had negative influence on brand equity of Linux OS. The other features namely, data security, interface and value for money did not have statistically significant influence on brand equity of Linux OS.

6.2 Operating System Acceptance Model

Operating system is a technical product which establishes the linkage between hardware and software. Operating system acceptance depends on a few of the major components depicted below:

It is presumed that operating system acceptance model is driven by customer lock-in, performance and availability.

Customer lock-in has been an important component for technology products. Customer lock-in increases the switching cost. It is relatively easy to establish customer lock-in for operating system products. Operating system products can establish customer lock-in through brand equity and vendor partnership. Brand equity's influence has been established in the study. Customers are influenced by the brand value and equity. Once brand equity is established, customers may not be willing to

shift over to other brands of operating system. Vendor partnership is across upstream and downstream. The role of vendor partnership has been elaborately presented in business model analysis chapter. The integration of operating system with hardware (OEM licenses) has been a traditional approach by Microsoft to establish forceful customer lock-in. Operating system is pre-loaded on a hardware and it is shipped to the customer with the pre-loaded operating system. The customer purchases the same hardware and gets used to the interface and other features of operating system. This process results in higher switching costs. In addition to the customer's usage factor, the customer lock-in established by providing exclusive access to a few of the application software by the operating system. These exclusive applications work on a specific platform of operating system. Therefore, the users do not have an option to use a software as desired/ required by them which may not be compatible with operating system.

However, in the recent days, application program interface (API) feature provides seamless interface with multiple applications. The users can use software application as per their preference provided API supports the platform.

The customer lock-in could be easily established for home segment customers. The enterprise customers need high performance of operating system. Therefore, the features of usability, data security, interface, value for money and customer support will have a significant impact on performance of the product. The study revealed that interface, customer support and interface are the most critical features of operating system product. Therefore, if the product performance is better than there is high probability of operating system being accepted by users. The factor of innovation is also a part of the product performance. The innovation is related to the rate at which the product is upgraded on regular basis. The upgradation of software indicates assurance and product reliability. The upgradation of software basically fixes the errors reported by the customers and new version is released. The upgraded software will ensure that the product is error free.

The availability factor is related to the distribution and the access to the source code of operating system.

Availability factor is also influencing customer lock-in. The operating system is made available to customers through OEM licenses or retail licenses. The concepts of licensing play a significant role in this process. The OEM licenses are embedded/pre-loaded with the operating system. The retail licenses are sold through appropriate distribution channel. The licenses are for end users and third party vendors/complimentors who integrate operating system into their software application or hardware. The licenses are made available directly for third party vendors/complimentors and through retailers to end users. (The distribution channels used by three major players have been discussed in chapter 4).

Licensing in software governs the access to source code. The license provides an authorization to use the software however, it does not necessarily provide access to source code. The users may need access to source code so that they can customize the application according to their requirements. Access to source code is provided in open source code model. The proprietary model conceals the source code. The users need appropriate interface features. Even, if the source code is concealed, the operating system must provide interface to work with multiple platforms and applications. This is required by both enterprise as well as home segment users. The major players have to agree to provide an interface feature that will help users to use the application according to their preference and requirement. The interface feature must be standardized by all three major players and have to develop adaptable interface feature that will connect applications and hardware across many platforms. This may be seen as value added activity by the users.

Therefore, the existing competitors or incumbents have to establish customer lock-in, provide a better performing product and making the product available easily could help the organization to establish and sustain market share in system software industry.

6.3 S-C-P Model for System Software Industry

SCP model has been applied and analysed for system software market.

6.3.1 Structure

The structure of the industry is analyzed based on the number of players in the industry. In the context of

system software, the structure is identified through market share of three major players.

The structure in this industry has moving from monopoly to tripoloy in the last six years. The H-index which is an indicator of the competition existing in the market. The competition was concentrated on one player namely Microsoft and now it is challenged by two more major players Apple Mac and Linux. The market structure is moving towards dynamic state as compared to static monopoly stage in earlier years. The changing structure has been analyzed in the study. The changing structure of system software market can be explained through the theoretical back drop of technology adoption lifecycle.

6.3.2 Conduct

The conduct of the organization is explained through business model in chapter 4. Three major players in the market have three unique business models. Microsoft is proprietary stand alone software, Apple Mac is a hardware integrated software and Linux is open source software. The revenue across these three organizations is generated through software license and support. Linux operating system predominantly generated through customer support.

System software market has major two components that explains the conduct of the organizations. They are Upstream value creation and downstream value creation. Upstream vale creation process includes the writing of source code and distribution of source code. The downstream consists of licensing and customer support. The source code of Microsoft and Apple Mac is proprietary and the users do not have the access to the source code, where as Linux operating system provides access to source code.

The users buy licenses of the software to derive the utility of product. Licensing provides an authorization for users to use the software. The licenses are made available through distribution channels for Microsoft and Apple Mac. Linux licenses are governed by GPL and are made available to customers either directly or through package distributors. According to the annual report of Microsoft, Microsoft Windows generated more revenue from OEM licenses. Linux operating system is also made available by sponsoring organization where, the hardware is preloaded with the Linux operating system. These license can be categorized under sponsored OEM licenses.

Customer support is a critical component in the conduct of the organization. Since the product is highly technical, the users need appropriate support and help for users to derive the utility of the product.

6.3.3 Performance

The performance of organization has been summarized below:

Dependent Variables	Ind.Variables	Microsoft Windows	Apple Mac	Linux
Overall Performance of Product	Usability	Yes	No	No
	Interface	Yes	No	No
	Value for Money	Yes	No	Yes
	Customer Support	Yes	Yes	No
	Data Security	No	No	No
Innovation/Up gradation of Product	Gross Profit	Yes	No	Yes
	Income	Yes	No	Yes
	R&D Expenditure	Yes	No	Yes
	Market share	Yes	No	Yes
Profit Formula/Gross Profit	Revenue	Yes	Yes	Yes
	Release of new versions	No	No	Yes
	R&D Expenditure	Yes	Yes	Yes
	Market share	Yes	No	Yes
	Market share Index	Yes(Negative)	No	Yes

Brand Equity	Product Performance	Yes	Yes	Yes
	Brand preference to buy	Yes	Yes	Yes
	Usability	No	Yes	Yes
	Interface	Yes(Negative)	Yes	No
	Value for Money	Yes	Yes(negative)	No
	Customer Support	No	No	Yes
	Data Security	Yes	Yes	No

It has been established that Microsoft, Apple Mac and Linux are three major brands in the system software market. It is identified that the features namely ease of use, data security, value for money, customer support and interface form the basis of operating system products. It has been identified that customer support and value for money are two critical features which are significantly related to performance of Linux and Apple Mac respectively. Microsoft Windows performance is influenced by all features identified in the study except the data security. The gross profit, income, R&D expenditure and market share are significantly influencing innovation at Microsoft and Linux. However, none of the latter factors are influencing innovation/up gradation of product for Apple Mac. Release of new versions had no significant relationship with profit formula for Microsoft and Apple Mac. The market share index was negatively related with profit formula for Microsoft. The market share and market share growth index had no significance with profit formula of Apple Mac. The brand equity was significantly by product performance and brand preference to buy for all three major players in the system software market. Usability and customer support did not significantly influence the brand equity of Microsoft; however, interface had negative impact on brand equity of Microsoft. Customer support is not significantly influencing the brand equity of Apple Mac and the value for money was negatively influencing the brand equity of Apple Mac. Interface, value for money and customer support did not have significant influence on brand equity of Linux operating system.

It has been established that customers prefer to switch over operating system from Microsoft Windows to other operating system. The other major players in the market namely Apple Mac and Linux have to be equipped to tap this wave of switch over. Apple Mac

has been perceived as a product which is expensive but at the same time it provides many features. Therefore, Apple has to continue with the same strategy of providing high quality products to customers.

6.4 Business Policy Analysis

Business policies are the guidelines for routine operations of the business. The policies govern the actions of the firms. Generally, policies aim at providing a framework of how business conducts its operations. The business policies of major players in operating system market namely Microsoft, Apple and Linux are analyzed in the section below. Business policies of product development and distribution adopted by these organizations are analyzed in the section below.

6.4.1 Policies of Microsoft

1. Business Segment

Microsoft has mainly five business segments: Windows & Windows live division, Server and Tools, Online Services Division, Microsoft Business Division, and Entertainment and Devices Division. Operating system belongs to Windows and Windows Live Division.

Windows and Windows live division cater to the operating system requirements for personal computers. Server and tools focuses on server software, software developer tools, services and solutions. The operating system product pertains to the above two business divisions of Microsoft.

2. Product Development and Support Center

Microsoft has operation and support centers in Ireland providing support for Europe, African and Middle-East region, Singapore providing support for India, China and Asia pacific. Fargo, North Dakota, Fort Lauderdale, Florida, Puerto Rico, Redmond, Washington, and Reno,

Nevada provide support to Latin America and North America. The data centers are spread across America, Europe and Asian regions. In order to customize the products to the local needs, Microsoft offers localized products by incorporating user interface, dialogue boxes and language translation applications.

The product development at Microsoft is internal. Microsoft regularly gets information about the changing customer usages and advancement of hardware technology. Based on this input the internal development team adapts the software design. Microsoft sends the required documentation and user guides to all its vendors prior to the release of application. This will ensure that the vendors are aware about new application released and accordingly they will develop their applications that are compatible with Microsoft's new application.

Majority of the R&D is undertaken in Redmond USA. In order to reach and understand the global requirements, Microsoft has set up R&D centers across globe in the following countries Canada, China, Denmark, Estonia, Germany, India, Ireland, Israel, and the United Kingdom. The research and development at Microsoft is protected through copyright, trademarks etc. The software applications' intellectual right is protected through licenses. Microsoft also engages in cross licensing where it will get exclusive access to a new technology which will be incorporated in Microsoft application. Microsoft research is a research wing of Microsoft which works with many top universities in the world to predict and understand the technology trend of the future.

3. Product Distribution

Microsoft products reach customers through OEM's, distributors and resellers and online. OEM's are pre-installed Microsoft operating system hardware. The OEM's are classified under two categories, Direct OEM and system builders. Direct OEM is a result of the direct contract between Microsoft and hardware manufacturers. The companies like dell, HP, Acer and other major computer hardware manufacturers fall under this category. The hardware manufactured by these organizations will have Microsoft operating

system pre-loaded with the hardware. The system builders are small players who source license of Microsoft from local distributors. They do not have direct contact with Microsoft. The licenses are sold through large account resellers (LAR), distributors, value added resellers (VAR), OEM, system builders and retailers. LARs typically sell Microsoft products to large organizations. VAR's serve medium and small organizations. The distribution channel is spread across globe to serve customers. The products are also made available through retailers, exclusive and non-exclusive and distributors resellers. Microsoft also sells products online at www.microsoftstore.com Microsoft provides many licensing options to customers depending upon their requirement. (detailed discussion on licensing options is made in Chapter. 4).

4. Pool of Talent

In June 30, 2013, Microsoft had approximately 99,000 employees on a full-time basis, 58,000 in the U.S. and 41,000 internationally. 37,000 employees were in product research and development, 26,000 in sales and marketing, 21,000 in product support and consulting services, 6,000 in manufacturing and distribution, and 9,000 in general and administration. The employees are not subjected to collective bargaining agreements.

The Microsoft Department of Legal and Corporate Affairs undertake the task of ensuring the compliance across the globe. This department understands and creates awareness about the legal requirements across the globe of operating the business. This department plays a significant role in ensuring compliance and legal indemnity across the globe.

6.4.2 Policy Prescription to Microsoft
1. Customer Support

The present study indicated that customer support is not influencing brand equity. Therefore, it is necessary for Microsoft to strengthen its customer support program. At present it has limited support centers spread across. Microsoft can expand its support team and establish more support centers in the growing economies like India and China. Currently it has support center in Singapore to support operations in India and China.

2. Product Development

User centric product development is required for Microsoft to sustain its presence. The result of the current study reveals that some of the features of Microsoft have to be improved for its product to be accepted. The detailed discussion on features is in strategies and actions section. Users may have to be involved in the development of the product as well. The study indicates that users involvement in product development may be very negligible resulting in some of the features not influencing brand equity and some features are negatively influencing brand equity. The product development centers could be located in the fastest growing economies as well computer literacy. Asia, Middle-east and Africa are the regions with highest growth of computer usage. Therefore, Microsoft may have to establish product development centers in these regions. Microsoft also has to release new versions on time. The release of new versions or software update will have its impact on gross profit.

6.4.3 Business Policies of Apple

Apple operates primarily on geographic basis. The geographical operating segments are Americas, Europe, Japan, Greater China, Rest of Asia Pacific and Retail. Americas segment includes North and South America, Europe includes European countries, India, Africa and Middle east, Greater china includes Hong Kong, China and Taiwan. Rest of Asia Pacific include Asian countries and Australia. Retail segment consists of retail stores in 13 countries and all retail stores provide similar hardware, software and services. Apple has a range of products which cater to the various segments of the customers.

1. Business Segments

Apple product family includes iPhone , iPad , Mac , iPod , Apple TV , a portfolio of consumer and professional software applications, the iOS and OS X operating systems, iCloud , and a variety of accessory, service and support offerings. The Company also sells and delivers digital content and applications through the iTunes Store , App Store™, iBooks Store™, and Mac App Store. Apple makes its products available to customers

through its retail stores, online stores, direct sales force and through third party wholesalers, retailers and value-added resellers.

2. Product Development

The Mac operating system and hardware is designed internally. Xcode is Apple's integrated development environment for creating applications for iOS devices, including iPhone and iPad, and Mac. Xcode provides project management tools; analysis tools to collect, display and compare app performance data; tools to simplify the design and development of user interfaces; and the latest software development kits. Apple's developer program provides required information about technology, documentation, discussion forums to develop applications.

3. Customer Support

Apple provides customer support through two program namely, Apple Care Protection Plan ("APP") and the Apple Care+ Protection Plan ("AC+"). AC+ is applicable to iPhone and iPads and these services are not available in all countries. APP is a fee based customer support program generally for a contract period of two to three years. It provides phone support, hardware repairs and web-based support services.

4. Product Distribution

Apple prefers to sell its products directly by operating its own retail stores across the globe. The organization also strongly believes in engaging direct sale force to talk to customers and make customer understand the value addition and utility delivered by Apple products. Apple also sells third party applications as well along with its products. The Company also sells its products and third-party products in most of its major markets directly to education, enterprise and government customers, and consumers and small and mid-sized businesses through its online and retail stores. Apple sells products through its non-exclusive distributors and retailers. They sell Apple products as well as its competitors products.

Apple Mac OS is hardware integrated operating system. The hardware is generally manufactured through its outsourcing partners in China. Apple works with selective outsourcing partners and rely on only few of

its outsourcing partners for manufacturing its products.

Apple holds patents a few on its hardware devices and applications such as iPhone, Mac iPad etc. Some of components in Apple products have incorporated the third party patented technology.

Apple offers limited part warranty to its products. Basic warranty of its products is one year and can be extended through APP or AC+ support programs.

5. Pool of Talent

During September 28, 2013, Apple had approximately 80,300 full-time employees and an additional 4,100 full-time temporary employees and contractors. Approximately 42,800 of the total full-time employees were engaged in the Company's Retail segment.

1. Customer Support

Apple Mac has to provide better customer support. The study revealed that customer support is not influencing the brand equity but it is significantly influencing the overall performance of product. The customer support provided by Apple may not meet the expectations of customers. Therefore the current support programmes have to be revised to meet the customer expectation. The present policies of customer support focuses on phone and web support, however, a physical onsite may positively influence the customers. Therefore, in addition to the current focus areas, Apple may also focus more on physical onsite support services.

2. Product Development

Apple Mac needs to have effective R&D policies which will release product updates/revised versions on time. This will have significant impact on gross profit of organization. Therefore, R&D centers may be expanded to growing economies.

BOOK REVIEW
T. Muralidharan: Your Right First Job, Rupa Publications India Pvt. Ltd., 2015
New Delhi-110 002
PP 1 – 153 + XI
Reviewer: N.S. Viswanath

This book makes a fascinating reading for anyone who gets the access. The Right First Job (RFJ) is always difficult for any job aspirant. If at all anyone has got it, that is purely by chance. The author describes RFJ, the personality and the industry in the Indian context. The characteristics of first job entrant have been described. This is used to make people ready with their resumes. Some elements of written communication are presented. The author describes in greater detail in need for effective participation in group discussion. Further, the interview process in any setting is lucidly explained. Special characteristics of technology, interview and the contents of an offer letter are enumerated with ease. The adaptability of a job extract in the first three months is detailed with human touch. The book also provides a plausible solution for the person who would not get RFJ. The author deserves a special credit for his language and effective communication with any reader. This book is a good text recommended for people who would like to reduce the uncertainties. This book is a good collector's item in a household.

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