IJBIT

International Journal of Business and Information Technology

Table of Contents

1

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Developing Education Services in India as a Fulcrum for Creating Niche as Global Academic Hub

Prof. (Dr.) A.Q.Khan

Professor in Finance, Accounts and International Business, Department of Commerce, AMU, Aligarh, India ;
Coordinator, PGDPM, Centre for Distance Education(CDE), AMU, Aligarh.
abdulaqkhan@rediffmail.com

Abstract— Education is the backbone of a nation and one of the key indicators of a countries growth and development. An effective higher education sector provides the country with a globally competitive workforce which facilitates economic growth and development. The higher education system in India has grown in a remarkable way, particularly in the post-independence period. Education as a service industry is a part of globalization process and under the umbrella of GATS, which has removed all trade barriers in higher education and makes it a global commodity. The WTO negotiations and commitments made by the government of India in 1995 have had its positive impact on the service sector where India has its core competence. The objective of GATS & WTO negotiations is the expansion and progressive liberalization for that purpose they maintain a multilateral framework of principles and rules for promoting growth of all trading partners including developing countries.

It is a fact that increased demand led to the significant changes in supply. The progress of education sector in India is a result of a complex mix of supply side and demand side factors. Today with 250 universities, and approximately 8 million students, India has the world's second largest system of higher education. Emergence of WTO with its four modes of services provides huge opportunities for the growth of education sector. Global trade in higher education is estimated to be more than US$ 50 billion a year, which reveals that India is still major importer of the services whereas US, UK, Australia, Canada, France and Germany are the major exporter of this service. India is enjoying its competitive leverage on account of the provision of its propitious, exuberant, bonanzic quality and cheap higher education. It is also said that the post liberalization, globalization era has had a major role in the success story of the Indian economy. The booming higher education sector well buffeted by the professional services sector, it is now sanguine enough to maintain and sustain the quality of higher education by providing international presence and global competitiveness.

The present paper makes an earnest attempt to analyze the impact of each mode of GATS for the higher education in India emphasizing the comparison of present scenario with future agenda for global competitiveness. The paper has further discussed the issues regarding whole gamut of aspects of trade in higher education services including its problems, prospects and challenges for traditional institutions by private sector as well as foreign players. In a nutshell, the paper could bring out a set of recommendations, and strategies for enhancing higher education services in India to compete with the global giants in education service sector.

Keywords—WTO, GATS, Higher Education, Global Competitiveness

1.   Introduction

Antecedently, emphasis was inclined towards agriculture and manufacturing sectors, but with the convergence of new technologies they have lost importance in comparison to service sectors. It has been recognized that India is maintaining growth rate more than 9% and is targeting to double this growth rate in future. India is mainly focusing on service sectors for its growth and expansion. Education provides quality manpower which is very essential for global competitiveness. Service sector is the main determinant in the growth of GDP in India.India's recent growth has been led by the export of education services with well buffeted background of huge quality manpower.The growth of service sectors is higher than the growth in agriculture and manufacturing sectors.With the emergence of global business opportunities, service sector has got a gateway to grow at a faster rate than the economy as a whole.

Education plays an eminent role in framing socio-economic setup of any country. Education in India is considered to be a governmental activity, but over the last decade a whole new education industry has grown, alongside the fringes of our formal education system (Banga Rashmi (2006)). The current scenario of university industry interface has changed

2

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

the formats of tutorials and coaching classes, on-line education programmes, distance education, education consultancies and study programmes in India and abroad.The post WTO-GATS phenomena have encouraged many business organizations to invest in education and conceptualizing to earn profit. India has to be discussed under the challenges and prospects of higher education. The research paper therefore critically examines the global competitiveness of Indian higher education vis-à-vis the General Agreement on Trade and Services (GATS). In order to identify the research gap and to carve out the scope and objectives of the study review of literature is presented in the following paragraph in a compact and significant manner.

2.   Review of Literature

There are few studies which has been conducted in the area of education especially higher education.The post liberalization, globalization regime has had a significant impact on a wide range of interdisciplinary studies.The prominent studies includes as follows

The study of Satish Y. Deodhar (2001), on GATS and Educational Services:"Issues for India's Response in WTO Negotiations", and Satish Y. Deodhar(2002),"Managing Trade in Educational Services:Issues for India's Response in WTO Negotiations", opine that India's commitment with GATS in education does not bear any fruit but it further points out that without WTO commitment India cannot get the pace of growth which is indirectly beneficial for other nations.The papers and articles of Razib Ahmad(2003)   "10 reasons why India should allow FDI in education sector",Jane Knight(2003),"The Observatory on Borderless Higher Education",Jane Knight(2003) "GATS,Trade and Higher Education Perspective2003-Where are we?",Mrinalini Shah,(2004),"Education Sector, Destination India: A New Trade in WTO Regime",and Samina Rafat and Shikha Sahai(2004) "WTO-GATS Regime and Future of Higher Education in India" all have discussed about globalization of higher education and delocking opportunities for already globalised Indian service sectors.The service sector of India is dependent on India's knowledge resources and that too attained through the organized education system. Another important study of Devesh Kapoor and Pratap Bhanu Mehta (2004), on "Indian Higher Education Reform: From Half -Baked Socialism to Half- Baked Capitalism" points out the limitations of the post liberalization, globalization era of higher education. The study concludes that now India has not made any commitments in any of the GATS negotiations for education.

The paper of Khan AQ, and SM Anas Iqbal, (2005), on "Privatization of Higher Education for Globalization under WTO Regime: A Case of India", has focused on the current statistics of public private investment in higher education and has made a comparison on the enrolment of students in both the pattern and has shown the increasing private participation in higher education than that of public participation. The Government of Australia (2005) "Australia's Competitors in International Education" is an update of governments education services for global competitiveness is an overview that India is the future destination of the Australian education service providers. The report also finds out that India is next generation competitor for Australian higher education services.

Rupa Chanda's,(2004)study on GATS, Higher Education Services in India,and the study of Shashi K Shrivastava,(2006) on Higher Education System in India:have the same opinion that India has the future in global competitiveness under common platform of GATS.The paper of Sanat Kaul,(2006),on "Higher Education in India:Seizing the Opportunity",points out the factors of the four modes of GATS and its implication for Indian Education Services.The paper further emphasizes on the necessity of negotiation for India and how long it will be beneficial for Indian economy as well. Agarwal's Pawan's (2006) study on higher education in India: the need for change of the higher education in India is a crucial evaluation of the present scenario.It covers all the issues regarding FDI, GATS, WTO and privatization of the sector.The working paper on higher education suggests for further reforms to exploit the market through the advantage of mass potential of knowledge resources and quality manpower.

3.   Research Gap and Scope of the Study

The studies mentioned above have focused on the future benefits of higher education.The studies somewhat having a common opinion that Indian education services should be commited with WTO and most of these issues described its importance theoretically.The analytical framework of higher education services in the present study is a bit different from the past studies.

The important aspects of higher education is being focused in the present study.India is still in a nascent stage in higher education.The study also tries to focus on the future prospects and challenges of higher education for global competitiveness under GATS environment.The present scenario of higher education in India and its implications after international commitments is based on the following objectives.

Objectives of the Study
- To appraise present scenario higher education services in India in post and pre liberalization regime.
- To evaluate the structure of Indian higher education system with special reference to private-public participations.
- To find out government's intervention in facilitation and promotion of the future higher education perspective.

3

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

- To analyze the challenges and future opportunities of Indian higher education sector for its strategic management.
- To make a SWOT analysis of the present scenario of Indian higher education for global competitiveness.
- To justify why India need to go globally (i.e; making cross country comparison of the Indian higher education with global standards).

4.   Higher Education Services in India: A Bird' Eye View

Education in India is considered to be a governmental activity, but over the last decade a whole new education industry has grown, alongside the fringes of our formal education system.The current scenario of university-industry has opened many avenues for the students to get higher education through various sources like tuitions, coaching classes, distance education, on-line study programmes, education consultancies for various courses in India and abroad.The WTO-GATS phenomenon have encouraged many entrepreneurs and business houses to invest in education as a result, conceptualizing education services to develop as a profit motive industry has emanated (Satish Y.Deodhar , 2001).

A large share of education expenses are financed by state budgets, most of which are in the form of recurrent expenditures. The Kothari Commission Report (1964) and the NPE (1986) recommended that 6% of GDP should be provided to education. Overall around 3.7% of GDP has been invested in the last couple of years in education sector within which 17% was on elementary education alone. On an average, around 50%-55% of all education spending is on elementary education and around 11%-12% invested in university and higher education. India has not been able to maintain high standards of education especially in knowledge and technology.

The growth of higher education in India has been phenomenal. Starting with 1950-51, there were only 263,000 students in all disciplines in 750 colleges affiliated to 30 universities. This has grown by 2005 to 11 million students in 17,000 Degree colleges affiliated to 230 universities and non-affiliated university-level institutions. In addition, there are about 10 million students in over 6500 vocational institutions. The enrolment is growing at the rate of 5.1 per cent per year. However, of the Degree students only 5 per cent are enrolled into engineering courses, while an overall 20 percent in sciences. The demand for professional courses is growing rapidly (Sanat Kaul, 2006).

Over the last decade education is growing towards success. The progress of education sectors in India is improving at a phenomenal rate as a result of a complex mix of

Table 1: Growth of the recognized Specific Higher Education Institutions (HEIs) in India during Post Liberalization Regime (1990- 2010[1])

Liberalization Regime (1990-20101)	Colleges for general education	Growth	Colleges for professional education @	Growth	Universities / Deemed Univ./Instt. Of National Importance	Growth	Total	Total Growth
1990-91	4862	0	886	0	184	0	5932	0
1995-96	6569	7.9	1354	10.1	226	3.2	8149	8.1
2000-01	7929	1.9	2223	4.7	254	4.1	1040	2.5
2001-02	8737	10.2	2409	8.4	272	7.1	1141	9.7
2002-03	9166	4.9	2610	8.3	304	11.8	1208	5.8
2003-04	9427	2.8	2751	5.4	309	1.6	1248	3.4
2004-05	10377	10.1	3201	16.4	407	31.7	1398	12
2010*	15300		4200		500		2000	
Mean	8152.4	5.4	2204.85	7.6	279.43	8.5	1063	5.9
CAGR	5.4		9.8		4.3		6.2	
SD	2360.1	2.8	818	7.7	79.4	7.5	3232.	3
CV%	32.7	53.9	44.1	83.3	31.9	132.9	34.6	51.4

supply side and demand side factors.The country has made tremendous progress in improving elementary education provision and increasing participation. Huge opportunities for supply is generating with the increasing demand, besides the periphery of our formal education system. Many business organization have been encouraged to invest in education as there is a need of more and more educational institutions.To make India one of the major knowledge economies in the world in the near future, it is important to continue the current level of focus and commitment, along with the right amount of resources in an improved governance and service delivery framework.

With the increase in educational institutions the need for professionals and experts is increasing but because of inadequate supply higher education services is being commercialized. The higher education services in India have a prospective future in the post liberalization, globalization era. India has growth prosperity where in the total world about 140 million students have enrolled in higher education in which India has a share of 10% of the world and it is expected that in near future there will be a sharp rise in movement of international students across countries. This will provide variegated opportunities in education services especially for trade in higher education services for India and this will help Indian institutions in placing their position without full commitment. (Mrinalini Shah, 2004). The present scenario of Indian higher education is such that it has a standard growth in all the aspects and in the near future it can avail the fruits of liberalization only after making the needful commitments and accepting the approved proposals from the developed countries.

Table 1 and 2 pertaining to the growth of higher education services in India shows rapid growth in Indian higher education institutions and enrolments. Before Independence, the growth rate of educational institutions was very nominal but after 1991, it has grown in a remarkable way. The total institutions and enrolments is expected to reach 20000 and upto 2010 it will reach 24000 with 15 million enrolments as a whole. Both pre and post liberalization regime has a classical view but the growth of post liberalization is more in comparison to pre liberalization in terms of enrolments.Here the problem arises to finance the higher education without effecting the budgets of both central and state governments. Post liberalization, globalization led to the introduction of new and emerging sources of investment. Without making commitments with WTO many domestic and foreign investors have been deep-seated in the structure of higher education. For ensuring quality expertise education within the country it is important to make international co-operation and negotiations.

The present scenario of global competitiveness necessitates analysis and investigation of private commitments in higher education in order to know India's performance against global standards through private and public combination. The maximum opportunities for students for higher education are possible because of the implication of WTO negotiation which assures privatization of the sector and equal opportunity for the public.

In the ancient and medieval period India's position in higher education was incredible. Even then the cultural heritage of ancient Indian education system gained much popularity in the world. After Independence the students from third world nations were dependent on Indian universities due to cheap and quality education especially from Iraq, Iran and Middle East, North and West Africa and Central Asian countries.

It is observed that the foreign students are influenced and attracted towards other developed countries because the post liberalization regime has witnessed sudden increase in the fee structure and other expenses without any infrastructural improvement. Hence, there is a need to improve the infrastructure and quality of educational institutions which is possible through planned funding. The post WTO-GATS regime does not only promote privatization of education but also aims to derive maximum benefit from global educational ambience.

Table 2. Growth of Total Higher Education and Enrolment in India since Independence (1947-2010)

Year	No. of Institutions	Growth	No. of Students '000'	Growth
1947	616	0	250	0
1950	770	25	333	33.2
1960	2154	179.74	666	100
1970	3700	71.77	2125	219.07
1980	5100	37.84	2750	29.41
1990	6000	17.65	4333	57.57
2000	12750	112.5	8750	101.92
2005	18000	41.18	10420	19.09
2010[1]	**24000**	**33.33**	**15000**	**43.95**

Education Services in Post WTO-GATS Regime

Government of India has made WTO negotiations and commitments in 1995, the purpose of which was to promote overall economic growth including that of developing countries. The WTO-GATS negotiations also maintain a multilateral framework of principles and rules with the objective of expansion and progressive liberalization of trade.

GATS have classified the total services (161) into 12 different sectors and education is one amongst them. Commitments of GATS are flexible in nature i.e; any nation can make commitments in any sector of its own choice that is without any compulsion the nation can make use of their selection criteria where

---

[1] *Shashi K. Shrivastava, (2006) *Projected figures*

5

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

they have their core competitiveness. It enabled the nations to enjoy the benefits of the commitments, striking a balance between commercial interests and regulatory public policy concerns.

Out of the total services the education services have been further divided into five parts as Primary, Secondary, Higher, Adult and other education services.The least commited sector in GATS is the education sector which has only 48 members as on August 2007 whereas in tourism all the member countries are commited and financial and business services obtained maximum weightage. Rapid changes are most apparent in the area of higher education, which normally refers to post-secondary education at sub-degree and university-degree levels. GATS has made clear definitions on the services in four modes, all the four modes are relevant in education services especially in higher education services.

- **Mode 1: Cross Border Delivery:** Mode 1 is already in practice in India without any negotiation. Here the consumers need not to move, the services itself cross the border. It is possible through internet (i,e; on-line courses), distance- education services, tele-system etc. It also comprises sale of paperback editions of books and educational CDs or DVDs.

- **Mode 2: Consumption Abroad:** Under this mode the consumer or student travels to the country where the service is supplied. One glaring instance of this mode is that an Indian student studying abroad at his own expenses. This mode influence development of technology

and movement of students across the border for higher education.

- **Mode 3: Commercial Presence:** Under this mode the service provider establishes his commercial presence across the border through appropriate provision such as Franchises, Off Campus, Collaboration, FDIs in Indian institutions etc. Indian has not permitted foreign higher education institutions in India, but in order to compete domestic educational institutions with the foreign one India should allow it. Import-competing institutions should be developed in order to improve campus facilities. With the HRD Ministry contemplating to allow establishing of foreign universities in India we might see campuses of overseas universities flourishing in india

- **Mode 4: Movement of Natural Persons:** This mode refers to the movement of natural persons temporarily across the country for providing educational services, for eg. Foreign faculty and scholars teaching in India or Indian teachers teaching abroad on visiting arrangements. For subsequent negotiations on trade services Indian authorities should put forward their own proposals and select commitments in their best interest instead of accepting proposals and commitments made by other nations. This should generate adequate data related to trade for educational service providers and users. Based on that, government can easily handle various sectors of educational services and can also ensure critical observation on India's

Table 3. Selected Country Wise Gross Enrolment in Higher Education and GNP/Capita (Current and Projected up to 2011)

country	Enrolment 1991	Enrolment 2001	Estimated Enrolment 2011/	GER (current)	GNP/capita US$ (current)	Growth (%)	GNP/Capita US$ (2011*)
USA	13.71	15.93	**18.51**	81	34280	16.19	39829.93
China	3.82	12.14	**38.58**	13	890	217.8	2828.42
Japan	2.9	3.97	**5.43**	49	35610	36.9	48750.09
India	**4.95**	**10.58**	**22.61**	**11**	**460**	**113.74**	**983.20**
UK	1.26	2.24	**3.98**	64	25120	77.78	44658.34
France	1.7	2.03	**2.42**	54	22730	19.41	27141.89
Italy	1.45	1.85	**2.36**	53	19390	27.59	24739.70
Brazil	1.54	3.13	**6.36**	18	3070	103.25	6239.78
Russia	5.1	8.02	**12.61**	70	1750	57.25	2751.88
Canada	0.84	1.19	**1.69**	58	21980	41.67	31139.07
Indonesia	1.59	3.18	**6.36**	15	690	100	1380.00
Philippines	1.71	2.47	**3.57**	31	1030	44.44	1487.73
Australia	0.49	0.87	**1.54**	65	19900	77.55	35332.45
Malaysia	0.12	0.56	**2.61**	27	3330	366.67	15540.11

6

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

competitiveness.

Global Competitiveness in Higher Education: Niche for India

After 1991, India's knowledge resources have been growing at a faster rate which results in the growth of higher education. Globalization has led higher education to be recognized all over the world. To some extent India has achieved its highest targets but still there is a huge gap to be filled which are the key indicators of global competitiveness such as R&D, high-tech exports etc.

Here, the need arises to find out such gaps to be filled in order to meet out global standards by framing planned policies.India is still far away from global standards which oblige it to execute planned policies for the development of higher education.Tables and figures indicate that India can compete globally through its structured plans and policies and better utilization of its knowledge resources. The statistics as depicted in the table also emphasizes the comparative analysis of the global competitiveness of higher education with the selected global leaders in this field.

Table 3 represents Country Wise Gross Enrolment in Higher Education after 1991 to 2001 and estimated enrolments of 2011 along with the GNP/Capita US$. GER of 2001 would increase to 23 in 2011. This shows an emerging trend of Indian higher education services, but in terms of per capita expenditure India is still lagging behind. GER of USA is highest but it does not have any future potential in comparison to other developing countries like Malaysia, China and India. It is noticeable that other nations such as Brazil, Australia, Indonesia and UK are growing at the same pattern where UK has already overblown in marketing their higher education sector.

Table 4. Gross Enrolment Ratio of Top Ten Countries

Country	2007	2011²
India	13.74	**23.70**
Australia	75.72	**84.55**
Canada	53.13	**44.12**
China	40.55	**351.61**
France	61.38	**90.83**
Germany	54.67	**74.37**
UK	66.35	**78.51**
USA	95.55	**167.81**

Table 4 represents Gross Enrolment Ratio of selected countries and India is one amongst the top ten countries. In the post liberalization regime India and China have a growth rate of 114% and 217% respectively, in comparison to other developed countries.China is leading India in the overall growth.It is evident from the table that USA, UK and Australia are the leaders in GER due to their population advantage but India and China are still managing to maintain their growth in GER.

² *UNESCO Statistical Year Book 1998, And Institute Of Statistics 2005 in Pawan Agarwal *Projected*

Table 5 represents the contribution of private sector to the higher education in selected nations. It is seen that India is emerging in the scene of global higher education statistics. In the no. of institutions India stands 42% and 30% respectively, which is good but not impressive in comparison to Brazil which stands 88% and 70% respectively. In India the public expenditure for higher education is still taken as a responsibility by the government and not as a segment of innovativeness where concerted efforts are required.

Table 6 represents country Wise International PCT applications. Application of PCT from India is the major indicator of science and technology education. It has been seen that India's share of contribution towards science and technology through variety of researches is very low. The last five years experienced declining trend in India's PCT applications where the US and Japan are leading India by their fruitful researches. The share of Indian PCTs in the world is only 0.5%. India's growth is 241% which is positive but still needs improvement. India should move ahead to improve scientific researches and technologies, so that it can compete against global standards.The future policies in science and technology should be so framed that it can be used to exploit the issues in the new and emerging spheres of higher education.

Table 7 represents Percentage Share of World Reputed Publications of Major Countries. It shows that India is enjoying special status in its publication sphere but in scientific publication it needs improvement. Indian publication has got a considerable position in the post

Liberalization, globalization era but still India is lagging behind China. In order to meet out higher education standards India should go for global commitments. The statistics regarding global standards of higher education shows that India is growing but share of Indian publications are decreasing.

7

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Table 5. Contribution of Private Sector to the Higher education in selected Countries[1]

Country	All Higher Education Institutions				Universities			
	No. Of Institutions		Enrolment		No. Of Institutions		Enrolment	
	Private % Total	Year	Private % Of Total	Year	Private % Total	Year	Private % Of Total	Year
Argentina	42.9	2000	25.7	2000	55	2005	14.4	2005
Brazil	88.9	2003	70.8	2003	51.5	2003	56.7	2003
Chile	93.3	2000	71	2000	75	2000	58.9	2000
China	39.1	2002	8.9	2002	0.6	2002		2002
Germany	29.5	2003	3.7	2003	24.8	2003	1	2003
Hungary	54.4	2004	14.2	2004				
Japan	86.3	2000	77.1	2000	73.7	2000	73.3	2000
Kenya	34.2	2000	9.1	2000	70	2000	19.3	2000
Malaysia	92.2	2000	39.1	2000	41.7	2000	7.5	2000
Mexico	69.1	2002	33.1	2002	72.7	2002	41.8	2002
Moldova	44.5	2003	20	2003				
Magnolia	64.2	1999	26	1999	27.2	2003		2003
Philippines	81	2003	76	2003			8.3	
Poland	66.8	2001	29.4	2001	6.3	2000	3.5	2000
Portugal	64.2	2003	28.5	2003	37	2001	19.4	2001
Romania	56	2001	23.3	2001				
Russia	37	2000	12.1	2000				
Thailand	68	2000	19	2000	48.9	2001	16.8	2001
Uruguay	42.9	2004	10	2004	88.9	2000	12	2000
USA	59.4	2000	23.2	2000	74.6	2000	35.3	2000
Venezuela	56.6	2004	41.3	2004	54.2	2004	21.2	2004
India	**42.95**	**2005**	**30.77**	**2005**	**31.01**	**2005**	**10**	**2005**

Table 6. Country Wise International PCT Applications Patent International Applications

Country	PPP-GDP 20	2000	2001	2002	2003	2004	2005	2011[1]	%Sha	%Growt
USA	12278	20.1	38007	43055	41292	41023	43464	45111	**53546.8**	33.6	18.7
China	9412	15.41	784	1731	1018	1295	1706	2452	**7669.9**	1.8	212.8
Japan	3911	6.4	9567	11904	14063	17393	20223	25145	**66081.1**	18.7	162.8
India	**3633**	**5.95**	**190**	**295**	**525**	**764**	**723**	**648**	**2210.3**	**0.5**	**241.1**
Germany	2522	4.13	12582	14.31	14326	14682	15235	15870	**20012.1**	11.8	26.1
UK	1833	3	4795	5482	5376	5205	5041	5115	**5457.7**	3.8	6.7
France	1830	3	4138	4707	5089	5172	5181	5522	**7366.3**	4.1	33.4
Italy	1668	2.73	1394	1623	1982	2163	2196	2309	**3823.7**	1.7	65.6
Brazil	1577	2.58	178	173	201	219	281	283	**365.1**	0.2	29
Russia	1576	2.58	533	557	539	586	519	500	**469.0**	0.4	-6.2

Table 8 represents Science and Technology indicators of the major economies of the world. The indicators of science and technology reflect the technological capability of a country. Indian education system needs to keep pace with the Scientific and Technological development for global competitiveness. With the explosive growth of higher education services along with the development of Science and Technology competition has become a hallmark of growth all over the world and further commitments with global leaders can lead to the capitalization of India's key resources.

Table 7. Percentage Share of Well Reputed Publications of Major Countries

Years	India	Growth %	China	Growth %	S. Korea	Growth %	Brazil	Growth %
1995	1.9	-2.6	1.5	8.6	0.8	50.0	0.8	23.1
2000	1.8	-5.3	3.3	30.0	1.6	10.7	1.3	4.2
2005	2.3	2.0	5.7	12.9	3.1	18.1	1.8	8.9
2011[1]	4.58	3.96	11.48	25.83	6.13	36.15	3.63	17.89

Table 8. Science & Technology Indicators on Two Major Developed and Two Fast Growing Economies (2006)[1]

Key Indicators		USA	JAPAN	CHINA	India
Expenditure on R&D	As percentage of GDP Percentage Performed HEIs	2.60 16.8	3.15 13.9	1.31 10.1	0.81 2.9
Research manpower	Researches/million Technicians/million Rank Growth Competitive Index	4484 -- 2	5287 528 12	663 -- 49	119 102 50
Patent	PCT application	45111	25145	2452	648
Publications In reputed Journals	No. of papers rank No. of citations rank	1 1	2 4	9 18	13 21
High tech Exports	Volume US$B Payment in US$B	216.02 32	124.04 24	161.6 30	2.84 5
International Std. HEIs	HEIs in Shanghai's Top 500 University	161	36	18	3

The major challenge of Indian economy is R&D, where India is still struggling. The developed nations are even spending their huge investments in R&D where India is far behind of them and in comparison with China which is real competitor for is also framing their policies according to the needful research and developments (Agarwal Pawan, 2006).Indian universities are not counted even in 500 best global institutions and there are only 3 Indian institutions in Shanghai's index which lies at 250-300th position. India is considered as one of the weak nation in high-tech export where China and other developed countries are excelling in this aspect.

India's patent rights are only 648 where US had more than 45000. It shows that India is far behind US and it cannot excel with the existing level of standards. India has got expertise in publication and in order to get the desired proficiency in publication it is necessary to find out new and emerging sources, which is not possible without further commitments with GATS. India has to utilize the capitalization of resources in an effective manner so that it can fetch growth in higher education and can go for global competitiveness.

5.   Prospects and Challenges of Indian Higher Education under GATS

India's exuberant knowledge provide future benefits to service sector as well as education sector, which provides real strength to Indian IT and ITES companies. Today India has the world's third largest number of technically and professionally trained manpower. Professionalists and Technologists educated in India are in demand all over the world which is the key resource for global competitiveness in all the aspects of growth measures.

"India's higher education policy of the 1950s, which envisaged schools of excellence, especially in technology and sciences, has finally paid off rich dividends. The creation of IITs, IIMs, Schools of Science, Schools of Law, a large number of advanced training and research institutions have now been well and widely accepted. Doctors trained in India have been the backbone of the British Medical Service for many decades. Indian scientists have found positions of

9

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

importance in research laboratories of the US and other developed countries. But it was the IIT engineers who have finally struck gold during the dot.com boom of the 1990s and brought laurels and bore testimony to Indian competence abroad. Of about 140,000 graduates of IIT so far, roughly 40,000 have gone to the US. They have been given the credit of creating 150,000 jobs and $80 billion in market capitalization. It is said that when a new IT company is launched, investors inquire if there is an Indian in it. Further, 55 US Members of the House of Representatives co-sponsored Resolution 227 honouring the economic innovation attributable to graduates of the Indian Institute of Technology" (Sanat Kaul, 2006).

India is rich in off-shoring knowledge and manufacturing sectors. Indian manufacturing sectors can become competitive in specific areas through skill upgradation. Technological changes provide India a unique opportunity to mobilize its human resources. Mobility of skilled work and workers and opportunities in IT/ITES sector (require 8.8 million people-direct/indirect by 2010) are very important for the growth of service sectors.

On the basis of the opinion of WTO and GATS commitments the standard of the rich and poor for availing higher education services are to be compared. In the new global realities of competition the objective of commitments should be emphasized to provide higher education to the poors through scholarships on merit basis in order to bridge the gap.

India looks to liberalize trade in educational services and proffer precise commitments in its proposal for dialogue. Indians must understand that they are not trading-off their privileges and pedals on concerns that are essential to their nationhood, cultural philosophy and protection. There are many exemptions and preserves allowed in GATS which can be successfully utilized to protect Indian interests. Article II.1 initiates the Most Favored Nation (MFN) clause by mentioning that a country will truce another member country treatment which is no less constructive than that it accords to any other country. However in the same breadth, Article II.2 allows countries to negotiate exemption from this commitment and those exemptions must be mentioned in the schedule of commitments made. For example, India can give special treatment to students of SAARC and NAM countries without giving the same special treatment to others, provided this is mentioned in the commitment schedules. Article XII.1 allows countries to take measures to control the balance of payments problems (BOP). This may include restrictions on transfer of payments and foreign exchange until the BOP situation improves. India does not face BOP problem at this time. However, if it does in the future, India can

exercise the option of restricting trade in educational services to prevent flight of foreign exchange from the country. Moreover Article XIV allows measures to protect public morals, maintain public order and national security, and prevent fraudulent practices. For example if Indian authorities believe that some of the educational material coming into the country is not according to the morals and values of this land, restrictions may be imposed to protect public morals. In fact, Article X even provided for emergency safeguard measures as well (Sanat Kaul, 2006).

6.   Suggestions and Conclusions

India should endorse the US view of including educational testing services to be included in the country commitments. However India should press for phased liberalization in order to suit its needs. A lead-time of almost one decade is necessary to upgrade our testing services to compete effectively with foreign suppliers in the domestic market, and gather market intelligence to focus an adaptation of our services for the export market. India may commit to all modes of trade in higher education as well (Joshi M. M. 1998).India should carve out niche market for its knowledge programmes. In order to compete with foreign institutions based in India, the infrastructure of our import competing institutions should be upgraded. Almost one decade time period is required to to upgrade our priority institutions in terms of infrastructure and facilities. Such is the gestation period estimated due to the poor state of present facilities

Globalisation has its positive impact on the national higher education institutions. It leads higher education towards international involvement. The focus of Indian education sector has been shifted from the public sector to the private sector. Education has a huge global market in which students, teachers, non-teaching employees constitute resources for profit generation.

India may negotiate with other countries for their commercial presence in secondary education. Private high schools of CBSE standard have got recognition to be exported worldwide, and nearly more than 100 already exists in other countries. Similarly, US schools exist in India and elsewhere that are primarily meant for non-resident US citizens. The global trade professional services are increasing rapidly, so India should propose for a specific commitment on export of professional services under the trade mode-'movement of natural persons'. This is essential for the global recognition of academic and professional qualifications.

Indian authorities must request for assistance from UNESCO and/or other world bodies for improving educational infrastructure in the country. This has been done in other WTO agreements such as Agreement on sanitary and phytosanitary measures (SPS) and Agreement on Technical Barriers to Trade (TBT). Moreover such assistance must be provided in a structured, time-bound fashion. The motivation for such request is that developing countries such as India will find it extremely difficult to cope-up with abrupt issues that will arise if commitments were to be adhered-to immediately after an agreement is reached. To compete actively with developed nations, to upgrade our facilities and infrastructural needs, developing countries must have conversion time of almost one decade, in which complete implementation of the agreement can be undertaken (NIEPA 2001).

India should make necessary changes in the existing system so that Indian higher education system can face the onslaught of global challenges. Authorities must develop a database of information on all categories of education regarding number of educational institutions, their enrolments (domestic & foreign), faculty strength, financial sources and quality and accreditations.

Further, market intelligence regarding situation in other countries be sought through our diplomatic attaché in the Indian embassies abroad. Existing reputed educational testing services will have to be modernized. To compete with testing services such as say, GRE, GMAT, and TOEFL, our reputed testing services such as CAT, MAT, IIT-JEE and others must be upgraded and modernized. A committee must be constituted to suggest upgradations and implementation of the suggested upgradation. The upgradation will be in terms of year round availability of the testing service, computer-aided and internet-based testing, and universal acceptability of the tests by various academic institutions including foreign institutions. Moreover, assessment will have to be done whether or not private providers can take on the mantle of running such services for its efficient functioning (Khadria, B. 1999).

Out of the 12 counts of General Agreement on Trade in Services, education is the most important one which is a boon for India as it has vast resources of knowledge and human capital but unfortunately education services is the least committed count under GATS. In India without making further commitments to GATS all the four modes are in practice. If India is accepting them formally it may be more beneficial where India's real challenges can be converted into opportunities. There is a wide scope for further development in desired manner. Wherever the country is strong it can be marketed in cost effective manner. High quality with low cost is the strength of India's competent sectors, then why it can't be in education services especially in higher education.

References

[1] Agarwal Pawan (2006) "Higher Education in India the Need for Change", Working Paper No.180, Indian Council for Research on International Economic Relations Working Paper No. 180.
Australian Government, 2007, India's Services Sector: Unlocking Opportunity", Economic Analytical Unit Department of Foreign Affairs, www.dfat.gov.au/eau

[2] Banga Rashmi (2006) "Critical Issues in India's Services-led Growth", INRM Policy Brief No. 2 (India Resident Mission) Policy Brief Series, Asian Development Bank, Manila.

[3] Devesh Kapur and Pratap Bhanu Mehta, (2004), Indian Higher Education Reform: From Half-Baked Socialism to Half-Baked Capitalism, CID Working Paper No.108, September, Government of Australia (2005),"Australia's Competitors in International Education" July 2005 Update Government of Australia Department of Education Science and Training

[4] Jane Knight (2003), GATS, Trade and Higher Education Perspective 2003 – Where are we? http://www.pucminas.br/imagedb/documento/DOC_DSC_NOME_ARQUI20060214115610.pdf.

[5] Jane Knight (2003), The Observatory on Borderless Higher Education, UNESCO, Division of Higher Education, Section for Access, Mobility and Quality Assurance, Paris, 17-18 October.

[6] Joshi M. M. 1998 "Higher Education in India: Vision and Action, "UNESCO World Conference on Higher Education in the Twenty-First Century, Country, Paper, October 5-9: Paris.

[7] Khadria, B. (1999). "Offshore Universities and the Paradox of Factor-endowment and Factor-use in Trade in Services." Paper presented at Policy Perspective Seminar on Internationalization of Higher Education, National Institute of Educational Planning and Administration, New Delhi. November 26-27.

[8] Khan AQ, and SM Anas Iqbal, (2005), "Privatization of Higher Education for Globalization under WTO Regime: A Case of India", Prabandh, a Quarterly Journal of Management, Bureau of Public Enterprises, Lucknow.

[9] Mrinalini Shah, 2004, Education Sector, Destination India: A New Trade in WTO Regime, Amrapali Institute, http://www.iimk.ac.in/wto/seminar/MrinaliniShah.doc

[10] NIEPA (2001), "Trade in Education Service in WTO Regime – An Indian Response." National Institute of Educational Planning and Administration, New Delhi.

11

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

[11] Razib Ahmad (2003),"10 reasons why India should allow FDI in education sector." August 10,2003,
   http://www.indianraj.com/2006/09/.
[12] Rupa Chanda (2004), "GATS, Higher Education Services, and India", Working Paper IIM Bangalore.
Samina Rafat and Shikha Sahai, (2004) WTO-GATS Regime and Future of Higher Education in India. Institute of Productivity and Management, Lucknow,
http://www.iimk.ac.in/wto/seminar/SRafat&ShikhaSahai.doc.
[13] Sanat Kaul, (2006), "Higher Education in India: seizing the opportunity", working paper no. 179 Indian Council For Research On International Economic Relations, New Delhi, www.icrier.org, May.

[14] Satish Y. Deodhar (2001), GATS and Educational Services: Issues for India's Response in WTO Negotiations, IIMA Working Paper No. 2001-10-03, Indian Institute of Management, Ahmedabad,
[15] Satish Y. Deodhar (2002), "Managing Trade in Educational Services: Issues for India's Response in WTO Negotiations", The paper presented at the National Seminar on WTO and Allied Issues, Indian Institute of Foreign Trade, New Delhi, February.
[16] Shashi K Shrivastava, (2006), "Higher Education System in India: Challenges & Strategies for Reforms", Paper Presented at the Washington Symposium, NAFSA: Association of International Educators, Washington, USA, March.

12

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Implementing Value Investing Strategy by Artificial Neural Network

Shen, Kao-Yi[*1]

[*1]*Department of Finance, Chinese Culture University (SCE)*
231, Sce.2, Chien-Kuo S. Road., Taipei, Taiwan
[1]`kyshen@sce.pccu.edu.tw`

Abstract—*In the past few decades, both in academics and practice, building a reliable model to support investing decisions has gained growing interests. While applying various data-driven and computational algorithms for forecasting financial market has been investigated, an accounting-evaluation framework guided study is relatively unexplored. This research aims to build a self-learning mechanism led by a well-known evaluation framework for value investing. The artificial neural network (ANN) method is adopted for modeling the complexity and nonlinearity among accounting signals and the final output. The ANN model's final output may support investors to choose value stocks with financial logics considering the market dynamics. The findings suggest that the ANN model can generate positive outcome for value investing. Compared with the buy-and hold strategy of the market's index, even considered the risk factor by Sharpe ratio, the outcomes of the proposed ANN model were significantly better. These findings have implications for investors and researchers who plan to build a decision support system for value investing.*

Keywords— *Value investing, Fundamental analysis, Machine learning, ANN*

1.   Introduction

The forming of objective investment decision mainly ranges from two approaches: a technical analysis and fundamental analysis. A technical analysis approach is a way of forming technical signals by a stock's past data in prices and volumes. Investors rely on the buy-in/ sell-out signals from technical analysis to make their investment decisions. Generally, unlike the fundamental analysis approach, the trading period of technical investing is often shorter. As for the fundamental analysis approach, historical accounting information is scrutinized for accessing the potential profit/ risk of a stock. The most famous investing strategy based on fundamental analysis is value investing [1]. Investors manage to find out underpriced value stocks by considering various accounting signals. Before going any further, it is necessary to define some of the key investing terms that will be used in this research.

First of all, the idea of "value stock" should be clarified. According to Fama and French [2], financial research classifies firms that have high ratios of book-to-market equity (B/M), earnings-to-price (E/P), or cash flow-to-price (C/P) as value stocks. Secondly, it was observed that market has so called "value stock premium", which means that value stock often generates higher holding-period-return (HPR) against the market. This phenomenon increases our interests in exploring value investing. To conduct value investing strategy, investors need to scrutinize the financial statements of stocks. In this research, we focus on analyzing stocks with higher B/M ratios to proceed value investing. Finally, the idea of "underpriced stock" needs further explanation. By using a stock's historical financial information, investor may evaluate the fair price of a stock according to his own pricing method. If a stock's market price is far below its calculated fair price, it would be reckoned as underpriced.

While all seem to agree that using relevant financial information for fundamental analysis helps to conduct value investing, opinions differ as to which financial information should be included. For instance, Ou and Penman [3] used a model to capture future change in earnings by using a set of historical financial ratios. Lev and Thiagarajan [4] chose 12 financial signals for similar purpose. In this vein, Piotroski [5] proposed the F-Score model to conduct value investing, and his model showed 23% annual return between 1976 and 1996 by buying expected winners and shorting expected losers. The aforementioned models could be

13

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

regarded as taking an inductive approach to develop financial models through fundamental analysis. It relies on the support of constructing an accounting or financial model to identify crucial variables [6], but these models are inevitably constrained by the nature of conventional regression. The linearity of the general or logistic regression model rules out the capability to handle the volatility and nonlinearity of the stock market.

According to Rada [7], various data-driven algorithms try to leverage advanced mathematical methods and machine learning algorithms to depict the dynamics and nonlinear relationships within the financial market. Artificial neural network (ANN) is one of the proven techniques to handle nonlinear modeling. Although the auto-learning and adapting capability of ANN is suitable to construct a non-linear model for investment, the lack of support from financial logics is often a concern. Most of the models that aim to support investment are designed for forecasting. While applying the ANN technique, the construction of the forecasting model heavily depends on the training samples. A model might be good at fitting the sample data, but it might fail to extrapolate for further generalization. As shown in the above introduction, finance or accounting based value investing models lack the capability to handle nonlinear problem, and the data-driven approach might lack the explaining power due to over fitting of training data. Therefore, to shorten the gap, this research chose the proven F-Score model as the core framework to construct an ANN model. The purpose of this study was to construct a reasonable and practical model to support value investing. The specific aims in this study are to extend the practicability of the F-Score by building a reliable ANN model. The proposed method sheds the light on utilizing advanced machine learning algorithm to implement an investing strategy with financial logics and insights.

The rest of the study is organized as follows: in section2, we reviewed the concept of value investing and fundamental analysis. Also, the idea of machine learning is explained by taking ANN as an illustration. In section3, the F-Score based ANN modeling steps are introduced for improving the value investing strategy. Section 4 provides an empirical example to analyze 400 sample stocks in Taiwan's stock market from 2008 to 2010. Section 5 concludes this study.

2.   Investing and Machine Learning

This section briefly reviews the concepts adopted by the research, such as the definition of value investing, fundamental analysis and the mentioned data-driven techniques used in this study.

2.1   Literature Review for Value Investing

According to Fama and French [2], investment managers classify firms that have high ratios of book-to-market equity (B/M), earnings-to-price (E/P), or cash flow-to-price (C/P) as value stocks. Take high B/M stock for example. The higher book value compared with its market value, often implies that the lower the investors' interests in buying this stock. The value investing strategy was initiated by Benjamin and Dodd [1], they argued that out-of-favor stocks are sometimes under-priced in the market [8][9]. Intelligent investors may make profit by identifying this kind of stocks. Even in recent study, Elze [10] still finds this strategy to be useful in the European market. In this research, we define value investing as focusing on high B/M stocks, while investing decisions are driven by selecting stocks with strong financial prospects through fundamental analysis approach.

To proceed the introduction of fundamental analysis, prior studies show that investors have chance to gain positive abnormal returns by trading on financial signals [6]. This approach assumes that market is not always in equilibrium. Sometimes, the market cannot fully process the implications of a firm's financial signals. The market fails to reflect its fair price on a timely manner. This approach suggests investors to find underpriced stocks and hold those value stocks until their prices bounce back to fair level [1].

To examine the value investing strategy, Piotroski [5] conducted the fundamental analysis to propose his F-Score model. The F-Score model chose nine fundamental signals to measure three aspects of a firm's financial condition: profitability, financial leverage/ liquidity and operating efficiency. Current profitability and cash-flow generation show how firms can generate funds internally. F-Score used ROA and CFO to measure profitability performances. It defined CFO as cash flow from operations. F-Score also defined the variable "Accrual" as return on asset before cash

flow from operation deducted extraordinary items. The application of Accrual was originated from Sloan [12]. According to Shen, Yan, and Tzeng [13], while analyzing the F-Score model by using ANP method, ROE variable should earn more weights compared to the Accrual variable. Thus, in this research, ROE variable is used to replace Accrual.

2.2   Literature Review for Machine Learning and ANN

The modeling of large amount of data requires efficient and effective way to process. The majority of machine learning algorithms rely on sample data to conduct inductive learning [14]. Although different machine learning algorithms aim to find the "best" or "optimal" structure of relationship in the target data, their learning algorithms differ as to various reasoning logics. The theory of artificial neural network is one of the most prevailing techniques that mimic the human's nerve system to conduct learning [15]. The fundamental concepts and principles of ANN can be found in the classical work of Rumelhart and McClelland [16]. In general, a neural network is a set of connected input and output units. In analogy to the operation of human brain, ANN is trained by responding to "stimuli" by repeated replications of forming the "optimal" input-output relationship in a model. In an ANN model, processing elements (PE) are designed to mimic the behavior of the brain's neurons [16]. A neural network often comprises of a layer of input PEs, one or two layers of hidden layer PEs, and a layer of output PEs. As sample data are processed through the network, ANN learns the relationship between input and output variables. The learning process aims to map the best fit relationship between input and output, which is taken by the dynamic adjustments of weights associated with inputs and outputs. The process is also known as learning or training or adapting. Back-propagation is the most well-known algorithm for implementing the learning process. It assigns responsibility for mismatches to PEs in the network by propagating the gradient of the activation function back through the network. This process aims to minimize the MSE (mean square error) between the network's prediction and the actual target until the model is converged.

Addressing the applications of ANN in financial markets, researchers and analysts try to generate better predictions about returns of stocks or indices by leveraging the non-linearity modeling capability of ANN [17]-[19]. Although most of the studies show positive results, the reason for selecting a particular series of variables often lacks justification. Also, the constructed models highly depend on the training data. Even if a model can be adapted well to fit its training data, the lack of generalization might still be of a concern [20]. To tackle these two issues, this research adopts the framework of F-Score model to ensure the variable's relevance, and several sets of historical input variables added to improve the outcomes by expanding the model's time frame during modeling.

3.   Construct the ANN model for Value Investing

This section adopts the F-Score model as the conceptual framework, and depicts various dimensions of the original system that can be used for constructing the ANN model.

3.1   Influential Dimensions and Factors for Modelling

In the original F-Score model, to conduct value investing, three dimensions make up the evaluation model: profitability, financial leverage/ liquidity, and operating efficiency. Among these three dimensions, 2 to 3 extended sub-factors were identified to construct the measurement of strength for each dimension [5][13]. The overall structure is shown in Figure 1:
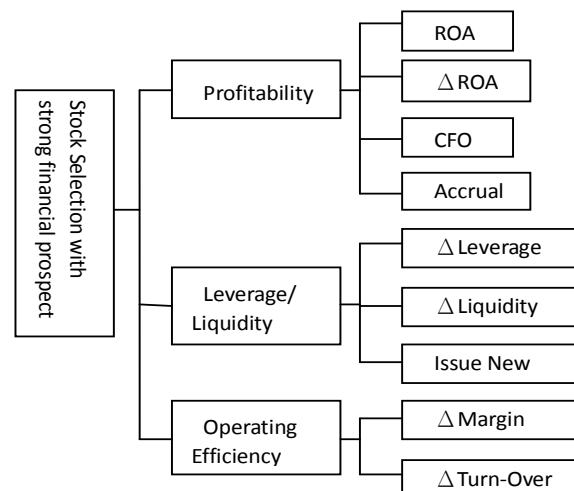

Figure 1. Hierarchical framework of original ANP structure

F-Score used ROA (return on asset) and CFO to measure profitability performances mainly. It defined CFO as cash flow from operations. Unlike traditional definitions of ROA and CFO, if a firm's ROA (CFO) is positive, the variables ROA (CFO) in regression model equals one, zero otherwise. F-Score also defined the variable "Accrual" as return on asset before cash flow from operation deducted extraordinary items. The application of Accrual was originated from Sloan [12], but not too much attention was paid in the subsequent investing research. Thus in this study, ROE (return on equity) variable is used to replace Accrual based on the suggestion of previous work [13]. Nine financial signals are designed to measure financial leverage, liquidity and source of funds. In F-Score system, financial leverage captures changes in a firm's long-term debt levels. It assumes that an increase in leverage is a bad signal regarding financial risk. F-score defines the indicator variable ΔLeverage equals one (zero) if a firm's leverage ratio fell (rose) in the previous year. It assumes that if a firm issues common equity in current year is a bad signal, which might be caused by lack of enough cash. It defines IssueNew equals zero if a firm issues common equity in current year, one otherwise. To measure the performance of operation efficiency, ΔMargin and ΔTurn-Over were applied in the F-Score model. The indicator variable ΔMargin equals one if ΔMargin is positive, zero otherwise. It defines ΔTurn-Over as the changes in firm's current year asset turnover ratio. The indicator ΔTurn-Over equals one if ΔTurn-over is positive, zero otherwise.

As a whole, the original F-Score model tended to capture the year over year (YoY) changes in various variables to reflect the investing potential of value stocks. To simplify the measurement process, Piotroski [5] chose the binary signals to form a logistic regression model. This study aims to extend the boundary of previous work by ANN for better modeling. The construction of the proposed ANN model is as below. In the initial phase, the input-output relationship is mainly referenced from the original F-Score model's settings, and the following steps show the creation of the ANN model.

Step1: Collect data by following the modified F-Score model.

To incorporate the previous knowledge from value investing, the network's structure and input data are collected according to the modified F-Score model as Figure 1. Due to the different scale and characteristics of input data, the collected data needs to be normalized. In this model, the commonly used log-sigmoid transfer function is applied to make the squashed output ranging from 0 to 1. After the preparation of input data, the data on hand have to be divided into training set and testing set. It is used to verify the generalization quality of the trained network.

Step2: Create the network's initial structure.

In this study, a three-layer network is chosen due to the potential flexibility to learn complex input-output relationships. Drawing an analogy to the modified F-Score model, the network structure in ANN holds nine input variables and one output variable respectively. A hidden layer is designed to constitute the three-layer model in the initial state, and the searching process to settle ideal parameters will be explained in the next step.

Step3: Train the network.

The training process aims to adjust the weights and biases to fit the network for the optimal modeling of the relationship between the inputs and output. The training process itself is an experiment. The feed-forward neural network uses the back-propagation algorithm, and by trying various number of hidden layer neurons and learning rates, the network is settled according to the performance function which can measure the biases between the actual output and the model's output. In this study, the MSE (mean square error) is selected as the performance function, defined as follow:

$$F = MSE = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(y_i - t_i)^2} \qquad (1)$$

where y_i is the predicted output from model, t_i is the actual output, and n is the number of training cases. Several training algorithms can be tried to find the ideal one for the study. To illustrate how the training works, consider the commonly used gradient descent algorithm. It updates the network weights and biases in the direction in which the performance function decreases most rapidly, the algorithm can be expressed as below:

$$x_{k+1} = x_k - \alpha_k g_k \qquad (2)$$

where the x_k is a vector of current weights and biases, g_k is the current gradient, and α_k is the learning rate. The equation (2) is iterated until the network converges. Several learning algorithms, such the Resilient Back-propagation, Variable Learning Rate Gradient Descent may be tested.

Step4: Validate the network by post-training analysis.

To check if the trained network could be applied for forecasting, the post-training analysis is needed. In this study, the trained ANN network is expected to conduct value investing by capturing the relationship between past accounting signals and subsequent stock performance. The network could be validated by plotting a regression figure, used for observing the outputs of the network and the targets by using the testing data set. If the training result is acceptable, the training result and the actual stock performance would be close on the regression figure.

In the second phase, to capture the effect of past selected variables, some inputs that were designed to measure YoY (year-over-year) differences in the initial phase are selected to observe their influence over the model. The concept is illustrated in the Figure 2.
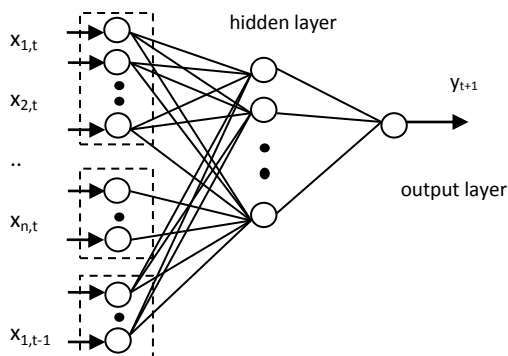

Figure 2. The formation of extended time frame model

Step5: Extend past selected signals to improve the generalization capability of ANN model.

From step1 to step 4, the influential weights of 9 input variables can be examined once the ANN training model is converged. It is worthwhile to include the input variables' longer historical

performance in the ANN modeling, such as a stock's ΔROA signal in the past of 2 or 3 years. The modeling of the input-output relationship could be expressed as the equation (3):

$$y_{t+1} = f(X_{i,t}, X_{i',t-1}, \ldots, X_{i',t-n}) \qquad (3)$$

where the y_{t+1} is the output HPR result of a stock at time t+1, $X_{i,t}$ is the ith input signal at time t and $X_{i,t-1}$ is the input signal $X_{i,t-1}$ at time t-1 respectively. Please be noted that $X_{i',t-1}$ means i' variable is only a subset of i variables.

Step6: Repeat the process for building an acceptable model

Repeat the process in step5 until an acceptable R value is found to finalize the ANN modeling. The R value is calculated by drawing the best fit linear regression between outputs and targets, which is an indication of the input-output relationship. If the R value is closer to 1, it implies the ANN model generates better forecasting results.

4.   Numerical Example for ANN Modeling

This research examined the proposed ANN modeling by using data from the TEJ (Taiwan Economics Journal) database. As there are more than 1,200 public listed companies in the Taiwan stock market, this study selected the highest 400 B/M ratio stocks (about 1/3 of the total stocks) for the end of April 2009 as value stocks. The reason for this timing is because that all public listed stocks are requested to declare their annual financial reports before the end of April every year. It is needed to explain that, all of the latest annual financial data that could be collected for a stock by the end of April/2009 was its actual results in 2008. The subsequent 12 and 18 months HPRs (holding-period-return) at two periods are examined to represent the ANN model's output variables. To examine the final network's performance, 1/4 of the sample stocks were randomly selected to reserve for testing, kept untouched during the modeling process.

As mentioned in the step5, the selected sample stocks' past data will be included for better modeling. We also need to exclude stocks which have not been public-listed for no longer than 3

17

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

years. The variables defined by the F-Score model are shown in Table1.

Table 1. Variables used as input variables from the F-Score

Dimension	Variable	Definition
Profitability Dimension	ROA09	The ROA of 2008 (collected for April/2009)
	△ROA09	(ROA_2008[*]- ROA_2007)/ ROA_2007
	CFO09	Cash flow from operation (collected for April/2009)
	ROE09	Return on equity (collected for April/2009)
Leverage/ Liquidity Dimension	△Leverage09	(Leverage_08- Leverage_07)/ Leverage_2007
	△Liquidity09	(Liquidity_08- Liquidity_07)/ Liquidity_2007
	IssueNew09	(Totalshares_08- Total shares_07)/ Total shares_07
Operating Efficiency Dimension	△Margin09	(Margin_08- Margin_07)/ Margin_07
	△TurnOver09	TurnOver_08- TurnOver_07)/ TurnOver_07

*ROA_2008 represents the ROA figure collected for 2008 in the end of April/2009 (all of the symbols follow the same naming logic)

ROE variable is used to replace Accrual in this research. The value of the input variables was preprocessed by normalizing them between the ranges of 0 to +1. This procedure is needed to reduce the unwanted magnitude effect along the inputs. The corresponding output variable is the 12 months HPRs of a stock, and the HPRs also need to be transformed for normalization. The detail procedures are illustrated in the following sections. Based on the aforementioned model, a set of high B/M stocks are divided into training group and

testing group respectively. About 10% stocks of the training group will be used for the ANN model's validation, while the testing group will be kept untouched until the trained ANN model is available.

4.1 The original time frame of the F-Score model

To test the proposed ANN model by the original framework, the 9 input variables of the 300 high B/M stocks (the other 100 high B/M stocks were reserved for final examination) were collected for the end of April/ 2009. For example, the variable ROA's value at end of April/ 2008 of sample stocks was retrieved, and the △ROA was the difference between 2008 and 2009 in the percentage change. The other input variables also followed the same time frame to collect the corresponding data. The desired output in the ANN model was the following 12 month's HPRs of sample stocks (from the end of April/ 2009). The HPRs of the sample stocks were adjusted by TEJ to eliminate their dividend effect, and the following 18 months HPRs was also included for comparison. The ANN model was designed to learn the relationship between the 9 input variables and the following HPRs for value investing.

A single hidden layer was selected for implementing the ANN model. According to previous research [18][21], a feed-forward network based on back-propagation method with single hidden layer was successfully used for financial classification and prediction. As a whole, the ANN model consisted of three layers of neurons, including the input layer, hidden layer and output layer. The network configuration was conducted through experiments. Although 12 months and 18 months HPRs were tested as output variables, only one output variable was included in the output layer each time. The experiment consisted of various hidden layer neurons, learning rate and learning algorithms. After experiments, the ANN model employing the Levenberg-Marquardt algorithm (one of the back-propagation method) with 0.3 learning rate was found to be suitable for the network structure. The training, validation and testing groups were all selected randomly in each experiment. The 3 groups of sample stocks summed up to 300 high B/M stocks, and the validation group was set to be 10% (30 stocks) of the total samples. In Table1, two sizes (10% and

15%) of testing group were compared to ensure the model's stability.

The finalized network configuration delivered the lowest mean square error (MSE) in average. By conducting a regression plot, the relationship between the network's output and the targets could be shown. The training data's R value and the testing data's R value were both shown for different hidden layer neurons setting as Table2. Even the lowest training data showed more than 70% R value, which indicated a positive fit.

Table 2. The Regression value of the desired target and the model's output by using numerical return

HPRs	Test Group	HLN=16 (R) Train/ Test	HLN=18 (R) Train/ Test	HLN=20 (R) Train/ Test
t=12 M	10%	75.28%/ 64.08%	74.6%/ 66.15%	78.32%/ 72.13%
t=12 M	15%	77.21%/ 71.08%	79.13%/ 70.93%	79.48%/ 67.71%
t=18 M	10%	75.01%/ 66.53%	77.82%/ 78.34%	76.14%/ 72.92%
t=18 M	15%	78.34%/ 62.13%	70.23%/ 69.12%	76.01%/ 72.62%

This study employed an experimental approach to gain an in-depth analysis of the relationship between the 9 input variables from the F-Score model and the subsequent HPRs. During the experiment, the best training result regarding the R value was shown in figure3.
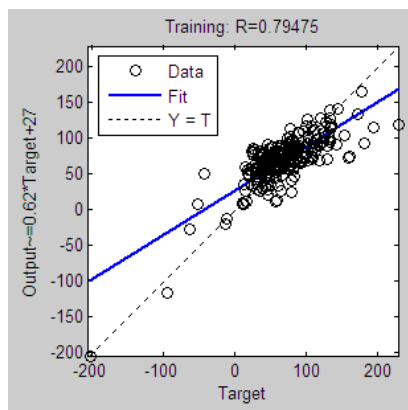

Figure 3. The regression plot of the training model in the original time frame

As there might be too many external factors that would decrease the accuracy of the expected forecasts, we further transformed the HPRs into 5 return classes. The transformation was done by calculating the full range of the 300 sample stocks' HPRs. The 5 return classes hold equal range. For example, this study defines the lowest 20% as class 1, the following 20% as class2…until class5. This transformation was done to turn the nature of prediction from numerical to sequential classification problem. In Table3, the result indicated that most of the R values between the outputs of the network and the targets did not improve consistently.

One thing needs to be explained in here, in Table3, most of the numbers of HLNs were different compared with Table2. It was the result of experiments after trying various learning rate and HLN numbers. As the result did not show consistent improvement, in the subsequent part of the analysis, the study returned back to use the original numerical HPRs as the output variables.

Table 3. The Regression value of the desired output and the model's output by using sequential classification

HPRs	Test Group	HLN=13 (R) Train/ Test	HLN=15 (R) Train/ Test	HLN=18 (R) Train/ Test
t=12M	10%	74.01%/ 69.54%	75.15%/ 72.13%	76.13%/ 62.12%
t=12M	15%	72.33%/ 74.11%	71.51%/ 66.39%	74.55%/ 70.58%
t=18M	10%	77.32%/ 76.51%	74.38%/ 70.12%	76.35%/ 69.10%
t=18M	15%	75.31%/ 83.52%	73.91%/ 70.88%	74.22%/ 73.96%

4.2   The extended time frame of the F-Score model

In the previous analysis, only the concurrent financial signals were put into consideration for forecasting. In the investment practice, while investment experts conducting the analysis, they often trace back to the previous year's performance, sometimes even longer than one or two years. To make the ANN model meet the practice for value

19

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

investing, this study extended the time frame for input variables of the F-Score model. 6 of the 9 original input variables measure the annual rate of change, these variables were considered suitable to include more historical data for modeling. Following this reasoning, this study added these variables to extend the time frame for input variables. The input variables of the extended time frame were illustrated in Table 4:

Table 4. Input variables used in the ANN model from the extended time frame

Time frame	Input Variables	Number of variables
09+△08_model	ROA09, △ROA09, △ROA08, CFO09, ROE09, △leverage09, △leverage08, △Liquidity09, △Liquidity08, IssueNew09, IssueNew08, △Margin09, △Margin08, △TurnOver09, △TurnOver08	15
09+△08+△07_model	ROA09, △ROA09, △ROA08, △ROA07, CFO09, ROE09, △leverage09, △leverage08, △leverage07, △Liquidity09, △Liquidity08, △Liquidity07, IssueNew09, IssueNew08, IssueNew07, △Margin09, △Margin08, △Margin07, △TurnOver09,△TurnOver08, △TurnOver07	21

During the experiment for the extended time frame, the same back-propagation algorithm was used for learning, and one layer hidden layer was chosen as the Table5. After many experiments by assigning different HLNs, 20 HLNs yielded the

best result for the 09+△08_model, and 23 HLNs for the 09+△08+△07_model respectively.

Table 5. Extended time frame for two periods HPRs

	12 months (R) train / test	18 months (R) train / test
09+△08_model	(81.37%/ 74.06%)	(80.19%/ 71.73%)
09+△08+△07_model	(82.98%/ 77.53%)	(77.19%/ 74.38%)

In general, the extended time frame model showed better R values compared with the original model. To highlight the best result in these models, it was suggested that the 09+△08+△07_model may deliver a better fit for both training and testing groups while considering 12 month HPRs.
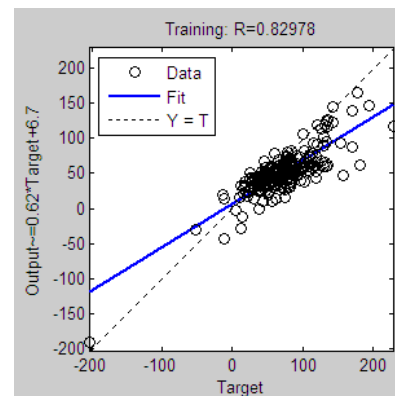
Figure 4. The regression plot of the training by using extended time frame

4.3   The final examination of the trained ANN network

Further, to examine the practicability of applying the ANN model for value investing, this study kept all of the trained network's parameters and respective settings of the 09+△08+△07_model. Then, by using the initially reserved 100 sample stocks and their corresponding input variables, the ANN model generated 100 outputs (their 12 month HPRs). The outputs were ranked in sequence, which represented the ANN model's prediction for the subsequent 12 months. The top 30% (30 stocks) were selected to form a portfolio, named as HighValue portfolio. The actual performance of the HighValue portfolio was compared against the total

available stocks (1243 stocks with available data) in the market and the market indices. To test the difference in returns, this study applied t-test to examine the performance of differences. Also, to include risk factor for consideration, the Sharpe ratio was used to see the difference as Table6:

Table 6. Summary statistics of financial return for various groups and indexes

	HighValue	**Total Stocks**	**Index_A**	**Index_B**
Average	78.44%	41.55%	28.95%	47.43%
STD in average	12.48	14.44	7.00	15.22
Sharpe AVG	6.29%	2.88%	4.14%	3.12%
Stock Numbers	30	1243	N.A.	N.A.

The HighValue portfolio represented the selected top 30 stocks by the trained ANN model, which showed 78.44% HPRs in average. One thing needs to be reminded in here. After the financial crisis in the late 2008, the stock markets bounded back from the beginning of 2009 all over the world. It's not a surprise that all of the portfolios and indices showed such positive returns. Even though, the HighValue portfolio still outperformed the other portfolios and indexes in returns. The index_A was the Taiwan weighted average index, and the Index_B represented the Taiwan's OTC (over the counter) index. It was consistent with general understanding. Index_A was composed of larger market cap stocks, which indicated lower standard deviation in average returns.

Table 7. Comparing HighValue portfolio's performance against the market

	Difference in average	**t-value**	**Sharpe's difference**
HighValue-TotalStocks	36.89%	6.115[**]	3.41%
HighValue-Index_A1	49.49%	8.243[**]	2.15%
HighValue-Index_B2	31.01%	5.122[**]	3.17%

A single sample t-test against benchmarked figure was conducted to examine the mean differences between the HighValue portfolio and the market. All of the four t-tests were significant under the two-tails circumstance at .05 level. Compared against the Index_A, the difference went up to +49.49% as Table7 showed. The result indicted that the ANN model could select value stocks among a general high B/M stocks to outperform the market significantly. As shown in Table7, to consider the risk factor by comparing the Sharpe ratios [21][22]among different portfolios and indices, the HighValue portfolio was better than the market's indices consistently. Although the comparison of Sharpe ratio was lack of statistical inference, it may be regarded as a second perspective to see the result.

5.   Discussion and Conclusions

To conclude, the study adopted the value investing strategy by constructing the ANN model to select stocks among a high B/M ratio stocks, named as HighValue portfolio. A major finding is that the HighValue portfolio not only outperformed the major market indices significantly, but also showed superior Sharpe ratio while considering risk factor. These results indicate that constructing an ANN model through fundamental approach is a practical way to select high potential value stocks. It can be reasoned that the ANN modeling requires a logical guidance to include crucial variables considering various time lags effect [23]. In the present study, the examination period for HPRs is right after the financial crisis. Many sound stocks fell to historical low levels, which also provided the value investing strategy a good opportunity to step in. With regard to the previous value investing model [5], the

proposed ANN model leveraged its own nonlinear learning capability to extend the F-Score model's limitations. The present findings contribute to the modeling of conventional value investing strategy by using a machine learning approach. Future research should consider how to accommodate more meaningful financial logics while binding various rules to support investing decisions [24][25]. Finally, this study suggests that the applied ANN modeling may be tested in the other stock markets to examine the practicability and effectiveness.

References

[1] B. Graham, and D. Dodd, *Security Analysis*, McGraw-Hill, New York, 1934.

[2] E. F. Fama, and K. R. French, *"The Cross-Section of Expected Stock Returns,"* Journal of Finance, Vol 47, No.2, pp. 427-465, 1992.

[3] J. A. Ou, and S. H. Penman, *"Accounting Measures, Price-Earnings Ratio and the Information Content of Security Prices,"* Journal of Accounting Research, Vol 27, pp. 111-143, 1989.

[4] B. Lev, and S. R. Thiagarajan, *"Fundamental Information Analysis,"* Journal of Accounting Research, Vol 31, No.2, pp. 190-214, 1993.

[5] J. D. Piotroski, *"Value Investing: The Use of Historical Financial Statement Information to Separate Winners from Losers,"* Journal of Accounting Research, Vol 38, pp. 1-41, 2000.

[6] S. Basu, *"Investment Performance of Common Stocks in Relation to Their Price-Earning Rations: A Test of the Efficient Market Hypothesis,"* Journal of Finance, Vol 32, No.3, pp.663-682, 1977.

[7] R. Rada, *"Expert Systems and Evolutionary Computing for Financial Investing: A Review,"* Expert Systems with Applications, Vol 34, pp. 2232-2240, 2008.

[8] E. F. Fama, and K. R. French, *"Multifactor Explanations of Asset Pricing Anomalies,"* Journal of Finance, Vol 51, No.1, pp. 55-84, 1996.

[9] E. F. Fama, and K. R. French, *"Value versus Growth: the International Evidence,"* Journal of Finance, Vol 53, No.6, pp. 1975-1999, 1998.

[10] G. Elze, *"Value Investing Anomalies in the European Stock Market: Multiple Value, Consistent Earner, and Recognized Value,"* The Quarterly Review of Economics and Finance, Vol 50, pp.527-537, 2010.

[11] C. Clubb, and M. Naffi, *"The Usefulness of Book-to-Market and ROE Expectations for Explaining US Stock Returns,"* Journal of Business Finance & Accounting, Vol 34, No.1-2, pp. 1-32, 2007.

[12] R. G. Sloan, *"Do Stock Prices fully Reflect Information in Accruals and Cash Flows about Future Earnings?"* The Accounting Review, Vol 71, No.3, pp. 289-316, 1996.

[13] K. Y. Shen, M. R. Yan, and G. H. Tzeng, *"An integrated fuzzy-ANP model for value investing,"* 2010 7th International Conference on Fuzzy Systems and Knowledge Discovery, Vol 2, pp. 982-986, 2010.

[14] T. M. Mitchell, *Machine Learning*, McGraw-Hill (Science), 1997.

[15] K.J. Kim, *"Artificial Neural Networks with Evolutionary Instance Selection for Financial Forecasting,"* Expert Systems with Applications, Vol 30, No.3, pp.519-526, 2006.

[16] D. Rumelhart, and J. McClelland, *Parallel distributed processing*, Cambridge, MA: MIT Press, 1986.

[17] A. Abhyankar, and L. S. Copeland, and W. Wong, *"Uncovering nonlinear structure in real-time stock-market indexes: the S&P 500, the DAX, the Nikkei 225, and the FTSE 100,"* Journal of Business & Economic Statistics, Vol 15, pp.1-14, 1997.

[18] D. Enke, and S. Thawornwong, *"The use of data mining and neural networks for forecasting stock market returns,"* Expert Systems with Applications, Vol 29, pp.927-940, 2005.

[19] W. Zhang, Q. Cao, et al., *"Neural Network Earnings per Share Forecasting Models: A Comprehensive Analysis of Alternative Methods,"* Decision Sciences, Vol 35, No.2, pp.205-237, 2004.

[20] P. Jardin, *"Predicting Bankruptcy Using Neural Networks and Other Classification Methods: The Influence of Variable Selection Techniques on Model Accuracy,"* Neurocomputing, Vol 73, pp.2047-2060, 2010.

[21] S.G. Eakins, and S.R. Stansell, *"Can Value-Based Stock Selection Criteria Yield Superior Risk-Adjusted Returns: An Application of Neural Networks,"* International Review of Financial Analysis, Vol 12, pp.83-97, 2003.

[22] T. S. Quah, *"DJIA Stock Selection Assisted by Neural Network,"* Expert System with Applications, Vol 35, No.1-2, pp.50-58, 2008.

[23] T. Yu, S. Simoff, and T. Jan, *"VQSM: A case study for incorporating prior domain knowledge into inductive machine learning,"* Neurocomputing, Vol 73, pp.2614-2623, 2010.

[24] J. L. Wang, and S.H. Chang, *"Stock Market Trading Rule Discovery Using Two-Layer Bias Decision Tree,"* Expert System with

22

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Applications, Vol 30, No.4, pp.605-611, 2006.

[25] L. Motiwalla, and M. Wahab, "*Predictable variation and profitable trading of US equities: a trading simulation using neural networks,*" Computer & Operation Research, Vol 27, pp.1111-1129, 2000.

Author Biographies

Shen, Kao-Yi, Ph.D, Assistant Professor of Department of Finance at Chinese Culture University (SCE), Taipei, Taiwan. Dr. Shen is now also the Director of Graduate Institute and Department Development Center at Chinese Culture University (SCE). Dr. Shen obtained his Ph.D degree in Business Administration at National Cheng-chi University in Taipei. He worked as a senior analyst in VC industry, and he was the PM-head of an international IT company based in Taiwan. He also worked for several Financial Institutions in Taiwan as an external consultant. The author's research interests focus on investing styles, artificial intelligence techniques and entrepreneurship.

23

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Linkage between the Quality of Corporate Governance and Firm Performance: Indian Evidence

Dr. Anurag Pahuja

Apeejay Institute of Management, Jalandhar, Punjab (India)
anurag_pahuja@yahoo.co.in

Abstract— The paper provides an overview of Indian corporate governance practices, based primarily on the responses to a survey in 2008 of 50 Indian public limited listed companies. Constructing a broad Corporate Governance Quality Index (CGQI) for Indian public firms, we document a positive relationship between governance practices and firm valuation. The findings suggest that an increase in CGQI by one point (where the index ranges from 1-100) causes an increase of the market capitalization by 8.5%, on average, of company's book asset value i.e. Tobin's Q and an increase of 13.9% in MBV ratio. We find evidence of a positive relationship for an overall governance index and for a sub-index covering Board Composition and Independence (BCII). Where the sub-index for BCII is individually significant, the sub-indices for Shareholders rights, transparency and disclosures, board and committee functioning, and CSR and stakeholder value are not significant.

Keywords: Corporate governance, Clause 49, Firm Performance, Corporate governance quality, Sub-indices, Board Independence

1.   Introduction

Corporate governance issues have attracted the interest of researchers, scholars, economists and decision makers worldwide, particularly in the past two decades. The whole contemplation on corporate governance stems from the hypothesis that good governance mechanisms influence firms' performance. Good governance means either no or very little misuse of the firms' resources by managers and controlling shareholders. This would result in better allocation of resources and the investors and creditors would be more eager to put their money in such firms, resulting in lower cost of capital for the firms, which is another source of better firm performance. Better corporate governance is expected to lead to better corporate performance by preventing the expropriation of controlling shareholders and ensuring better decision- making. In expectation of such an improvement, the stock prices may respond instantaneously to news indicating better corporate governance (Nam & Nam, 2005). Zahir and Sisodia (2006) have a different perspective and advocate good corporate governance because it promotes relationships of accountability among the primary corporate participants to enhance corporate performance. It has been observed that investors base their investment decisions in any company on corporate governance practices being followed. Globally, investor opinion survey, conducted by McKinsey and Company (2002) has confirmed that corporate governance remains a great concern for institutional investors, with a majority of them willing to pay a premium for companies demonstrating consistent adherence to high governance standards. At the same time, the task force on corporate governance established by the Organization for Economic Co-operation and Development (OECD, 1999) opines that "the degree to which corporations observe basic principles of corporate governance is an increasingly important factor for investment decisions".

2.   Review of Literature

The fundamental issue in research on corporate governance is to discern whether companies' market value is determined by internal and/or external governance mechanisms. However, till date, there is no conclusive empirical evidence on how and whether corporate governance mechanisms influence corporate performance.

24

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Many past research studies have examined the relationship between a variety of governance mechanisms and firm's market valuation/firm performance. Most of these studies have concentrated on finding a link between firm performance and a specific aspect of corporate governance such as board characteristics (Bhagat & Black, 1999; Millstein & MacAvoy, 1998), ownership concentration (Himmelberg, Hubbard & Palia, 1999; Morck, Shleifer & Vishny, 1988), board composition (Agrawal & Knoeber, 1996; Hermalin & Weisbach, 2003), executive compensation (Abowd & Kaplan, 1999; Bebchuck, Fried & Walker, 2002), shareholder activism (Carleton, Nelson, & Weisbach, 1998; Karpoff, Malatesta & Walking, 1996), and anti-takeover provisions (Sundaramurthy, Mahoney & Mahoney, 1997). The trend changed and several studies examined this linkage using a composite measure of corporate governance such as corporate governance index or governance score (Aman & Nguyen, 2007; Bebchuk, Cohen & Ferrell, 2005; Black, 2001; Black, Jang & Kim, 2003 & 2006; Brown & Caylor, 2004 & 2006; Cheung, Connelly, Limpaphayom & Zhou, 2006; Cheung, Jiang, Limpaphayom & Lu, 2007; Durnev & Kim, 2005; Gompers, Ishii & Metrick, 2003; Klapper & Love, 2004). The reason behind this shift is that the overall quality of corporate governance must be considered while examining its impact on firm performance. In the following section, few of the important studies using composite measure of corporate governance and its relationship with firm valuation/performance are being discussed.

Black, Jang, and Kim (2003) constructed a corporate governance index ranging between 0 and 100, based primarily on responses to a survey of listed companies by the Korea Stock Exchange. The index was based on six sub-indices for shareholder rights, board of directors in general, outside directors, audit committee and internal auditor, disclosure to investors, and ownership parity. They found that corporate governance is important for explaining the market value of a complete set of Korean public companies as a moderate 10 point increase in the corporate governance index predicts a 6% increase in Tobin's Q and a 14% increase in market/book ratio in Ordinary Least Squares (OLS) regressions. A worst-to-best change in the index predicts a 44% increase in Tobin's Q and a 105% increase in market/book ratio.

Drobetz, Schillhofer and Zimmermann (2003) evidenced higher valuation of firms in countries with a better legal environment. They investigated whether differences in the quality of firm-level corporate governance also help to explain firm performance in a cross-section of companies within a single jurisdiction. Constructing a broad Corporate Governance Rating (CGR) for German public firms, they documented a positive relationship between governance practices and firm valuation.

Leal and Carvalhal-da-Silva (2005) constructed a broad corporate governance practices index (CGI) composed of 24 objective and binary questions for the period from 1998 to 2002, giving equal weights to all the questions, scores for individual companies ranged between 0 and 24. They found a positive, significant, and robust relationship between CGI and corporate value, suggesting that the improvement of corporate governance practices do pay off in Brazil.

Brown and Caylor (2006) created Gov-Score, a summary measure of firm specific governance, based on 51 Institutional Shareholder Services factors, representing both internal and external governance mechanisms. These 51 governance provisions were classified by the eight ISS categories: audit, board of directors, charter/bylaws, director education, executive and director compensation, ownership, progressive practices, and state of incorporation and were coded 1 or 0 depending upon whether it represents minimally acceptable governance or not. They show that a parsimonious index based on seven factors fully drives the relation between Gov-Score and firm valuation.

The study by Cheung, Connelly, Limpaphayom and Zhou (2006) developed a corporate governance index including 86 questions to measure overall corporate governance and disclosure practices of the 100 largest listed firms in China. These 86 questions were classified into five OECD corporate governance principles: rights of shareholders; equitable treatment of shareholders; role of stakeholders; disclosure and transparency; and board responsibilities. They find no statistically significant relation between market valuation and corporate governance practices, as measured by the corporate governance index, among Chinese listed companies. They concluded that the market valuation of Chinese listed companies is not yet related to their corporate governance practices.

Aman and Nguyen (2007) constructed a corporate governance index based on several attributes known for their association with firm

25

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

performance like board structure, ownership composition and disclosure policy. The index was used to form five portfolios whose monthly returns were analyzed over the period of 2000 to 2005. Contrary to the results of the above mentioned studies, they found that risk-adjusted returns are insignificant across all five governance-based portfolios. In fact, firms with lower governance ratings achieved higher returns while firms with higher governance ratings generated lower returns. They explained this as higher the risk faced by the firms, the lower the governance ratings, the higher the returns and lower risk along with lower returns to the firms with higher governance ratings. They concluded that stock prices fairly reflected the lower risk of well-governed firms and higher risk of poorly governed firms.

Toudas and Karathanassis (2007) in their study constructed a Governance Index for a sample of Greek companies quoted on the Athens Stock Exchange. They classified firms, using each firm governance index, into three governance portfolios. Furthermore, the Fama and French model, extended to include a momentum variable, was tested for each of the three governance portfolios. Their findings suggested that most of the firms in the sample are semi-democracies followed by democracies and dictatorships respectively. Good governance appears to be of value in as much as we found higher Tobin's Q ratios for democracies followed by semi-democracies and dictatorships. They also reported significant negative abnormal returns for shareholder-friendly and manager-friendly firms.

Borrowing from the past literature, it can be summarized that a number of research studies conducted abroad have tried to test the impact of quality of corporate governance on firm's financial performance. Some have found a positive relationship between quality of corporate governance and firm's performance (Black, Jang & Kim, 2003; Brown & Caylor, 2006; Mohanty, 2002; Nam & Nam, 2005). Others have found no such relationship (Cheung et al., 2006). Here arises the need of the present study. Rarely few studies have found a negative relationship (Aman & Nguyen, 2007).

3.   Objectives and Hypothesis of the Study

This study seeks to test the findings of already conducted studies, particularly, to establish the linkage between the quality of corporate governance and financial performance of the firms. Specifically, this study aims at:

- finding out the quality of corporate governance in the Indian companies, and
- establishing the linkage between the quality of corporate governance and financial performance of the firms.

Commensurate with the above mentioned objectives, the following hypothesis was framed:

H0: Better quality of corporate governance does not ensure better financial performance of the firms.

H1: Better quality of corporate governance ensures better financial performance of the firms.

4.   Data Base and Research Methodology

To carry out the objectives of the study, both primary and secondary data has been used. Secondary data for the study was collected from the annual reports of the company. For this purpose, the annual reports for the year ended March 31, 2007 were used. To identify corporate governance practices in India, a structured questionnaire after pre-testing was served to collect data. The validity of the questionnaire was first tested by extensive review of the relevant literature. Subsequently, these items were submitted to a panel of three academicians and three company secretaries for evaluation. They examined each item for its consistency with the best practices in corporate governance as per SEBI regulations and also recommended additional items for the inclusion. The reliability was measured by the test-retest reliability technique, wherein, five respondents were administered the questionnaire and were then re-administered after a two weeks time. The degree of similarity between the two measurements was then determined by computing a correlation coefficient. The coefficient of correlation was 0.81 between the test and the retest. A score of 0.80 or more is considered to be highly satisfactory for group measurement *(www.arts.arizona.edu).* The questionnaire was found to be both valid and reliable and was subsequently administered to the respondents.

All listed companies in India comprehend the universe of the study as SEBI regulations relating to corporate governance are applicable to listed companies in the form of Clause 49 of listed agreement. The size of sample taken for the above study was 100 listed companies covering a broad cross-section of various size-groups, industry–groups, ownerships and various geographical areas.

26

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

The survey was conducted during May 2008 to October 2008, constituting a total period of six months. The questionnaire was e-mailed as an attachment to prospective respondents (Company Secretaries) and few of the organizations were approached in person. Despite repeated reminders, the response rate was quite low as only two usable questionnaires could be received. Finally, the questionnaire was put on the website to be filled online and directly submitted to the investigator. Finally, a total of 52 questionnaires were received, out of which two incomplete questionnaires were rejected. So the present study is based on the findings of the 50 companies.

4.1   Developing Corporate Governance Quality Index

The quality of corporate governance has been measured from the responses of company secretaries to the questionnaire and scoring them. All the studies have their own ways of scoring corporate governance practices. Objectivity and consistency are said to be the hallmarks of any good corporate governance scoring methodology. Black, Jang and Kim (2003) choose 42 items from 123 survey questions, excluding those asking about management's views rather than facts, those irrelevant to corporate governance, those that are ambiguous as to whether they represent good or bad corporate governance, and those to which the answers vary little from firm to firm. These 42 items are then classified into four categories: shareholders' rights, board of directors in general, outside directors, and disclosures and transparency, each of which has an equal weight of 0.25. The survey by Klapper and Love (2004) includes a total of 57 questions with answers in yes or no. They are classified into the following seven categories: discipline, transparency, independence, accountability, responsibility, fairness, and social awareness. Each category has a weight of 0.15 except for the last one i.e. social awareness, which has a weight of 0.10. The scores for Campos, Newell and Wilson (2002) are based on the following 15 elements of good governance derived from the OECD's principles of corporate governance (OECD, 1999) categorized into three categories that include a) Ownership and shareholder protection: dispersed ownership, transparent ownership, one share/one vote, anti-takeover defenses, and meeting notification; b) Board of directors: board size, outside directors, independent directors, written board guidelines, and board committees; and c) Disclosures and

transparency: disclosure, accounting standards, independent audits, broad disclosures and timely disclosures.

While developing the methodology for evaluating the adoption of corporate governance practices by the sampled companies in this study, both objectivity and consistency have been given due consideration. In total, the questionnaire contained seventy nine (79) questions including sub-questions. The scoring of corporate governance practices to develop an index of corporate governance quality has been done according to the methodology adopted by the Institute of Company Secretaries of India (ICSI). For the purpose of analysis, the questionnaire was divided into five sections namely (1) transparency and disclosure compliances, (2) shareholders' rights and relationships, (3) board composition, independence and governance, (4) functioning of board and board committees, and (5) stakeholder value enhancement and corporate social responsibility/other corporate governance Initiatives. Each question within a section carries a score of 10 at the maximum. Where there are a number of items in a question, the maximum score obtainable is distributed amongst them. The score obtained in each section is summed up and then the weightage factor is applied for that section to calculate the score earned by the company in that particular section. In the process, as there are five sections, equal weights are assigned to each section i.e. 20 percent each to avoid any subjective judgment of the relative weight assigned to any section. The weighted scores obtained in each section are the scores for the sub-index ranging between 0-20. Next, scores from sub-indices are compiled into overall corporate governance quality index. Each sub-index is calculated as the weighted average score of its contained questions and a Corporate Governance Quality Index (CGQI) is calculated for each company as the sum total of five sub-indices. Therefore, the CGQI ranges from 0 to 100, with better-governed firms having higher index scores.

4.2   Relationship between the Quality of Corporate Governance and Firm Performance

To study the relationship between quality of corporate governance and firm performance, the following variables were selected for the study, which have been defined differently by different researchers. Operational meaning to these variables is given in Table 1.

27

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

4.2.1   Dependent Variables

Market performance/valuation of the firms is the dependent variable. Data on two measures of firm performance i.e. Tobin's Q ratio and Market-to-Book Value ratio has been collected.

Tobin's Q is defined as the ratio of market value of equity and market value of debt to the replacement cost of assets. But in the Indian context, the calculation of Tobin's Q is difficult because corporate debts are not actively traded in the debt market and Indian companies report asset values at historical costs rather than at replacement costs. Hence, a proxy for Tobin's Q has been computed according to the approach adopted by Garg (2007) (Table 1), which is a slightly modified version of the computation by Chung and Pruitt (1994) who report that his computation approximates the actual Q to the extent of 96 percent. The modification has been done to make it compatible with the manner of reporting in the Indian context.

Market-to-Book Value (MBV) ratio is defined as the ratio of market value of equity to book value of equity (Sarkar & Sarkar, 2000). Market-to-Book Value (MBV) ratio has been computed as market value of common stock divided by book value of common stock.

It is expected that there would be a positive relation between firm performance and firm-level corporate governance as a consequence of lower expropriation of minority shareholders and other external investors.

4.2.2   Independent Variable

Corporate Governance Quality Index indicated as CGQI, has been defined as the constituent of five sub-indices i.e. Transparency and Disclosure Index (2) Shareholders' Rights and Relationships Index (3) Board Composition and Independence Index (4) Board and Committees Functioning Index and (5) Corporate Social Responsibility and Stakeholders Value Enhancement Index.

4.2.3   Control Variables

Apart from the governance characteristics, the performance of a firm is influenced by other factors too and the existing literature suggests that it is customary to control for the effect of these external factors to avoid any spurious relationship with the variables of interest. Control variables for the study include:

(a)   Firm Size

Firm Size is defined as total assets of the firm. Firm size can affect both market valuation and a firm's governance practices. Till date, the nature of the relationship between firm-level corporate governance and firm size is not clear. According to Klapper and Love (2004), larger firms could face greater agency costs as a consequence of their free cash flow, requiring better corporate governance practices to alleviate this problem. Besides, larger firms have more financial resources available to implement additional and costly corporate governance initiatives. On the other hand, smaller firms tend to grow faster and, thus, require more external capital. Therefore, both have incentives to voluntarily adopt better corporate governance practices. This study uses two alternative measures of size namely, the Log of Book Value of Assets (LnBVA) and Log of Market Capitalization (LnMC) to control for firm size.

(b)   Profitability

Profitability is expected to be positively related to market valuation. It is very likely that investors in India do value listed firms and make investments based on the firm's profitability. Singhvi and Desai (1971) indicate that high earnings motivate managers to comply with the rules and disclose detailed information in order to assure investors of the firm's profitability whereas when earnings are low, managers may not comply fully with the accounting rules in order to conceal the reasons for declining profits. If investors are assured of the profitability of the firm, they would be more inclined to invest in shares of the company, thereby resulting in higher market valuation. In this study, to control for the effect of profitability on market valuation, the ratio of Return on Equity (ROE) has been used as a measure of operating performance like the approach adopted by Cheung, Jiang, Limpaphayom and Lu (2007). Alternatively, ROA (Return on Assets) has also been used.

(c)   Total Affiliated Shareholdings

Total Affiliated Shareholdings (TAS), defined as percentage share ownership by all affiliated shareholders is expected to affect market valuation positively (Black et al., 2003). It is believed that owner-controlled firms tend to perform better.

(d)   Leverage

Financial leverage is the ratio of long term debt to total equity plus retained earnings and it can affect market valuation and corporate governance. McConnell and Servaes (1995) find that leverage is positively correlated to firm value when investment opportunities are scarce, which is consistent with the hypothesis that debt alleviates the overinvestment problem. On the other hand, other researchers find no such relationship between

28

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

leverage and firm performance (Agrawal & Knoeber, 1996; Beiner, Drobetz, Schmid & Zimmermann, 2003). The study uses Debt-Equity ratio (DE) as an additional control mechanism.

(e)   *Dummy Variables*

Two dummy variables i.e. Index dummy and CEO dummy have been used for the purpose of the study, which are discussed below.

If a firm is included in any national stock index, the company definitely is expected to perform better. Index dummy is having a value of 1 if the firm is included in BSE/NSE index and 0 otherwise.

When different persons hold the positions of Chief Executive Officer (CEO) and the Chairman of the board of directors, it is considered to be the recommended best practice (Cadbury, 1992) and the market may favor companies with such best practices. Dahya, Lonie and Power (1996) found that the stock market reacted favorably to the separation of two positions i.e. CEO and Chairman, and negatively if the two positions were combined. CEO dummy has been used for this purpose which is having a value of 1 if the positions of CEO and the chairman of the board of directors are held by different persons and 0 otherwise.

Table 1. Operational Meaning of the Variables

Variables	Acronym	Description
Dependent Variables		
Tobin's Q	Tobin's Q	Tobin's Q is computed as (MV of common stock+ BV of preference stock+ BV of borrowings + BV of CL)/ BV of total assets as denoted by FA + INV + CA) with all values computed at the end of year.
Market-to-Book Value	MBV	Market value of common stock divided by book value of common stock
Independent Variables		
Corporate Governance Quality Index	CGQI	Overall corporate governance quality index obtained from the factual

Variables	Acronym	Description
		information collected from company secretaries of the company (having value 0-100).
Transparency and Disclosure Index	TDI	Based on all disclosure related questions (having value 0-20).
Shareholder Rights Index	SRI	Based on rights of shareholders (having value 0-20).
Board Composition and Independence Index	BCII	Based on composition and independence of the board (having value 0-20).
Board and Committees Functioning Index	BCFI	Based on functioning of board and its various committees (having value 0-20).
CSR & Stakeholder Value Index	CSVI	Based on corporate social responsibility and stakeholder value enhancement initiatives (having value 0-20).
Control Variables		
Return on Equity	ROE	Computed as profit after taxes divided by net worth (shareholder equity).
Return on Assets	ROA	Computed as profit after taxes divided by total assets.
Book Value of Assets	BVA	Book value of assets in Lacs. (proxy for firm size)
Total Affiliated Shareholding	TAS	Percentage share ownership by all affiliated shareholders.
Debt-Equity Ratio	DE	Computed as total debt divided by net worth (shareholder equity).
Index Dummy	INDUM	1 if the firm is included in BSE/NSE index; 0 otherwise.
CEO Dummy	CEODUM	1 if the positions of CEO and the chairman of the

29

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

		board of directors are held by different persons; 0 otherwise.

5. Results

The results of the analysis are presented in the following sub-sections. Firstly, the Corporate Governance Quality Index (CGQI) for the sampled

companies has been described followed by descriptive statistics of the CGQI, TOBINQ and other variables used in the study. Thereafter, the results of correlation and regression analysis are presented.

5.1 Descriptive Statistics

This section describes CGQI, sub-indices along

Table 2. Descriptive Statistics of CGQI

Minimum	Maximum	Mean	Mode	Median	Standard Deviation	1st Quartile	3rd Quartile	Skewness	Kurtosis
50	79	65.94	66	66.0	6.80	61	71	-.113	-.114

Table 3. Frequency Distribution of CGQI

Total Score	Frequency (N)	Cumulative N	Percent (%)	Cumulative %
71-80	11	11	22.0	22.0
61-70	31	42	62.0	84.0
51-60	7	49	14.0	98.0
Below 50	1	50	2.0	100.0
Total	50		100	

Table 4. Descriptive Statistics of the Sub-indices

Sub-index	Number of Observations (N)	Minimum	Maximum	Mean	Standard Deviation
TDI	50	9	19	15.48	2.32
SRI	50	7	17	12.64	2.42
BCII	50	6	15	11.44	1.77
BCFI	50	7	18	14.34	2.03
CSVI	50	5	18	12.22	2.73

Table 5. Correlation Matrix for Tobin's Q, CGQI and Other Variables

*, **, and *** respectively indicate significance levels at 10%, 5%, and 1% levels. Statistically significant correlations (at 5% level or better) are shown in **boldface**.

	TOBINQ	CGQI	ROE	LNBVA	DE	TAS	INDUM	CEODUM
TOBINQ	1.000	**.855***	**.617***	**.319**	-.008	-.044	**.318**	-.209
CGQI	**.514***	1.000	**.652***	**.303**	-.021	.098	**.322**	-.211
ROE	**.559***	**.430***	1.000	.235*	.072	-.032	**.289**	**-.293**
LNBVA	.265*	**.422***	.221	1.000	.004	-.044	**.412***	**-.312**
DE	-.061	.148	-.046	.143	1.000	**-327**	-.096	.110
TAS	.097	.071	.060	.147	-.149	1.000	**.331**	-.037
INDUM	.180	**.327**	.156	**.720***	.235*	.260*	1.000	**-.297**
CEODUM	-.136	-.206	**-.300**	**-.339**	-.030	-.068	-.297**	1.000

30

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Table 7. Correlation Matrix for Tobin's Q, CGQI and Various Sub-indices
*, **, and *** respectively indicate significance levels at 10%, 5%, and 1% levels. Statistically significant correlations (at 5% level or better) are shown in **boldface**.

	TOBINQ	CGQI	TDI	SRI	BCII	BCFI	CSVI
TOBINQ	1.000	**.855***	**.567***	**.584***	**.444***	**.484***	**.514***
CGQI	**.514***	1.000	**.566***	**.738***	**.499***	**.574***	**.640***
TDI	**.356**	**.538***	1.000	**.287**	.107	.203	.159
SRI	**.371***	**.725***	.249*	1.000	.266*	**.310**	**.344**
BCII	**.304**	**.467***	-.008	.251*	1.000	.276*	.166
BCFI	.237*	**.647***	.189	**.398***	.229	1.000	.242*
CSVI	**.293**	**.678***	.163	**.355**	.203	.229	1.000

with other variables used. According to Table 2, CGQI for the sampled companies is ranging between the minimum score of 50 and maximum score of 79 with a mean value of 65.94, median 66 and standard deviation of 6.80.

Note: Number of Observations (N): 50

From the Table 3, it is clear that the quality of corporate governance of the firms in the sample is just above average but not in the higher range. Descriptive statistics of various sub-indices are shown in Table 4.

5.2   Correlation Results
The results of the correlation analysis among various variables used in the study are shown in the following tables.

5.2.1   Correlation Results of Tobin's Q/MBV, CGQI and other Variables
Table 5 provides the Pearson (below diagonal) and Spearman (above diagonal) correlation coefficients of Tobin's Q, CGQI and other control variables.

Table 5 indicates that the Pearson and Spearman correlation coefficients between Tobin's Q and CGQI are 0.514 and 0.855 respectively. This correlation is in accordance with the widely accepted hypothesis of positive relation of corporate governance and firm performance. The Pearson and Spearman correlation coefficients between Tobin's Q and ROE clearly indicate that market performance of the firm increases with profitability of the firm. The Pearson correlation

coefficient between Tobin's Q and LnBVA is statistically insignificant but the Spearman correlation between Tobin's Q and LnBVA is significant. The finding is consistent with the one by Mayur and Sarvanan (2006) who found a positive correlation between performance and size of the banks. Hall and Weiss (1967) also found a weak positive correlation between size and value of the firm. The Pearson and Spearman correlation between Tobin's Q and INDUM is significantly positive. This indicates that market value of firm is positively correlated with the firm's presence on any stock index as expected. The Pearson and Spearman correlation of Tobin's Q with DE, TAS and CEODUM are insignificant. All the significant correlations remain exactly the same when MBV replaces Tobin'Q.

5.2.2   Correlation Results of Tobin's Q/MBV, CGQI and Various Sub-indices
Table 7 reveals that the Pearson and the Spearman correlation coefficients of Tobin's Q with TDI, SRI and BCII are all significant at 1% level of significance. The Pearson correlation between Tobin's Q and BCFI is insignificant, but the Spearman correlation between Tobin's Q and BCFI is significant. The Pearson and Spearman correlation coefficients of Tobin's Q with CSVI are are significant. All the correlations of CGQI and its constituent sub-indices are highly positive and significant, as expected. When Tobin's Q is replaced with MBV, all the correlation results remain same except that Pearson correlation of

31

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

MBV with BCFI and CSVI is positive but insignificant.

5.3   Regression Results

The above correlation analysis suggests a positive and significant relationship of Tobin's Q/ MBV with CGQI, ROE, LnBVA and INDUM. All the sub-indices, too, are positively correlated with Tobin's Q and MBV ratio. To further analyze these relationships and to test the hypothesis (*Ho*), stepwise regression analysis was run using Statistical Package for the Social Sciences (SPSS 16) to find out the predictors of firm performance. Tobin's Q and MBV ratio are used as proxy for a company's performance as reflected in its market valuation. Many firm characteristics can potentially be associated with both Tobin's Q and governance. Therefore the study includes a comprehensive set of control variables to limit omitted variable bias (Balasubramniam, Black & Khanna, 2008).

5.3.1   Regression Results for Tobin's Q/ MBV, CGQI and Control Variables

In order to find out the contribution of quality of corporate governance and other variables on the firm performance, two stepwise regressions are run where Tobin's Q and MBV ratio respectively are taken as dependent variables respectively. The following tables sum up the results of regression analysis.

Table 8 presents the regression results when Tobin's Q is taken as the dependent variable and CGQI as an independent variable and the first stepwise regression is run. It can be seen that in model 1, ROE is the first variable to enter the equation and explains 32.6 percent variance in Tobin's Q as shown by R^2. This is increased to 43.1 percent when CGQI enters the equation in model 2 (i.e. there is a 10.5 percent increase and is statistically significant). Adjusted R^2 for model 1 is .310 and model 2 is .403. For the initial model 1, F-ratio is 19.845 and is highly significant at less than 1% level of significance and it becomes 15.171 but remains significant at less than 1% level of significance. The Durbin-Watson statistic, which is used to test for the presence of serial correlation among the residuals, for this problem is 1.949, which falls within the acceptable range from 1.50 to 2.50 and satisfies the assumption of independence of errors. The Variance Inflation Factor (VIF), which is used to assess multi-collinearity, ranged between 1.0 and 1.16. Threshold values of tolerance (not shown in the table) above .10 and VIF scores of less than 10

suggest minimal multicollinearity and stability of the parameter estimates.

Table 8. Regressions of TOBIN'S Q on CGQI and Control Variables

This table reports the regression model using Tobin's Q as the dependent variable and CGQI as the independent variable and other variables as control variables. T-statistics are reported in parentheses. ***, **,** and ******* respectively indicate significance levels at 10%, 5%, and 1% levels. Statistically significant results (at 5% level or better) are shown in **boldface,** except for the intercept term.

TOBIN'S Q		
	(1)	(2)
Intercept	1.064***	-4.403**
	(3.954)	(-2.174)
ROE	**.054*****	**.041*****
	(4.455)	**(3.424)**
CGQI		**.085****
		(2.720)
LnBVA		-.018
		(-.133)
DE		-.074
		(-.601)
TAS		.046
		(.384)
INDUM		-.028
		(-.221)
CEODUM		.015
		(.119)
R^2	.326	
	.431	
Adjusted R^2	.310	
	.403	
F-Stats	19.845***	
	15.171***	
Durbin-Watson	-----	
	1.949	
VIF	1.000	
	1.163	

Analysis of the regression coefficients in Table 8 indicates that CGQI (*b* = .085, t statistic = 2.720 and *p*< .05) is positively contributing towards firm performance. This implies that good quality of corporate governance measured by CGQI guarantees a high market valuation in India's stock market. This finding is consistent with other findings that corporate governance and market valuation are positively related (Bai, Liu, Lu, Song & Zhang, 2003; Black et al., 2006; Beiner et al,

32

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

2004). Out of all other variables, the only significant control variable is ROE (b= .041, t statistic =3.424 and $p<$ .01). This result is as expected as investors in India seem to be prudent and value Indian listed firms based on their profitability. All other control variables have been excluded in stepwise regression results as these don't have a significant positive or negative coefficient, implying that these variables don't influence our dependent variable, Tobin's Q, to a significant extent endogenously but their exogenous effects can not be ruled out. Most surprising results include the negative coefficients for LnBVA and INDUM. The study does not find any significant relationship between Tobin's Q and CEO duality as reflected by CEODUM (Weir et al., 2002; Weir & Laing, 2000).

The results remain same when Tobin's Q is replaced by MBV as the dependent variable as reported in Table 9 which reveals that ROE and CGQI enter the equation in the same sequence. ROE is the first variable to enter the equation and explains 26.3 percent variance in Tobin's Q as shown by R^2. This is increased to 38.0 percent when CGQI enters the equation in model 2 (i.e. there is 11.7 percent increase and statistically significant). Adjusted R^2 for model 1 is .245 and for model 2 is .349. For the initial model, F-ratio is 14.600 and is highly significant at less than 1% level of significance and it becomes 12.278 but remains significant at less than 1% level of significance.

Table 9. Regression of MBV on CGQI and Control Variables

This table reports the regression model using Market to Book value ratio (MBV) as the dependent variable and CGQI as the independent variable and other variables as control variables. T-statistics are reported in parentheses. ***, **,** and ******* respectively indicate significance levels at 10%, 5%, and 1% levels. Statistically significant results (at 5% level or better) are shown in **boldface,** except for the intercept term.

MBV		
	(1)	(2)
Intercept	1.539***	-7.348**
	(3.559)	(-2.262)
ROE	**.074***	**.054**
	(3.821)	**(2.786)**
CGQI		**.139**
		(2.758)
LnBVA		-.082
		(-.615)

DE		-.070
		(.542)
TAS		.052
		(.413)
INDUM		-.038
		(-.285)
CEODUM		.018
		(.138)
R^2		. 263
		.380
Adjusted R^2		.245
		.349
F-Stat		14.600***
		12.278***
Durbin-Watson		-----
		1.926
VIF		1.000
		1.163

The Durbin-Watson statistic for this problem is 1.926 which falls within the acceptable range from 1.50 to 2.50 and satisfies the assumption of independence of errors. The VIF scores ranged between 1.0 and 1.163. Threshold values of tolerance (not shown in the Table 5.11) above .10 and VIF scores of less than 10 suggest minimal multi-collinearity and stability of the parameter estimates.

Two significant predictors of the firm performance are ROE (b= .054, t statistic =2.786 and $p<$ .05) and CGQI (b = .139, t statistic =2.758 and $p<$ .05). All other control variables have been excluded in this stepwise regression result also, thereby indicating their exogenous effect only.

5.3.2 Regression Results of Tobin's Q/ MBV, Sub-indices and Various Control Variables

As it is evident from the above analysis that corporate governance quality is a significant determinant of firm performance. To explore which sub-index (constituting CGQI) contributes the most towards firm performance, the regression analysis is conducted. The correlation results for firm performance and individual sub-indices have already revealed a significant and positive relationship of Tobin's Q and MBV with all sub-indices. Further, to find out the contribution of these individual sub-indices towards Tobin's Q, stepwise regression is run, wherein Tobin's Q and MBV are regressed on five sub-indices that comprise: TDI, SRI, BCII, BCFI and CSVI. Each sub-index ranges from 0 to 20. The regression

results of Tobin's Q and MBV on sub-indices with control variables are shown in the Tables 10 and 11 respectively.

Table 10. Regression of Tobin's Q on Sub-indices and Control Variables

This table reports the regression model using Tobin's Q as the dependent variable and various sub-indices as the independent variables and other variables as control variables. T-statistics are reported in parentheses. ***, **,** and ******* respectively indicate significance levels at 10%, 5%, and 1% levels. Statistically significant results (at 5% level or better) are shown in **boldface,** except for the intercept term.

Tobin's Q		
	(1)	(2)
Intercept	1.064***	-1.819***
	(3.954)	(-1.390)
ROE	**.054*****	**.051*****
	(4.455)	**(4.396)**
BCII		**.257****
		(2.247)
TDI		.184
		(1.466)
SRI		.104
		(.737)
BCFI		.081
		(.635)
CSVI		.158
		(1.260)
LNBVA		.124
		(.984)
DE		-.047
		(-.372)
TAS		.092
		(.746)
INDUM		.084
		(.671)
CEODUM		-.225
		(-1.509)
R^2		.326
		.402
Adjusted R^2		.310
		.372
F-Stats		19.845***
		13.427***
Durbin-Watson		-----
		2.103
VIF		1.000
		1.012

Table 10 reports the results when Tobin's Q is regressed against five sub-indices with all the control variables. Analysis of the regression coefficients indicates that ROE ($b = .054$, t statistics = 4.455 and $p < .01$) is the first variable to enter the equation in model 1 and explains 32.6 percent variation in Tobin's Q, followed by Board Composition and Independence Index (BCII) that enters the equation ($b = .257$, t statistics = 2.247 and $p < .05$) in model 2 and accounts for 7.6 percent variation in Tobin's Q as R^2 increases to 40.2 percent. All the other variables and sub-indices are positively related with Tobin's Q (except DE and CEODUM, which are negatively related) but are not statistically significant at all. The VIF scores ranged between the acceptable scores of 1.000 and 1.012 and the threshold values of tolerance were also above the acceptable score of .10. Durbin-Watson statistic for this problem is 2.103 which falls within the acceptable range from 1.50 to 2.50 and satisfies the assumption of independence of errors.

Analysis of the regression coefficients as reported in Table 11 indicates similar results when MBV is used instead of Tobin's Q and is regressed against various sub-indices with all the control variables. ROE ($b = .074$, t statistics = 3.821 and $p < .01$) is the first variable to enter the equation in model 1 and explains 23.6 percent variation in MBV, followed by Board Composition and Independence Index (BCII) that enters the equation ($b = .418$, t statistics = 2.280 and $p < .05$) in model 2 and causes another 11.1 percent variation in MBV as R^2 increases to 34.7. All other variables and sub-indices are positively related with MBV (except CEODUM which is negatively related) but are not significant at all. The VIF scores ranged between the acceptable scores of 1.000 and 1.012 and the threshold values of tolerance were also above the acceptable score of .10. Durbin-Watson statistic for this problem is 2.103 which falls within the acceptable range from 1.50 to 2.50.

Table 11-Regressions of MBV on Sub-indices and Control Variables

This table reports the regression model using MBV as the dependent variable and various sub-indices as the independent variables and other variables as control variables. T-statistics are reported in parentheses. ***, **,** and ******* respectively indicate significance levels at 10%, 5%, and 1% levels. Statistically significant results (at 5% level or better) are shown in **boldface,** except for the intercept term.

MBV		
	(1)	(2)
Intercept	1.539***	-3.514
	(3.559)	(-1.503)
ROE	**.074***	**.069***
	(3.821)	**(3.739)**
BCII		**.418**
		(2.280)
TDI		.233
		(1.802)
SRI		.170
		(1.167)
BCFI		.094
		(.708)
CSVI		.126
		(.961)
LNBVA		.093
		(.703)
DE		.096
		(.736)
TAS		.101
		(.779)
INDUM		.150
		(1.167)
CEODUM		-.235
		(-1.510)
R^2		.236
		.347
Adjusted R^2		.245
		.315
F-Stats		14.600***
		10.648***
Durbin-Watson		-----
		2.103
VIF		1.000
		1.012

In both the regressions, Board Composition and Independence Index (BCII) has been found to be positive and statistically significant. The strong results for BCII are consistent with the multi-country results in Dahya, Dimitrov and McConnell (2008) and the results for Korea in Black and Kim (2008). Both these studies have found that board structure is associated with higher firm market value. Researchers have also found evidence of positive investor reaction to the Clause 49 reforms, in which board independence was a central aspect (Black & Khanna, 2007; Dharmapala & Khanna, 2008).

5.4   Robustness Checks

To check the robustness of the findings of the study, some additional empirical tests have been performed by using other proxies. Alternative proxies of dependent and independent variables have been used as a measure of robustness check.

As done earlier, the dependent variable MBV is used as a proxy for market valuation, replacing Tobin's Q and the empirical results remain similar. There is a statistically significant relationship between market valuation and corporate governance quality.

Some of the independent variables are also replaced by other proxies in the following regressions such as LnBVA being replaced by LnMC and ROE being replaced by ROA. The main results remain unchanged. The market valuation reflecting market performance of the firms, measured in terms of Tobin's Q and MBV is found to be related to CGQI under all regressions.

The analysis supports alternative hypothesis H1 i.e. better quality of corporate governance ensures better financial performance of the firms. Therefore, null hypothesis H0 is rejected.

6.   Findings of the Study

While most of the previous studies used data from many countries to analyze the relationship between corporate governance and firm performance, this study has been conducted in India. A composite measure of corporate governance quality i.e. CGQI is developed and firm performance is measured through Tobin's Q and Market to Book Value ratio (MBV). The study finds that there is a positive statistically significant relationship between quality of corporate governance and firm's market value in India and supports the widespread hypothesis of a positive relationship between corporate governance and market performance of the firm. An increase in CGQI by one point (where the index ranges from 1-100) causes an increase of the market capitalization by 8.5%, on average, of company's book asset value i.e. Tobin's Q. At the same time, an increase in CGQI by one point (where the index ranges from 1-100) causes an increase of 13.9% in MBV ratio. This result is consistent with prior extensive research in other countries and cross-country research studies (Balasubramniam et al., 2008; Beiner et al., 2004; Black, 2001; Black et al., 2003; Brown & Caylor, 2006; Durnev & Kim, 2005; Gompers, Ishii & Metrick, 2003; Nam & Nam, 2005).

A sub-index for board composition and independence i.e. BCII is individually significant

35

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

whereas other sub-indices, though positively related, are not significant individually. The strong results for BCII are consistent with prior studies (Black & Khanna, 2007; Black & Kim, 2008; Dahya et al., 2008; Dharmapala & Khanna, 2008).

Another very interesting finding of the study is that profitability (as measured by ROE and ROA) is most strongly and positively associated with firm valuation. Profitability comes out to be a significant predictor of firm's market value, even stronger than CGQI. This can be explained with the help of the notion that Indian investors are prudent enough to invest in and value Indian listed firms based on their profitability. Also, it can be said that Tobin's Q, MBV, ROE and ROA, all are different measures of firm performance and therefore show a strong positive association amongst themselves.

All the major results of the study are robust to alternate measures of firm value and other proxies used in the study.

7.   Directions for Future Research

Despite few limitations, it is believed that this study has extended the previous limited research by contributing some new valuable insights into the corporate governance practices, particularly in India. It also provided empirical support for some theoretical propositions and it is hoped that the conceptual framework proposed and validated in this research forms the basis for future studies of scholarly nature. The constraints like paucity of time and resources experienced for the completion of this study logically necessitate further extension of this study. The results, although strong, are necessarily limited in their generalizability. Future studies could expand the potential generalizability by adopting some or all of the following suggestions.

Longitudinal Research Design: The cross-sectional nature of the data in this study restricts conclusions to those of association, not causation. A longitudinal research design spanning over a number of years could undoubtedly provide a richer understanding of the relationships present in the study.

Role of Additional Factors: In spite of the large number of variables included in the research, not all potentially relevant variables affecting quality of corporate governance and firm performance have been examined. Many other factors influence the performance of the firm and all of them would not have been controlled for in the study. Future research should investigate the

significance and relative importance of other variables on the performance of firm in India.

More Sophisticated Procedures: In this study, to construct summary indices, equal weightage has been given to all governance factors. Future research wishing to find the link between corporate governance and firm value should consider using more sophisticated weighing procedures rather than equally weighing all the factors that data providers posit to be good governance.

Exploring novel relationships: The focus of the study had been on corporate governance and firm valuation. It is well recognized that better corporate governance is advocated for reasons aside from enhancing firm value, such as fairness and equity. It is plausible that governance factors unrelated to firm value are important for these other purposes. Future research should consider examining corporate governance in these other contexts too.

8.   Conclusion

The present research makes a number of contributions with an aim to broaden the scope of the corporate governance literature. First, at the theory extension level, this study extends the corporate governance literature using theories and frameworks from the area of corporate governance and firm performance. Secondly, at the conceptualisation and measurement level, the research seeks to retest variables used in preceding studies for investigating the influence of these variables on firm's performance. Besides being theoretically insightful, the study has several important managerial implications. The findings suggest that the good corporate governance is an important determinant of its performance. Regardless of within country variations in the corporate governance practices, many firms choose to adopt governance provisions beyond what can be considered the norm in the country despite the costs associated with improving corporate governance and such improvements in corporate governance are reflected in higher market valuations. The findings contribute to the current policy debate on the rewards to the companies for improving corporate governance and provide fresh evidence to those firms which are still diffident on the issue of whether to follow best practices or not for improving their market performance as the results support the notion "better governed firms prove to be better in terms of their market valuation". Thus it appears that managers should

36

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

strive to improve the corporate governance of their companies.

Acknowledgements

References

Abowd, J. M. and Kaplan, D.S., *"Executive Compensation: Six Questions That Need Answering"*. Journal of Economic Perspectives. Vol. 13, pp. 145-168, 1999.

Agrawal, A. and Knoeber, C. R. *"Firm Performance and Mechanisms to Control Agency Problems between Managers and Shareholders"*, Journal of Financial and Quantitative Analysis,Vol. 31, pp. 377- 397, 1996.

Agrawal, A. and Knoeber, C. R. *"Outside Directors, Politics, and Firm Performance"*. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id =85310 , 1999. Last accessed 12-3-2006.

Aman, H. and Nguyen, P. *"Do Stock Prices Reflect the Corporate Governance Quality of Japanese Firms?"* Retrieved from http://papers.ssrn.com/sol3/ papers.cfm?abstract_id=983301, 2007. Last accessed 12-5-2006.

Bai, C. E., Liu, Q., Lu, J., Song, F. M. and Zhang, J. X. *"Corporate Governance and Market Valuation in China"*. Working Paper, University of Hong Kong, 2003.

Balasubramniam, N., Black, B. S. and Khanna, V. *"Firm-level Corporate Governance in Emerging Markets: A Case Study of India"*. University of Texas Law, Law and Economics Research Paper No. 87, 2008. Retrieved from http://ssrn.com/abstract=992529

Bebchuk, L. A., Cohen, A. and Ferrell, A. *"What Matters in Corporate Governance?"* Working Paper. Harvard Law School, 2005.

Bebchuk, L. A., Fried, J. M. and Walker, D. I. *"Managerial Power and Rent Extraction in the Design of Executive Compensation"*. The University of Chicago Law Review, Vol. 69, No. 3, pp. 751-846, 2002.

Beiner, S., Drobetz, W., Schmidt, M. and Zimmerman, H. *"Is Board Size an Independent Corporate Governance Mechanism?"* Working Paper, University of Basel, 2003.

Beiner, S., Drobetz, W., Schmidt, M. and Zimmerman, H. *"An Integrated Framework of Corporate Governance and Firm Valuation – Evidence From Switzerland"*. European Corporate Governance Institute Working Paper in Finance, No. 34/2004, 2004.

Bhagat, S. and Black, B. *"The Uncertain Relationship between Board Composition and Firm Performance"* Business Lawyer. Vol. 54, pp. 921-963, 1999.

Black, B. *"The Corporate Governance Behavior and Market Value of Russian Firms"*. Emerging Markets Review, Vol. 2: pp. 89-108, 2001.

Black, B. and Khanna, V. *"Can Corporate Governance Reforms Increase Firms' Market Values: Evidence from India"*. European Corporate Governance Institute Law Working Paper No. xx/2007. Retrieved from http://ssrn.com/abstract=914440, 2007.

Black, B. and Kim, W. *"The Effect of Board Structure on Firm Value: A Multiple Identification Strategies Approach Using Korean Data"*. Working Paper. Retrieved from http://ssrn.com/abstract=*968287*, 2008.

Black, B., Jang, H. and Kim, W. *"Does Corporate Governance Matter? Evidence from the Korean Market"*. Working Paper no. 209. Stanford Law School, John M. Olin Program in Law and Economics. Stanford, CA, 2003.

Black, B., Jang, H. and Kim, W. *"Does Corporate Governance Predict Firms' Market Values? Evidence from Korea"*. Journal of Law, Economics, and Organization Vol. 22, pp. 366-413, 2006.

Brown, L. D. and Caylor, M. L. *"Corporate Governance and Firm Valuation"*. Journal of Accounting and Public Policy. Vol. 25, No. 4, pp. 409-434, 2006.

Brown, L. D. and Caylor, M. L. *Corporate Governance and Firm Performance*. Unpublished working paper, Georgia State University, 2004.

Cadbury, Sir A. *The Report of the Committee on Financial Aspects of Corporate Governance*, London, 1992.

Campos C. E., Newell, R. E. and Wilson G. *"Corporate Governance Develops in Emerging Markets"*. *McKinsey on Finance,* Winter 2002, pp. 15-18, 2002.

Carleton, W., Nelson, J. and Weisbach M. *"The Influence of Institutions on Corporate Governance through Private Negotiations: Evidence from TIAA-CREF"*. The Journal of Finance. Vol. 53, No. 4, pp. 1335-1362, 1998.

37

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Cheung Y., Jiang, P., Limpaphayom, P. and Lu, T. *Corporate Governance in China: A Step Forward?* http://efmaefm.org/ Symposium2007/cheung.pdf. Last accessed on 21-6-2008. Forthcoming in European Financial Management, 2007.

Cheung, Y. L, Connelly, J. T., Limpaphayom, P. and Zhou, L. "*Do Investors Really Value Corporate Governance? Evidence from the Hong Kong Market*". The International Financial Management and Accounting, Vol. 18, No. 2, 86-122, 2006.

Chung, K. H. and Pruitt, S. W. "A Simple Approximation of Tobin's Q". *Financial Management*, Vol. 23, No. 3, pp. 70-74, 1994..

Coles, J. W., McWilliams, V. B. and Sen, N. 2001. "*An Examination of the Relationship of Governance Mechanisms to Performance*". Journal of Management, Vol. 27, pp. 23-50.

Dahya, J., Dimitrov, O. and McConnell, J. J. "*Dominant Shareholders, Corporate Boards, and Corporate Value: A Cross-Country Analysis*". *Journal of Financial Economics*, Vol. 87, pp. 73-100, 2008.

Dharmapala, D. and Khanna, V. "*Corporate Governance, Enforcement, and Firm Value: Evidence from India*". Retrieved from http://ssrn.com/abstract=1105732, 2008.

Drobetz, W., Schillhofer, A. and Zimmermann, H. "*Corporate Governance and Expected Stock Returns: The Base of Germany*". Working paper, University of Basel, 2003.

Durnev, A. and Kim, E. H. "*To Steal or not to Steal: Firm Attributes, Legal Environment, and Valuation*. The Journal of Finance, Vol. 60, pp. 1461-1493, 2005.

Garg, A. K. "*Influence of Board Size and Independence on Firm Performance: A Study of Indian Companies*". Vikalpa, Vol. 32, No. 3, pp. 39-60, 2007.

Gompers. P. A., Ishii, J. and Metrick, A. "*Corporate Governance and Equity Prices*". The Quarterly Journal of Economics, MIT Press, Vol. 118, No.1, pp. 107-155, 2003.

Hall, M. and Weiss, L. Firms Size and Profitability. "*The Review of Economics and Statistics*", August: 319–331, 1967.

Hermalin, B. E. and Weisbach, M. S. "*The Effects of Board Composition and Direct Incentives on Firm Performance*". Financial Management, Vol. 20, No. 4, pp. 101-112, 1991.

Himmelberg, C. P., Hubbard, R. G. and Palia, D. "*Understanding the Determinants of Managerial Ownership and the Link between Ownership and Performance*". Journal of Financial Economics, Vol. 53, pp. 353 -384, 1999.

Karpoff, J., Malatesta, P. and Walkling, R. "*Corporate Governance and Shareholder Initiatives: Empirical Evidence*". Journal of Financial Economics, Vol. 42, pp. 365-395, 1996.

Klapper, L. F. and Love, I. "*Corporate Governance, Investor Protection, and Performance in Emerging Markets*". Journal of Corporate Finance, Elsevier, Vol. 10, No. 5, pp. 703-728, 2004.

Leal, R., Carvalhal-Da-Silva, P. and André, L. "*Corporate Governance and Value in Brazil (and in Chile)*". Inter-American Development Bank, Latin American Research Network, Research Network Working Paper #R-514, 2005. http://www.iadb.org/res/pub_desc.cfm?pub_id=R-514, 2005. Last accessed on 30-3- 2008.

Mayur, M. and Saravanan, P. "*Does Board Size Really Matter: An Empirical Investigation on Indian Banking Sector*". Icfai Journal of Corporate Governance, Vol. 5, No. 2, pp. 22-34, 2006.

McConnell, J. and Servaes, H. "*Additional Evidence on Equity Ownership and Corporate Value*". Journal of Financial Economics, Vol. 27, pp. 595-612, 1990.

McKinsey and Company. *Global Investor Opinion Survey: Key Findings*, 2002.

Millstein, I. and MacAvoy, P. "*Active Board of Directors and Performance of the Large Publicly Traded Corporation*". Columbia Law Review, Vol. 98, pp. 1283-1321, 1998.

Mohanty, P. "*Institutional Investors and Corporate Governance in India*". National Stock Exchange of India Research Initiative Paper No. 15. Retrieved from SSRN: http://ssrn.com/abstract=353820, 2002.

Morck, R., Shleifer, A. and Vishny, R.W. "*Management Ownership and Market Valuation: An Empirical Analysis*". Journal of Financial Economics, Vol. 20, pp. 293–315, 1988.

Nam, S. and Nam, I. C. "*Corporate Governance in Asia: Recent Evidence from Indonesia, Republic of Korea, Malaysia, and Thailand*". www.adbi.org/book/2005/ 02/02/884.corporate.governance.asia/ - 24k, 2005. Accessed on July 3, 2006

Nam, S. and Nam, I. C. *Linkage between the Quality of Corporate Governance and Firm Performance.* http://www.adbi.org/book/ 2005/02/02/884.corporate.governance.asia/linkage

38

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

.between.the.quality.of.corporate.governance.and.firm.performance/, 2005a.   Accessed on July 6, 2006

OECD. OECD "*Principles of Corporate Governance*". Paris: Organisation for Economic Co-operation and Development, 1999.

Sarkar J. and Sarkar, S. "*Large Shareholder Activism in Corporate Governance in Developing Countries: Evidence from India*". International Review of Finance, Vol. 1, No. 3, pp. 161-194, 2000.

Singhvi, S. and Desai, H. "*An Empirical Analysis of the Quality of Corporate Financial Disclosure*". The Accounting Review, Vol. 46, pp. 129-138, 1971.

Sundaramurthy, C., Mahoney, J. M. and Mahoney, J. T. "*Board Structure, Anti-takeover Provisions, and Stockholder Wealth*". Strategic Management Journal, Vol. 18, No. 3, pp. 231-245, 1997.

Toudas, K. and Karathanassis, G. "*Corporate Governance and Firm Performance: Results from Greek Firms*". Retrieved from SSRN: http://ssrn.com/abstract=1067504, 2007.

Weir, C. and Laing, D. "*The Performance-Governance Relationship: The Effects of Cadbury Compliance on UK Quoted Companies*". Journal of Management and Governance, Vol. 4, pp. 265-281, 2000.

Weir, C., Laing, D. and McKnight, P. J. "*Internal and External Governance Mechanisms: Their Impact on the Performance of Large UK Public Companies*". Journal of Business Finance and Accounting, Vol. 29, No. 5 & 6, pp. 579-611, 2002.

Zahir, M. A. and Sisodia, S. "*Towards Understanding Corporate Governance: Developing a Framework*". Apeejay Journal of Management & Technology, Vol. 1, No. 1, pp. 7-14, 2006.

39

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Impact of Foreign Direct Investment (FDI) on Indian Economy:
A Comparison with China and the USA

Prof. A. Q. Khan *
Dr. Taufeeque Ahmad Siddiqui**

Abstract— Recent beguiled financial recession impacted the whole world but surprisingly much negativity has not been witnessed in India. One of the strong reasons for this is attributed to robust financial system. The Indian economy has now come out of the recessionary menace whatsoever. The economic portents now appear to be good and strong enough to expect a growth rate of 9 to 10 percent. For this, to augur successfully huge financial resources are required. In this direction, the Planners are venturing into some more reforms. The economists and the planners opine alike that one of the ways for the development and growth of an economy is the steady and sustainable promotion and the growth of Foreign Direct Investment (FDI).

The FDI boosts efforts for development in several ways, for instance, boosting exports; creating new employment opportunities; increasing technological capabilities and increasing total financial resources for overall development of the economy. A high level of Foreign Direct Investment (FDI) inflows is an indicator of economic health of a country. The Planners have been formulating such economic policies that can assure maximum flow of FDI in the country. There is therefore a clear strong worldwide competition for attracting FDI.

It is said that FDI has to play a novel role in the world economy. The role of FDI has now transformed from a tool to solve the financial crisis to a modernizing force. In Post-Liberalization regime India has experienced tremendous growth in total FDI inflows from an average of US$5-6 billion during previous five years; it has crossed the level of US$ 30 billion. But it still receives far less FDI flows than China and the USA or much smaller economies in Asia like Hong Kong and Singapore in terms of GDP or Gross Fixed Investment. It is not surprising. As India's growth strategies have been reliant primarily on domestic enterprises, Mindset has changed during last decade only.

This research paper thread bear examines the impact of globalization on FDI inflows in India compared to China and the USA.

In the research article impact of FDI on employment has also been analyzed in India. It also seeks to discuss the bi directional relation between FDI and GDP in the three countries in order to assess whether FDI is causing growth or growth rate is prerequisite for attracting FDI in case of India. The authors have also ventured into carving out a set of strategies to deal with the issues and problems in attracting FDI for promotion and growth of international Trade, enhanced employment opportunities and development of infrastructure, consequently contributing to the overall growth and development of Indian economy to achieve and sustain the coveted double digit growth rate.

1.   Introduction

A high level of FDI inflows is an indicator of economic health of a country. The Planners have been formulating such economic policies that can assure maximum flow of FDI in the country. There is a clear strong worldwide competition for attracting FDI. In general it can be mentioned that FDI means capital inflows or outflows from or to abroad that is invested in the production capacity of the host economy and are "usually preferred over other forms of external finance because they are non-debt creating, non-volatile and their returns depend on the performance of the projects financed by the investors. FDI also facilitates international trade and transfer of knowledge, skills and technology." (Planning Commission of India, 2002). FDI is also depicted as a means of modernization and employment generation. Overall benefits of FDI depend on the policies of the host government. It triggers technology spillovers, assists human capital formation, contributes to international trade integration and particularly exports, helps create a more competitive business environment, enhances enterprise development, increases total factor productivity and, more generally, improves the efficiency of resource use (OECD, 2002).

The role of FDI has transformed from a tool to solve the financial crisis to a modernizing

force. According to UNCTAD India has emerged as the second most attractive country for FDI. Only China is ahead of India. The US, Russia and Brazil are behind India. India has experienced tremendous growth in FDI inflows in the last few years, from an average of US$5-6 billion during previous five years to around US$ 30 billion in 2008-09. But it still receives far less FDI flows than China and the USA or much smaller economies in Asia like Hong Kong and Singapore in terms of GDP or Gross Fixed Investment. It is not surprising, as, India's growth strategies have been reliant primarily on domestic enterprises; mindset appears to have changed during last decade only.

2.   Literature review

In the following paragraphs compact reviews of literature on subject-matter of FDI are presented variegated dimensions of FDI are inflows are critically examined to arrive at the research gap and to set the objectives of the study. P. R. Bhat (2008) analyzes the determinants of FDI in ASEAN. The empirical model is estimated for five countries of ASEAN and ASEAN region as a whole for the period 1976-2003. The result of the model shows that there is a positive influence of the size of the economy on FDI inflows in the case of Indonesia and Singapore. The infrastructure is significant for Indonesia and Malaysia in attracting FDI. Exchange rates have an impact on FDI for Malaysia. The model is estimated for panel data of ASEAN region by pooled least square method and fixed effect model. Lardy (1994), Lemoine (2000), and Wei (2000) find that FDI has been a major conduit to China's export and overall economic growth as it did in the rest of the Asian Newly Industrializing Economies (NIEs) since the 1980s until mid 1990. Rajan, Kumar and Vargill (2008) discuss about FDI outflows from India and other emerging Asian economies. According to them since both China and India have also experienced significant outward FDI, otherwise gross FDI inflows would have added much more to reserves. While there is a strong competition for attracting FDI, what is importance of FDI for a country's economic growth? It is definitely a complicated task to separate and quantify the multifaceted packages that FDI offers to the host country. There have been a number of studies attempting to determine the relation between FDI and growth. Generally, studies have found a positive links between FDI and the economic growth.

Blomström and Kokko (2003) communicate that FDI appears less positive in least developed economies, suggesting the existence of threshold level of development is necessary for FDI. Moreover the FDI and growth studies can be criticized also. For instance, a significant criticism is regarding: FDI does not lead to greater productivity and overall economic growth, but these are prerequisites for attracting FDI. Athreye and Kapur (2001) emphasize that since the contribution of FDI to domestic capital formation is quite small, growth-led FDI is more likely than FDI-led growth. Dua and Rasheed (1998) finds that industrial production in India has had a unidirectional positive -causal impact on inward FDI flows thus infers that economic activity is an important determinant of attracting FDI inflows in India, and not vice-versa.

The UNCTAD (1999) mentions that transnational corporations (TNCs) can complement local development efforts by: Increasing financial resources for development; boosting export competitiveness; generating employment and strengthening the skills base; protecting the environment and social responsibility; and enhancing technological capabilities.

3.   Gap, Scope and Objectives

The review of literature reveals that numerous studies have been conducted to assess relation between FDI and growth. Moreover, several research articles have raised the significant issues with regard to FDI also. However, this research paper goes a step further to threadbare examine the impact of globalization on FDI inflows in India compared to China and the USA. It also seeks to discuss the bi directional relation between FDI and GDP in order to assess whether FDI is causing growth or growth rate is prerequisite for attracting FDI in India. Further, in the research paper double log model has been used to find elasticity between different factors.

Against this backdrop the following objectives have been pursued in this study:-
a. To study and examine the overall modus operandi of FDI in Indian economy.
b. To study analytically as to how the FDI has been contributing to the overall growth of the economy.
c. To study FDI on the basis of various components.
d. To study the impact of Globalization on FDI inflows in India, China and the USA.
e. To study impact of FDI on employment in India.
f. To study the causal relation between FDI and the GDP in India, China and the USA.
g. Finally to set a strategy for making FDI inflows beneficial for Indian economy as a whole.

4.   Hypothesis and Methodology of the Study

41

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 Month 2011

A. Ho- The Null Hypothesis presumes that there does not exist bi directional relation between GDP and FDI in India. Hi- The Alternative Hypothesis accepts that there is bi directional relation between GDP and FDI.

B. Ho-The null hypothesis assumes that there is no significant impact of Globalization on FDI inflows in India during the period under review. Hi- The Alternative Hypothesis presumes that there is significant impact of Globalization on FDI inflows in India during the period under review.

C. Ho- The Null Hypothesis presumes that there is no impact of FDI inflows on employment in Telecom sector in India. Hi- The Alternative Hypothesis accepts that there is impact of FDI inflows on employment in Telecom sector in India.

D. Ho- The Null Hypothesis presumes that there does not exist bi directional relation between GDP and FDI in China. Hi- The Alternative Hypothesis accepts that there is bi directional relation between GDP and FDI.

E. Ho-The Null Hypothesis assumes that there is no significant impact of Globalization on FDI inflows in China during the period under review. Hi- The Alternative Hypothesis presumes that there is significant impact of Globalization on FDI inflows in China during the period under review.

F. Ho- The Null Hypothesis presumes that there does not exist bi directional relation between GDP and FDI in the USA. Hi- The Alternative Hypothesis accepts that there is bi directional relation between GDP and FDI in the USA.

G. Ho-The null hypothesis assumes that there is no significant impact of Globalization on FDI inflows in USA during the period under review. Hi- The Alternative Hypothesis presumes that there is significant impact of Globalization on FDI inflows in USA during the period under review.

In order to test the hypotheses the following statistical tools have been used.

Stepwise univariate regression using double log-linear regression functions has been applied. The univariate regression has been used based on the following equation

$$LNY = a + bLNX$$

Where Y stands for dependent variable.
X stands for independent variable
LN represents natural log.
Here "a" is intercept of X on Y and b is the slope of curve.

In first model of first, fourth, and sixth hypothesis Y stands for FDI and X stands for GDP. In order to test causality in second model of the hypotheses variables have been interchanged.

In second, fifth and seventh hypothesis Y represents FDI and X stands for Globalization. Trade openness has been used as the indicator of Globalization. The following formula has been applied to calculate trade openness

Globalisation (GL) = (Import + Export) / GDP

Import, Export and GDP have been taken on current prices.

In third hypothesis y stands for FDI in Telecom sector and x represents employment generated in the sector. In order to assess impact of FDI on employment Telecom sector has been taken because it has been among top sectors, receiving FDI consistently for last many years.

T-test has been applied to verify the degree of significance of coefficient of regression.

The estimates of R-squared, alternatively known as the goodness of fit or the coefficient of determination in regression analysis have also been used. The coefficient of determination measures the strength of linear relationship between the dependent variable and independent variable. It represents the proportion of explained variations to the total variations.

5. Analysis and interpretations

Comparison of India with other Asian countries in terms of FDI as percentage of GDP, percentage of Gross Fixed Investment and FDI per head:

Share of FDI in GDP in countries of Asia is presented in the following table. Table 1 exemplifies share of FDI in GDP in different countries of Asia. In India the share was only 0.7% and 0.8% during the years 2003 and 2004 respectively. In 2006 sudden increase was witnessed, the share which was at a level of 0.9 % in 2005, reached up to 1.9 % in 2006, registering growth of more than 100 %. The reasons for this splendid growth can be attributed to favorable policies of UPA government as well as economic boom during the period. In the next year i.e. 2007 slight decrease was registered when the share stood at 1.7 %. In spite of recession in 2009 the figure touched a slight increased mark of 2%.

On the other hand Pakistan which was at meager 0.6 % during the year 2003 reached up to

On the other hand, the share for China has been more than 7 % from the year 2003 to

Table-1, Share of FDI in GDP in Different Countries of Asia[1]

Country	2003	2004	2005	2006	2007	2008	2009
India	0.7	0.8	0.8	1.9	1.7	1.8	2
China	2.9	2.8	3.4	2.8	2.9	2.1	1.8
Pakistan	0.6	1.1	2	3.4	2.7	2.2	2.1
Vietnam	3.7	3.5	3.7	6.5	8.7	8.1	7.6

Table-2 Share of FDI in Gross Fixed Investment[1]

Country	2003	2004	2005	2006	2007	2008	2009
India	2.9	3.2	2.9	6.4	5.2	5.5	5.9
China	7.3	7	8.4	6.9	7	5	4.3
Pakistan	4.2	7.6	11.5	16.7	12.7	10.2	9.7
Vietnam	11	10.7	11.2	20.4	26.7	24.8	23.1

Table-3, Per head FDI (in US$)[1]

Country	2003	2004	2005	2006	2007	2008	2009
India	4	5	6	16	16	16	18
China	37	43	61	60	60	64	65
Pakistan	4	7	14	27	18	16	17
Vietnam	18	20	24	49	52	70	80

3.4 % in 2006but decreased to 2.1 % during the referred period. In case of China the share has been around 2% from 2003 to 2009 except 2005 when the share crossed level of 3%. Vietnam has been top performer where the share has crossed mark of 8% during 2007. If the share is compared for different countries between 2008 and 2009 (period of recession) India is exception where the share has increased, while all the other countries i.e. Pakistan, China, and Vietnam faced decline in the share.

Share of FDI in Gross Fixed Investment in various Asian countries is shown in table-2. From table 2 it is discernible that share of FDI in Gross Fixed Investment in case of India accounted for 2.9 % in the year 2003. The figure reached up to the tune of 6.4 % during 2006, registering growth of 100 % against the last year i.e. 2005. During the year 2007 the share plummeted to 5.2 %. For next two years i.e. 2008 and 2009 recovery was witnessed when the share reached up to 5.5 % and 5.9 % respectively. For sudden increase in the share during 2006, stable government and favorable policies are said to be main reasons.

2009. After 2007 sudden downward trend was witnessed due to global financial recession. The figure stood at 5 % and 4.3 % during 2008 and 2009 respectively. Although the share for Pakistan has been wavering still it has been better than that of India. In case of Vietnam the share has been continuously in double digits during the years between 2003 and 2009. From the year 2006 it has been more than 20%. Commitment of the government for high growth rate is main reason for this phenomenon.

The FDI per head is better indicator to illustrate implication of FDI because it provides information as regards FDI based on population of the country. Table 3 demonstrates per capita FDI for India, China, Pakistan and Vietnam. In the years 2003, 2004 and 2005 per head FDI for India was US$ 4, US$, 5 and US$ 6 respectively. In next year i.e. 2006 tremendous growth was registered when the amount became more than double of previous year. In the year 2006 the investment reached at level of US$ 16. For next two years the investment remained at the same level. In 2009 again increase was registered, during the year the investment amounted to US$ 18. For sudden growth during 2006 the major causes can be ascribed to stable government and

43

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 Month 2011

dedication of government for maintaining growth rate. Inspite of global recession during last two years the figure of FDI inflows did not come down due to India's strong economic fundamentals.

Although per head FDI in India has reached up to US$ 18 in 2009 still it cannot be compared with China or Vietnam where the investment has reached at the level of US$ 65 and US$ 80 respectively during 2009.

Foreign Direct Investment in India:

It is evident from table 4 that share of

FPI became negative. Reason for this can be attributed to global financial recession and world wide downward trend in stock market.

Comparison of Foreign Direct Investment and Foreign Portfolio Investment in India: In order to demonstrate Comparison between FDI and FPI index number has been presented in table 5. In 2001-02 index number for FDI reached up to the level of 152 from 100 during last year. From the 2002-03 downward trend started that continued for next three years. In the year 2003-04 it declined up to 107. From next year recovery started. Index number which

Table-4, Total Foreign Investment and Share of FDI[1]

Year	Foreign Direct Investment $millions	Foreign Portfolio Investment	Total Foreign Investment	Share of FDI in total Foreign Investment (%)
2000-01	4029	2760	6789	59.346
2001-02	6130	2021	8151	75.2055
2002-03	5035	979	6014	83.72132
2003-04	4322	11377	15699	27.53042
2004-05	6051	9315	15366	39.37915
2005-06	8961	12492	21453	41.77038
2006-07	22826	7003	29829	76.52285
2007-08	34362	27271	61633	55.7526
2008-09	35168	-13855	21313	100

Table-5, Index Numbers of FDI and FPI[1]

Year	Index number of FDI	Index Number of FPI
2000-01	100	100
2001-02	152.1469	73.22464
2002-03	124.969	35.47101
2003-04	107.2723	412.2101
2004-05	150.1862	337.5
2005-06	222.4125	452.6087
2006-07	566.5426	253.7319
2007-08	852.8667	988.0797
2008-09	872.8717	-501.993

FDI in total foreign investment has been wavering. This is so due to volatile nature of Foreign Portfolio Investment. In 2000-01 share of FDI in total foreign investment was 59.32 % that reached up to 83.74 % in 2002-03. In the next year i.e. 2003-04 the share plummeted to 27.5 %. From next year upward trend started that continued during succeeding three years and the share crossed level of 76 % in the year 2006-07. In next year however the share came down at the level of 55 % but again during next year 2008-09 share of FDI became 100 %. This is so because

was at level of 150 in 2004-05, peaked up to the tune of 872 in the year 2008-09. 2004-05 was the year when UPA government came into power, this is main reason which can be attributed to continuous upward trend of FDI.

Index number for FPI that was at 100 in base year i.e. 2000-01 plummeted to 35.4 in the year 2002-03. In succeeding year impressive hike was registered when the index number crossed the level of 400. After zigzag trend for next three years the index number crossed the level of 900 but in next year i.e. the index number became

negative. From the table it is crystal clear that FPI has been highly volatile during the period under review. On the other hand FDI has been comparatively stable. This is so, due to nature of both the investment. FDI is long term investment. It is not easily reversible. Any crisis for one or two years does not impact FDI. FPI, on the other hand, is very volatile. Entry or exit for them is very easy.

Table 6 illustrates Foreign Direct Investment in India since 2000-01. It is discernible from the table that FDI was US$ 4029 million in the year 2000-01 that increased to US$ 6130 million registering growth rate of 52 % in the year 2001-02. For next two years i.e. 2002-03 and 2003-04 the downward trend was witnessed, for the years the investment amounted to US$

bearish mode. From 2004-05 trend of recovery was witnessed. In the year 2004-05 and 2005-06 growth rate of 40 % and 48 % was registered with the investment amounting to US$ 6051 million and 8961 million respectively. In the year 2006-07 FDI registered splendid growth of 154 %, with investment amounting to US$ 22826 million. Reason for this tremendous growth can be ascribed to boom in Indian economy during the period. During the year 2007-08 upward trend continued, in this year the investment amounted to US$ 34362 million with the growth rate of 50%. In the succeeding year i.e. 2008-09 the growth rate declined to the level of 2 %.For the slump in the growth rate noticeable cause is global financial recession. Although the growth rate of 2 % is not at all pleasing, if it is compared

Table-6, Foreign Direct Investment in India[1]

S No	Year	Foreign Direct Investment (million US$)	Growth rate (%)
1	2000-01	4029	
2	2001-02	6130	52.14693
3	2002-03	5035	-17.863
4	2003-04	4322	-14.1609
5	2004-05	6051	40.00463
6	2005-06	8961	48.09122
7	2006-07	22826	154.726
8	2007-08	34362	50.53886
9	2008-09	35168	2.345614
10	CAGR		34.06

Table-7, Component wise Foreign Direct Investment in India [1]
(Amount in US $ million)

Years	FIPB/RBI's Automatic Route/Acquisition	Equity Capital of unincorporated bodies	Re-invested Earnings +	Other Capital +
2000-01	2339	61	1350	279
2001-02	3904	191	1645	390
2002-03	2574	190	1833	438
2003-04	2197	32	1460	633
2004-05	3250	528	1904	369
2005-06	5540	435	2760	226
2006-07	15585	896	5828	517
2007-08	24575	2292	7168	327
2008-09	27329	666	6426	747

5035 million and US$ 4322 million with negative growth of 17.8 % and 14.1 % respectively. For the slump the major causes are attributed to the unfortunate event of 9/11 attack in US leading to the cascading effect on almost all the countries of the world. In many of the economies even including India the stock market went into

with last two years, still it is satisfactory for India because at least it is positive. Most of the countries could not save themselves from adverse impact of the crisis but India is able to maintain positive growth rate. Strong economic fundamentals and controlled privatization are cited to be major reasons for this.

Table 7 presents component wise FDI in India since 2000-01. The data are broadly classified into three components i.e. equity, reinvested earnings and other capital. Equity is again categorized into two parts. The first part includes FDI which comes through RBI's automatic route or FIPB route or through

Reinvestment of earning by Foreign Direct Investors was at the level of US$3350 million in the year 2000-01, increased to US$ 1833 million in 2002-03. In 2003-04 slight decline was registered when the investment decreased to US$ 1460 million. From the next year upward trend started which continued till 2007-08. In the year the investment peaked up to the level of US$

Table-8, FDI through RBI's automatic route/FIPB route/acquisition route[1]

S. No.	Year	RBI route(US$ million)	Share of RBI route in Total FDI(%)	Growth rate of FDI through RBI route (%)
1	2000-01	2339	58.05411	
2	2001-02	3904	63.68679	66.90894
3	2002-03	2574	51.12214	-34.0676
4	2003-04	2197	50.83295	-14.6465
5	2004-05	3250	53.71013	47.92899
6	2005-06	5540	61.82346	70.46154
7	2006-07	15585	68.2774	181.3177
8	2007-08	24575	71.51796	57.68367
9	2008-09	27329	77.70985	11.20651
10	**CAGR**			**39.27**

acquisition route. The part includes data of foreign technology transfer and Merger & Acquisition. The second part illustrates equity share held by those foreign companies who are incorporated in India. It is evident from table 7 that FDI through RBI's automatic route/ FIPB route/acquisition stood at US$ 2339 million in the year 2000-01. After few hiccups during quinquannial period next years the investment reached up to US$ 5540 million in 2005-06. In the year 2006-07 marvelous growth was registered. During the year the investment became almost three times of last year and it reached upto US$ 15585 million. During next two years momentum continued and in 2008-09 the investment reached up to the level of US$ 27329 million. Equity of foreign incorporated bodies which stood at US$ 61 million in the year 2000-01, increased to US$ 190 million in 2002-03. In 2003-4 sudden slump was witnessed when the investment declined to the level of US$ 32 million. The reason for decline may be uncertainty due to election year. In the year 2004-05 fabulous growth was registered when the investment reached up to the tune of US$ 528 million. For the succeeding years upward trend continued and in 2007-08 the investment peaked up to the level of US$ 2292 million.

During the next year i.e. 2008-09 clear impact of recession was seen when the investment plummeted to US$ 666 million.

7168 million. In the year 2008-09, owing to financial crisis the investment however declined to US$ 6426 million.

It is essential to examine the component (RBI's automatic route/FIPB route/acquisition route) separately. The component is most significant, as, Majority of FDI enters in India through this route. This component comprises Foreign Technology Transfer and Merger and Acquisition. It is discernible from table 8 The component of FDI amounted to US$ 2339 million in 2000-01, increased to US$ 3904 million in 2001-02 registering growth rate of 66 %. During next two years i.e. 2002-03 and2003-04 negative growth rate of 34 % and 14 % was registered with investment amounting to US$ 2574 million and US$ 2197 million respectively. From 2004-05 onwards recovery was witnessed when the investment reached at US$ 3250 registering growth rate of 47 %. During next three years upward trend continued with accelerated growth. In the year 2006-07 the investment peaked up to the tune of US$ 15585 million, registering splendid growth of 181 %. This was a period of boom for Indian economy, as, for the period average GDP growth rate was more than 9 %. For succeeding two years i.e. 2007-08 and 2008-09 the investment amounted to US$ 24575 million and US$ 27329 million, with growth rate of 57 % and 11 % respectively.

46

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 Month 2011

Share of the component in total FDI has been wavering in initial years under review. From 2003-04 the upward trend started. In the referred year the share stood at 50 %. The share kept on increasing and finally, touched level of 77 % in the year 2008-09. The upward trend exemplifies increasing investment in foreign technology transfer and Acquisition

Table 10 illustrates result of second model. In this case also independent variable is significant at any level of significance. The constant is significant at 0.03 % level. The same result can be drawn that there is a clear impact of GDP on FDI and the relation is indirect. However, some other macro-economic factors have also impacted GDP. Coefficient of

Table-9, Results of First Hypothesis (Model-1) [1]

		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
Model		B	Std. Error	Beta		
	(Constant)	11.031	0.592		18.642	0
	LN_FDI	0.362	0.055	0.927	6.555	0

Table-10, Results of First Hypothesis (Model-2)[1]

		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
Model		B	Std. Error	Beta		
	(Constant)	-24.736	5.406		-4.575	0.003
	LNGDP	2.378	0.363	0.927	6.555	0

6.   Testing of Hypotheses

Hypothesis-1

Ho- The Null Hypothesis presumes that there does not exists bi directional relation between GDP and FDI in India. Hi- The Alternative Hypothesis accepts that there is bi directional relation between GDP and FDI.

In order to test the hypothesis two models have been used. In both the models the variables have been converted into natural log. In first model Natural log of FDI has been taken as an independent variable and natural log of GDP as a dependent variable. In second model the variables have been interchanged (Appendix 1). Table 9 presents result of first model. It is discernible that Independent variable is significant at any level of significance with T value of 5.66. The constant is also significant at any level of significance with T value of 18.6. It implies there is clear impact of FDI inflows on GDP but the relation is not direct. It appears that some other unknown factors have also played significant roll.

determination of both the variable is almost 85 % which also conveys same result that there is strong positive relation between FDI and GDP. Value of "b" is 2.1 % in second model The value communicates elasticity between GDP and FDI. In other words it can be mentioned that 1 % increase in GDP results into 2.1 % growth in FDI.

"B" is 0.36 % in the first model, elasticity between FDI and the GDP is 0.36 %. It implies that 1 % increase in FDI leads to 0.36 % increase in GDP. This may be very important means to boost GDP growth rate. If FDI increases by 10 % this can add extra 3.6 % to GDP growth rate.

Hypothesis- 2

Ho-The null hypothesis assumes that there is no significant impact of Globalization on FDI inflows in India during the period under review. Hi- The Alternative Hypothesis presumes that there is significant impact of Globalization on FDI inflows in India during the period under review.

Like the first hypothesis in this hypothesis also Natural log form of both the variables has been used. In order to quantify Globalization, trade openness has been taken as the indicator of Globalization. Trade openness stands for percentage of Import and export of

rate.

Hypothesis- 3

Ho- The Null Hypothesis presumes that there is no impact of FDI inflows on employment in Telecom sector in India. Hi- The Alternative

Table- 11, Results of second Hypothesis[1]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	14.454	0.732		19.735	0
	LN GL	3.123	0.598	0.892	5.223	0.001
R^2	0.795826					

Table- 12, Results of Hypothesis-3[1]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1						
	(Constant)	-0.645	0.395		-1.634	0.201
	LNFDI	0.07	0.056	0.589	1.261	0.296

Table- 13, Results of hypothesis 4 (first model)[1]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-11.086	4.047		-2.739	0.029
LNFDI	2.12	0.31	0.933	6.844	0

GDP. Natural Log of Trade openness is an independent variable while Natural Log of FDI is taken as a dependent variable (Appendix 2). Table 11 demonstrates results of the second hypothesis. Independent variable is significant at 1 % level of significance. It indicates that there is clear impact of trade openness on FDI inflows. Coefficient of determination for said variables is 79 %. It indicates that 79 % increase in FDI is explained by Trade openness.

"B" is 3.12 % which indicates elasticity between trade openness and FDI. In other words it can be noted that 1 % increase in trade openness may result into 3.12 % hike in FDI. On the basis of both hypotheses it can be inferred that increase in International trade i.e. Import and Export may lead to increase in FDI and an increase in FDI leads to increase in GDP growth

Hypothesis accepts that there is impact of FDI inflows on employment in Telecom sector in India.

Table 12 demonstrates results of the hypothesis. In order to test the hypothesis Natural Log of FDI inflows to Telecom sector have been taken as independent variable and Natural Log of employment has been taken as dependent variable. T is 1.26 with significance at 29 %. The value is beyond the level of significance, so, null hypotheses is accepted . The result implies that there is no impact of FDI on employment. The reason for this can be attributed to nature of service sector. Although Service sector creates employment but is not proportional to investment.

Hypothesis- 4

Ho-The Null Hypothesis presumes that there does not exist bi directional relation between GDP and FDI in China. Hi- The Alternative Hypothesis accepts that there is bi directional relation between GDP and FDI.

In this hypothesis two models have been used. In the first model Natural log of FDI of China is taken as an independent variable, while Natural Log of GDP of China is considered as a

Like second hypothesis in this hypothesis also Trade openness has been used as the indicator of Globalization. Natural logs of FDI and Globalization have been used as dependent and independent variable respectively (Appendix 4).

It is discernible from Table 15 that independent variable is significant at 0.17 % level of significance which is less than 5 % level of

Table-14, Results of Hypothesis 4 (Second Model)[1]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	6.248	0.996		6.271	0
LNGDP	0.41	0.06	0.933	6.844	0

Table- 15, Results of Hypothesis 5[1]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	13.468	0.135		100.095	0
	LNGL	0.621	0.199	0.764	3.131	0.017

dependent variable. In the second model the variables have been interchanged (Appendix 4). Table 13 presents results of the first model. Impact of the independent variable is significant at any level of significance. Therefore there is clear impact of FDI on GDP. Table 14 shows results of the second model. In this case also impact of Independent variable is significant at any level of significance. A coefficient of determination is 85 % which indicates very high inter dependence of the variables.

Value of "B" is 2.21 % in the first case and it is 0.41 % in the second case. It indicates that 1 % increase in FDI leads to 2.21 % increase in GDP. While 1 % increase in GDP results into 0.41 % increase in FDI.

Hypothesis- 5

Ho-The null hypothesis assumes that there is no significant impact of Globalization on FDI inflows in China during the period under review. Hi- The Alternative Hypothesis presumes that there is significant impact of Globalization on FDI inflows in China during the period under review.

significance. Therefore, there is clear impact of Globalization on Chinese economy.

"b" is 0.62 % which indicates that 1 % increase in Trade openness results in 0.62 % increase in inward FDI. Coefficient of determination of 52 %signifies 52 % of FDI is explained by Trade openness.

Hypothesis- 6

Ho-The Null Hypothesis presumes that there does not exist bi directional relation between GDP and FDI in the USA. Hi- The Alternative Hypothesis accepts that there is bi directional relation between GDP and FDI in the USA.

In order to assess causal relation between GDP and FDI two models have been assumed. In the first model FDI has been taken as an independent variable and GDP as a dependent variable. In the second model the variables have been interchanged. In both the cases all the variables have been taken in Natural Log form (Appendix 5).

49

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 Month 2011

indicates that 1 % increase in Globalization

Table- 16, Results of Hypothesis 6 (First Model)- Impact of GDP on FDI[1]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	6.214	1.243		4.998	0.002
LNFDI	0.7	0.086	0.951	8.11	0

Table- 17, Results of Hypothesis 6 (Second Model)[1]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-6.633	2.593		-2.558	0.038
LNGDP	1.29	0.159	0.951	8.11	0

Table 16 illustrates result of the hypothesis. Impact of FDI on GDP is significant at any level of significance with T value of 8.2. Value of B is 0.7 which signifies 1 % increase in FDI leads into 0.7 % increase in GDP. Table 17 explains impact of GDP on FDI inflows. There is clear impact of GDP on FDI with T value of 8.2, showing significance at any level of significance. In the second model B is 2.1 %. It indicates 1 % increase in GDP results into 2.1 % hike in FDI.

Hypothesis- 7

Ho-The null hypothesis assumes that there is no significant impact of Globalization on FDI inflows in USA during the period under review. Hi- The Alternative Hypothesis presumes that there is significant impact of Globalization on FDI inflows in US during the period under review.

In this hypothesis FDI has been assumed as dependent variable and Globalization as an independent variable. Like other hypotheses in this hypothesis also Natural Log values have been used to run regression (Appendix 5). Table 18

results in to 1.5 % hike in FDI. Coefficient of determination is more than 50 % which indicates that more than 50 % FDI is explained by Globalization.

If a result of India is compared with China and the USA in case of impact of Globalization on FDI it is noticeable that for India elasticity between the variables is 3.2 %.While for China and U.S. It is 0.62 % and 1.5 % respectively. The reason for this can be attributed to FDI being recent phenomenon in India. As in numerous sectors FDI has been permitted recently and limit has been increased. Owing to this reason growth of FDI inflows is splendid. For India this may be a very significant tool to increase FDI. As far as causal relation between FDI and GDP is concerned, it is significant in all the cases but "B" is different in all the hypotheses. The results indicate that in India 1 % increase in FDI results into 0.36 % increase in GDP. On the other hand in U.S. and China 1 % increase in FDI leads to 0.7 % and 2.21 % hike in GDP respectively. If impact of GDP on FDI is observed it is found that 1 %

Table- 18, Results of Hypothesis 7 – Impact of Globalization on US FDI Inflows[1]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	16.496	0.585		28.198	0
LNGL	1.552	0.431	0.806	3.6	0.009

exemplifies result of this hypothesis. Impact of Globalization is significant at 0.09 % level of significance which is well below 5 % level of significance, thus, null hypothesis is rejected. Elasticity between the variables is 1.5 %. It

increase in GDP in India, increases FDI by 2.37 %. In case of the U.S.A. 1% increase in GDP leads to 1.29 % increase in FDI, but in case of China it is 0.41 %.

The analysis suggests that if in a country

development is less, GDP impacts FDI more. As country develops FDI starts to impact GDP but after reaching particular level of development again impact of FDI starts to decline. That's why impact of FDI on GDP in India is less than China and USA. As India will develop sanguinely impact of FDI will also increase.

7. Policy implication and Strategies

It can be mentioned undoubtedly that FDI can boost efforts for development in several ways, for instance boosting export; creating new employment opportunities; increasing technological capabilities and increasing total financial resources for overall development of economy.

Although India has registered tremendous growth in FDI inflows during the reviewed period but, when it is compared with other countries the figures are not encouraging, indeed situation is miserable. "poor infrastructure, excessive bureaucracy and interdepartmental wrangling are slackening the pace of opening in many sectors."(World Economic Forum, 2008).

India lags behind China. China's FDI is concentrated in manufacturing sector, but FDI into India is concentrated mostly in services, for instance, information technology (IT), financial and non-financial services. Manufacturing sectors have more potential to promote ancillary industries which can offer extensive employment opportunities. While India's manufacturing sector has certainly undergone a renaissance in the last few years (Rajan and Rongala, 2007), foreign investors do not see India as a significant manufacturing hub.

The major reasons for this can be attributed to poor infrastructure as well as the labour market rigidities. Though, to connect major cities construction of the Golden Quadrilateral is going on. However, the road will not link much of India. Another infrastructure related problem is power. It is very common to face daily power cuts averaging more than 8 hours a day particularly in the northern region. The other infrastructure concerns are the ports, which can not be compared with world-class ports. Additional to infrastructure the rigidity in labour markets is another major problem. It becomes very difficult to get rid of excess labour or non-performers.

In order to improve infrastructure, FDI should be attracted in this sector. Incentives like tax rebate can be offered. Given potential of India's service sector FDI will continue to come. For those who are investing in services it should

be made mandatory for them to invest certain fixed percentage in infrastructure. Once infrastructure is developed, it will automatic attract by FDI for other sectors also.

In order to facilitate large scale investments including FDI, in the manufacturing sector, a Special Economic Zones (SEZ) Act was enacted in 2006. The law includes matters as regards establishment, functioning and investment of SEZ. Such a strategy has been successful in China in attracting FDI; generating huge employment opportunities in manufacturing sector and enhancing export. Nonetheless, so far, the policy has not been that much successful in India. The major causes for this can be ascribed to relatively small size of the SEZs and attitude of some political parties. Most of the SEZs in India are about 1 square kilometer compared to 100 square kilometers SEZs in China. Experience of Tata's Nano in West Bengal and Reliance's power project in Uttar Pradesh; are glaring instances to exemplify unconstructive attitude of some political parties and state governments.

Emphasis should not only be on absolute amount of FDI inflows but also the direction and composition. The best type of policy would involve steps to improve overall human capital and technical capabilities of the domestic economy without any discrimination. As in the union budget of 2010-11 IT has been announced that now there will be complete removal of restrictions for FDI in the services sectors should be considered, for instance, telecom, insurance, aviation and Direct to Home (DTH) etc. as this will reduce transactions costs for both consumers as well as service providers. Manufacturing sector should be promoted to boost employment without causing harm to service sector, as service sector has huge potential of growth. It should be utilized to increase growth rate of country as a whole.

Policies should be formulated for fast track FDI inflows. As Sanjaya Lall (2000) mentions "unless the agencies have the authority needed to negotiate the regulatory system, and unless the rules themselves are simplified, this may not help. On the contrary, there is a very real risk that a 'one stop shop' becomes 'one more stops'. Although several policy hindrances have been removed on FDI in India, results have been unsatisfactory owing to bureaucratic barriers at both levels state as well as central level. There is urgent need to be greater coordination between the centre and states to make sure that the considerable foreign investment in India gets translated into reality. It is necessary that India should formulate policies to attract FDI into R&D also for escalating the country's technological competence.

51

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 Month 2011

8.   Concluding remarks

There is a clear strong worldwide competition for attracting FDI because it has been accepted worldwide that FDI can boost efforts for development in several ways, for instance boosting export; creating new employment opportunities; increasing technological capabilities and increasing total financial resources for overall development of the economy. India has registered tremendous growth in FDI inflows during the last decade. A total FDI inflow has crossed the level of US$ 30 billion. Analysis in this research paper illustrates that there has been positive impact of FDI on overall growth of the economy. But when it is compared with other countries like China and the U.S.A. or even Vietnam and Pakistan the figures of FDI inflows are not encouraging, indeed situation is miserable. Whatever FDI India is receiving, it is not able to enjoy full benefits of that also. Poor infrastructure, excessive bureaucracy and interdepartmental squabbling are main reasons for the situation.

India requires having huge financial resources to attain and maintain double digit growth rate and overall economic development of the country. For achieving this goal, FDI can play vital rolls. We need to have comprehensive development strategy, which should include openness for trade and favorable business environment for FDI.

References

[1] Bhatt P R, (2008), "Determinants of foreign direct investment in asean" Foreign Trade Review, VOL. XLIII NO.3, Indian Institute of Foreign trade, New Delhi, pp 21-52.

[2] Blomström M and Kokko A, (2003), "The Economics of Foreign Direct Investment Incentives", Working Paper No.9489, NBER.

[3] Daisuke H, (2008), "Japan's Outward FDI in the Era of Globalization", in Rajan RS, Kumar R and Vargill N, eds,(2008) , "New Dimensions of Economic Globalization: Surge of Outward FDI from Asia" World Scientific Press, Chapter 4.

[4] Dua P and Rasheed AI, (1998), "Foreign Direct Investment and Economic Activity in India", Indian Economic Review, 33, pp.153-168.

[5] Lall S, (2002), "Linking FDI and Technology Development for Capacity Building and Strategic Competitiveness" Transnational Corporations 11, pp 39-88.

[6] Lardy N, (1994), "China in the World Economy" Institute for International Economics, Washington DC.

[7] Lemoine F, (2000), "FDI and Opening up the Chinese Economy", Working Paper No.2000-11, Paris.

[8] OECD, (2002), "Foreign Direct Investment for Development: Maximizing benefits minimizing costs" OECD Paris ,p 5.

[9] Planning Commission of India, (2002) , "Report of the Steering Group on Foreign Direct Investment: Foreign Investment India" government report, New Delhi, p 11.

[10] Rajan RS and Rongala S, (2007), "Asia in the Global Economy: Finance, Trade and Investment, " World Scientific Press, Chapter 14.

[11] UNCTAD, (1999), "World Investment Report 1999" Oxford University Press, New York and Geneva.

[12] UNCTAD, (2007), "World Investment Report 2007" Oxford University Press New York and Geneva.

[13] Wei SJ, (2000), "Natural Openness and Good Government", Working Paper No.7765, NBER.

[14] World Economic Forum, (2007), "Global Competitiveness Index 2007-08" World Economic Forum, Davos, p 133.

[15] Athreye S, and Kapur S,(2001), "Private Foreign Investment in India: Pain or Panacea?" " The World Economy 24, pp.399-424.

52

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Appendices:

Appendix-1, Foreign Direct Investment (FDI) and Gross Domestic Product (GDP)

Year	FDI (Rs crore)	GDP (Rs crore)	LNFDI	LNGDP
2000-01	18406	1902999	9.820432	14.45894
2001-02	29235	2081474	10.28312	14.54859
2002-03	24367	2254888	10.10099	14.62861
2003-04	19860	2519785	9.896463	14.73968
2004-05	27188	2877701	10.21053	14.8725
2005-06	39674	3282385	10.58845	15.00408
2006-07	103367	3779384	11.54604	15.14507
2007-08	138276	4320892	11.83701	15.27897
2008-09	161481	4933183	11.99214	15.41149

Source- compiled by the Authors from Economic Survey of 2009-10 and monthly FDI fact sheets of DIPP from September, 2005 to October, 2009.
LNFDI = Natural Log of FDI
LNGDP = Natural Log of GDP

Appendix-2, Impact of Globalization on FDI

Year	FDI (Rs crore)	GDP (Rs crore)	LNFDI	Import & Export	GL	LNGL
2000-01	18406	1902999	9.820432	434444	0.228294	-1.47712
2001-02	29235	2081474	10.28312	454218	0.218219	-1.52225
2002-03	24367	2254888	10.10099	552343	0.244954	-1.40669
2003-04	19860	2519785	9.896463	652475	0.258941	-1.35116
2004-05	27188	2877701	10.21053	876405	0.30455	-1.18892
2005-06	39674	3282385	10.58845	1116827	0.340249	-1.07808
2006-07	103367	3779384	11.54604	1412285	0.373681	-0.98435
2007-08	138276	4320892	11.83701	1668176	0.386072	-0.95173
2008-09	161481	4933183	11.99214	2072438	0.420102	-0.86726

Source- Same as Appendix 1
LNFDI = Natural Log of FDI
GL = Globalisation
LNGL = Natural Log of Globalisation

Appendix- 3, Impact of FDI Inflows on Employment (A Case Study)

Year	FDI in Telecom (Rs crore)	Employment (Lacks)	LNFDI	LN Employment
2002-03	1058	0.79	6.964136	-0.23572
2003-04	532	0.81	6.276643	-0.21072
2004-05	588	0.85	6.376727	-0.16252
2005-06	3023	0.87	8.014005	-0.13926
2006-07	2155	1	7.675546	0

Source- Worked out from monthly FDI fact sheets of DIPP (September 2005 to October, 2009) and Economic survey 2009-10

53

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 Month 2011

Appendix-4, FDI, GDP and Globalization in China

Year	GDP (million Rmb)	FDI (in million Rmb)	Import & Export	GL	LNGDP	LNFDI	LNGL
2000	9921500	348167	3922461	0.39535	16.11021	12.76044	-0.92798
2001	10965500	403576	4216046	0.384483	16.21026	12.90812	-0.95586
2002	12033300	454850	5134016	0.426651	16.30319	13.02772	-0.85179
2003	13582300	442445	7037770	0.518157	16.42428	13.00007	-0.65748
2004	15987800	501162	9547715	0.597188	16.58734	13.12468	-0.51552
2005	18321700	488430	11518200	0.628664	16.7236	13.09895	-0.46416
2006	21192400	491400	13733460	0.648037	16.86915	13.10501	-0.43381
2007	25730600	546040	15873120	0.616897	17.06319	13.21045	-0.48305
2008	30067000	627396	17393264	0.578484	17.21894	13.34933	-0.54735
R^2					0.870001		0.58337

Source- Report of People Republic of China's Ministry of Commerce, National Bureau of Statistics and General Administration of Customs 2009

Appendix-5, FDI, GDP and Globalization in the U.S.A.

Year	GDP (US $ million)	FDI (US $ million)	Import & Export	GL	LNGDP	LNFDI	LNGL
2000	9951500	1,421,017	2568500	0.25810	16.11323	14.16688	-1.3544
2001	10286200	1,518,473	2426400	0.23588	16.14631	14.23322	-1.44439
2002	10642300	1,499,952	2433200	0.22863	16.18035	14.22094	-1.47563
2003	11142100	1,580,994	2586100	0.23210	16.22624	14.27356	-1.46058
2004	11867800	1,742,716	2979100	0.25102	16.28934	14.37096	-1.38221
2005	12638400	1,905,979	3332900	0.26371	16.35225	14.46051	-1.3329
2006	13398900	2,154,062	3711300	0.27698	16.41068	14.58287	-1.28379
2007	14077600	2,450,132	4025600	0.28595	16.4601	14.71165	-1.25191
2008	14441400	2,046,847	4370000	0.30260	16.48561	14.53181	-1.19534
R^2					0.903811		0.649264

Source- U.S. Department of Commerce, Bureau of Economic Analysis, February 2010

54

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Devising Service Plan Using Customer Base; a Telecom Sector Study

Ishfaq Ahmed, Muhammad Qasim

Hailey College of Commerce, University of the Punjab, Pakistan

`ishfakahmed@gmail.com, thinkquest.pk@gmail.com`

Abstract *— Customers are said to be the king, this fact is proved irrespective of the fact that business is manufacturing based or service based. Now organizations try to satisfy and retain existing customers as retaining customers is less costly and more secure then creating new customers. Considering the importance of customers for business this study aims to study the customers as the prime factor to be considered. It covers customer division on the basis of their gender and what are the differences between male and female customers regarding the dimensions of service quality and whether there is any difference of satisfaction and retention intentions of these customers. This study is conducted on university students, for study 296 university students who were using mobile were selected using simple random sampling technique. Questionnaire was used for data collection and analysis was finally done using SPSS 16.0. Results are given in the findings portion.*

Keywords *— Telecom sector, customer satisfaction, customer retention, Pakistan.*

1.   Introduction

With the changing business trends organizations are striving to sustain themselves. In the contemporary business this change is required to be competitive. Organizations adopt all those strategies that might bring significant change in the organizational process. Out of many drivers of change customers are considered to be one of the most important factors that have changed the business world drastically. Now organizations try to retain the existing customers; as creating new customers costs high and brings uncertainty. So satisfying and retaining existing customers is demand of the time. Satisfying and retaining existing customers is important is it can save cost as well as it can create customer base being source of new customers by word of mouth marketing.

This significance is realized irrespective of the sector of economy. Like other sectors service sector is primarily based on the customer satisfaction and future intentions. Telecom sector is one of the major sectors in services industry having great amount of contribution for public and state. In Pakistan telecom sector is one of the most developed and sophisticated sectors of the economy and contributes a significant amount towards the GDP. This sector has seen tremendous growth as its customers increased to 95 million in 2009 from just 68,000 in 1996 (www.pta.gov.pk). The rate of growth in telecom sector in Pakistan was auspicious, as found by Valdecantos (2009) cellular companies in Pakistan have seen 100% sustainable growth for some years. Many researchers have linked customer satisfaction and retention with sustainable financial performance of firms (Fornell & Wernerfelt, 1987; Reichheld & Sasser, 1990). Steenkamp (1989) also narrated that customer retention is one of the factor that can increase market share.

Now companies in telecom sector in Pakistan are facing stiff competition and now the directions of wars have turned from creating customers to sustaining and retaining customers. These changes trends have made the firms change their operational strategies as well. Now all the marketing and business focus is on retaining the customers. These changes trends require in-depth study.

This study aims to identify an important research issue regarding the customer retention. It aims to study the dimensions of service quality that these companies are providing what should be their preference of provision of the service quality to the customers based on the gender differences of the customers.

2.   Literature Review

Retaining customers is one of the debates being done on all levels of businesses. Retaining customers and its proposed benefits has been given due importance by many researchers. While considering the returns of the customer retention Fornell & Wernerfelt (1987) and (Reichheld & Sasser, 1990) found that customer retentions is source of higher financial returns for organizations. Steenkamp (1989) commented that customer retention can be source of increased market share and financial growth. Customers with higher repurchase intentions are source of word of mouth marketing for the organizations by recommending others to use their services and though they increase customer base for the organization (Iqbal et al., 2008). Fornell and Wernerfelt, (1987); Reichheld and Sasser, (1990) found that customers retention reduces costs and can be source of high market share.

Considering the factors that lead towards increased repurchase intentions of customers one of the important factors identified by the researcher is customer satisfaction. In the words of Drucker (1973) customer satisfaction is base for success. Researchers have proved that there is positive relationship b between customer satisfaction and better financial performance of organization (Rust and Zahorik, 1993; Anderson et al., 1994). Telecom sector like other sectors is not an exception. Henkel et al. (2006) found satisfied customers of telecom sector are having more positive relationship their repurchase intentions and they are willing to spend more in future (Iqbal et al. 2008). Kim et al. (2004) also gave same sort of findings and found that customers satisfaction increases both present and future uses. Satisfied customers spend more and they pursue to spend even more in future (Zeithaml, 2000, Keiningham, et al. 2007).

Fornell (1992) discovered that if organizations want to make their customers satisfy and retain as future customers they should be provided with the better quality services. Ahmad et al. (2010) also found that provision of services with better quality increases level of satisfaction and customer repurchase intentions. Considering the quality dimensions there is a widely accepted model given by Parasuraman et al. (1988), according to this

model there are five dimensions of service quality, these dimensions are Tangibles, Empathy, Reliability, Assurance and Responsiveness. Cronin and Taylor (1992) while discussing the significance of the service quality dimensions found that customer satisfaction is a function of service quality offered to customers. Lai (2004) also found a positive and significant relation between dimensions of service quality and customer satisfaction and future retention or repurchase intentions. Same findings have been proved by the work of Cronin & Taylor (1992). Findings given by Ahmed et al. (2010) prove that there is significant relationship between service quality dimensions, customer satisfaction and repurchase intentions, except dimension of empathy which was found to have insignificant relationship with customer satisfaction and repurchase intentions. Baumann et al. (2006) concluded that effective service provision, positive attitude and empathy with customers increase customer satisfaction and they intend to visit service provider again for repurchase. He also concluded that better quality has long term effect on customer behaviors. Considering the relationship of service quality and customer satisfaction and retention, Cronin et al. (2000) found that service quality, value of service and satisfaction are all directly to customers reuse intentions. Steenkamp (1989) concluded that provision of quality service increases market share and likewise Fornell (1992) acknowledged satisfaction with service facilitate to retain customers.

Considering the demographical factors and their relationship with customer satisfaction and retention various findings are given by researchers. As noted by Butler et al. (1996) demographical differences make difference in perceived quality and perception of better quality is positively related to customer satisfaction and retention (Kim et al. 2004). Serenko et al. (2006) there is no difference in male and female regarding satisfaction and retention intentions. Age, education and expertise have no relation with satisfaction (Keiningham et al. 2006). Bigne et al. (2005) found that buying behavior of customer can be predicted by age, social class and behavior patterns. Matthews & MacRae (n.d.) found that demographics have a significant effect on attitude towards switching the service provider.

56

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Considering the literature given in the preceding section, this study signifies the role of demographical factors as these factors are much ignored in Pakistani scenario. This study would be a worth while study as there are huge differences considered due to demographical divisions of man and women in the society. Telecom sector is widely spread service providing sector in the country, so provision of services and customer perception would be varying while considering the demographical factors.

3.   Research Methodology

Sample

This study comprises youth; the reason for selecting this portion of population is that this segment of the population is widely targeted by the companies because of highest portion in population. To satisfy and to retain the customers is difficult one for this segment of the society. Youth pay more attention towards promotional advertisements of telecom companies. 400 students were selected from different universities and surveys questionnaire were personally administered. 296 questionnaires were received back with a response rate of 74%. There were 50% male students and 50% female respondents with an average age of 21.72 years. Sample was selected thru convenience sampling a form of non-probability sampling.

Instrument and Measurement

In order to measure the variables and data collection questionnaire was adopted form Yu et al. (2005).

Data analysis

In order to identify the differences on the basis of gender test of mean differences were used. SPSS 16.0 was used for the purpose of analysis.

4.   Findings of The Study

Table-1 shows descriptive statistics of both male and female customers regarding service quality dimensions and their satisfaction and repurchase intentions. This table contains information about the N (number of respondents), mean scores against each dimension for which respondents were

inquired, standard deviation and standard error of mean. The questionnaire was designed on 7-point scale ranging from 1=strongly disagree to 7=strongly agree. All the responses which are above 4 the mean score of the scale are above the neutral value and fall either in the category of slightly satisfied (5) or satisfied (6). All the values which are below 4 fall in the category of slightly dissatisfied (3) or they are near to mean score so fall in the category of neutral response.

Insert table-1 here

Table-2 shows the test of differences between two groups (Male and female). Findings of the table contain Levene's test used to identify homogeneity of variance and then findings of t-test regarding the differences of the mean score of both the groups. Levene's test shows that there is homogeneity of variance among the variables of interest, so this test can be applied here to find the differences. Findings of the t-test show that there are significant differences on the basis of gender regarding perception of quality dimensions, customer satisfaction and repurchase intentions (p<.05). While looking for the differences that whether male are more satisfied or females are more satisfied we have to refer back to table-1 to compare their mean scores.

Table-1 refers that mean scores of all the dimensions of service quality, satisfaction and repurchase intentions of females are higher then the mean scores of male respondents. This shows that females are more satisfied with the services of telecom sector when compared to male users. Females are also found to have higher repurchase intentions then male users.

Insert table-2 here

5.   Findings of The Study

Findings of the study show that there are significant differences observed for the perception of service quality of customers from gender perspective. These findings contribute a lot for practiioners to devise marketing and services plan. If we consider both the male and female users of telecom sector, females are found to be more satisfied with services and are willing to stay with the same service provider. But male respondents

57

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

are relatively lagging behind both in satisfaction and repurchase intention. This would help market department to offer more benefits for male users and to give them due consideration. This would in return increase their satisfaction level and organization would be able to reap more returns in shape of satisfied customers with higher future purchases.

REFERENCES

[1] Ahmad, Z., Ahmed, I., Nawaz, M.M., Usman, A., Shaukat, Z.M., Ahmad, N, (2010), Impact of Service Quality of Short Messaging Service on Customers Repurchase intentions: an Empirical study of Cellular companies of Pakistan. International Journal of Business and Management. 5(6), 154-160

[2] Ahmed, I., Nawaz, M.M., Usman, A., Shaukat, M.Z., Ahmad, N. (2010), Impact of Service Quality on Customer Satisfaction: empirical evidence from telecom sector of Pakistan. Interdisciplinary Journal of Contemporary Research for Business, 1(12),98-113.

[3] Baumann C., Burton S., Elliott G. & Kehr H.M. (2006), Prediction of attitude and behavioral intentions in retail banking, International Journal of Bank Marketing, 25(2), 102-116.

[4] Bigne E., Ruiz C, & Sanz S. (2005), The impact of internet user shopping patterns and demographics on consumer mobile buying behavior, Journal of Electronic Commerce Research, Vol. 6, No. 3, pp.193-209.

[5] Butler D., Oswald S. L. & Turner D.E. (1996), The effects of demographics on determinants of perceived health-care service quality. The case of users and observers, Journal of Management in Medicine, Vol.10, No.5, pp.8-20.

[6] Cronin Jr., Brady M.K. and Hult, G.T.M. (2000), Assessing the effects of quality, value, and customer satisfaction on consumer behavioural intentions in service environments. Journal of Retailing. 76(2), 193-218.

[7] Cronin Jr., J.J, and Taylor S.A. (1992), Measuring service quality: A re-examination and extension. Journal of Marketing. 56, 55–68.

[8] Drucker, P.F. (1973), Management: Tasks, Responsibilities and Practices, Harper & Row, New York, NY.

[9] Fornell, C. (1992), A national customer satisfaction barometer: the Swedish experience. Journal of Marketing. 56, 6-21.

[10] Fornell, C. and Wernerfelt, B. (1987), Defensive marketing strategy by customer complaint management: a theoretical analysis. Journal of Marketing Research. 24, 337-46.

[11] Henkel, D. Houchaime, N. Locatelli, N. Singh, S. Zeithaml, V.A. and Bittner (2006), The Impact of emerging WLANs on Incumbent Cellular Service Providers in the U.S.   M.J. Services marketing, McGraw-Hill Singapore

[12] Iqbal A., Zia M. H., Bashir S., Shahzad K & Aslam M. W. (2008), Antecedents and Outcomes of Customer satisfaction in using prepaid cellular service in Pakistan, Proceedings of the First International Conference on Business and Technology, Iqra University, Islamabad, Pakistan.

[13] Keiningham, T. L., Cooil, B., Aksoy, L., Andreassen, T.W., and Weiner, J. (2007). The value of different customer satisfaction and loyalty metrics in predicting customer repurchase intentions, recommendation, and share-of-wallet. Managing Service Quality, 17(4), 361-384.

[14] Kim, M.K., Park, M.C., and Jeong, D.H (2004), The effects of customer satisfaction and switching barrier on customer loyalty in Korean mobile telecommunication services, Telecommunication Policy, 48,145-159.

[15] Lai T.L. (2004), Service Quality and Perceived Value's Impact on Satisfaction Intention and Usage of Short Message Service (SMS), International systems Frontiers. 6(4), 353-368

[16] Matthews C. & MacRae M. (n.d.), The Demographic of Switching, available online at http://www.melbournecentre.com.au/Finsia.../ClaireMatthews_paper.pdf

[17] Parasuraman, A., Zeithaml, V.A. and Berry, L.L. (1988), SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality. Journal of Retailing. 64(1) , 12-40.

[18] Reichheld, F.F. and Sasser, W.E. (1990), Zero defection: quality comes to services, Harvard Business Review, Vol. 68 No. 5, pp. 105-11.

[19] Rust, R.T. and Zahorik, A.J. (1993), Customer satisfaction,customer retention, and market share , Journal of Retailing,Vol. 69, Summer, pp. 193-215.

[20] Serenko A., Turel O, & Yol S. (2006), Moderating Roles of User Demographics in the American Customer Satisfaction Model within the Context of Mobile Services, Journal of Information Technology Management, Vo. 17, No.4, pp. 20-32

[21] Steenkamp, J.-B.E.M. (1989), Product Quality. Van Gorcum, Assen/Maastrichts.

[22] Valdecantos, C. (2009), Online available at

http://consultantvalueadded.com/2009/01/12/emergingmarkets-telecom-market-review pakistan-2008/

[23] www.pta.gov.pk

[24] Zeithaml, V.A. (2000), Service quality, profitability, and the economic worth of customers: what we know and what we need to learn. Journal of the Academy of Marketing Science. 28(1), 67-85.

Table-1
Group Statistics

	GENDER	N	Mean	Std. Deviation	Std. Error Mean
Tangibles	Male	199	5.2538	1.17623	.08338
	Female	97	5.6134	1.12617	.11435
Empathy	Male	199	3.5678	1.56482	.11093
	Female	97	3.0464	1.39956	.14210
Assurance	Male	199	4.7353	1.26521	.08969
	Female	97	5.1031	1.08265	.10993
Responsiveness	Male	199	4.9087	1.18215	.08380
	Female	97	5.3540	1.02465	.10404
Reliability	Male	199	4.7085	1.11461	.07901
	Female	97	5.2131	.91564	.09297
Satisfaction	Male	199	4.9322	1.60466	.11375
	Female	97	5.8711	1.02133	.10370
Repurchase Intentions	Male	199	4.7142	.74531	.05283
	Female	97	5.0245	.61460	.06240

Table-2

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Tangibles	Equal variances assumed	1.644	.201	-2.503	294	.013	-.35963	.14366	-.64237	-.07690
	Equal variances not assumed			-2.541	198.082	.012	-.35963	.14152	-.63871	-.08056
Empathy	Equal variances assumed	2.086	.150	2.783	294	.006	.52145	.18734	.15275	.89014
	Equal variances not assumed			2.893	210.707	.004	.52145	.18027	.16608	.87682
Assurance	Equal variances assumed	7.879	.065	-2.457	294	.015	-.36775	.14967	-.66231	-.07319
	Equal variances not assumed			-2.592	219.246	.010	-.36775	.14187	-.64736	-.08814
Responsiveness	Equal variances assumed	5.082	.055	-3.173	294	.002	-.44524	.14032	-.72140	-.16909
	Equal variances not assumed			-3.333	216.744	.001	-.44524	.13359	-.70854	-.18194
Reliability	Equal variances assumed	4.213	.051	-3.866	294	.000	-.50452	.13049	-.76133	-.24770
	Equal variances not assumed			-4.135	227.275	.000	-.50452	.12201	-.74493	-.26410
Satisfaction	Equal variances assumed	31.177	.050	-5.264	294	.000	-.93897	.17837	-1.29001	-.58793
	Equal variances not assumed			-6.100	273.808	.000	-.93897	.15393	-1.24200	-.63595

59

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

| Repurchase intentions | Equal variances assumed | 3.955 | .058 | -3.553 | 294 | .000 | -.31029 | .08734 | -.48218 | -.13840 |
| | Equal variances not assumed | | | -3.795 | 226.524 | .000 | -.31029 | .08177 | -.47141 | -.14917 |

60

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Role of Television Advertisements and Other Elements of Promotion Mix in Influencing Rural Consumers for Purchase of Toiletries

Ms. Sukhmani[*a], Dr. B.S. Hundal[*b]

[*a] *Assistant Professor in Management, Apeejay Institute of Management, Jalandhar-144007*

[*b] *Reader, Department of CBM, GNDU, Amritsar*

sukhmani_2001@yahoo.com

Abstract— The rural market of India is fascinating and challenging at the same time. It offers large scope on account of its sheer size and potential. Even a gradual growth pushes up the sales of a product substantially, in view of the huge base. The factors chosen by the rural consumers which they consider accountable for deciding the optimal promotion mix confirm the level of awareness among the rural respondents about the elements of promotion mix. Each of the elements of promotion mix has its own impact on the rural masses. They understand the significance of various elements of promotion mix in increasing the sales of the company. The market pioneers are being getting rewarded by capturing the rural markets. Simultaneously, due to the problems and hurdles posed by rural markets, the firms have to directly encounter them and put in a great deal of effort to get a sizeable share of the market. It is often said that markets are made, not found. This is especially true of the rural market of India. It is a market meant for the truly creative marketers.

1.   Introduction

Advertising is a measure of growth of civilization and a sign of striving of human race for betterment and perfection. The drive for survival and satisfaction and the limits of human endeavor have been succinctly summed up by Maslow in his holistic dynamic theory which brings together various schools of thought on the subject. (Maslow, 1954).

Television Advertising

Television is often called "king" of the advertising media, since a majority of people spend more hours watching TV per day in comparison to any other medium. Television uses the combination of sight, color, sound and motion to create an effect. TV has proved its credible power in influencing human behavior repeatedly. The Television Advertisement is a form of advertising in which goods, services, organizations, ideas, etc. are promoted via the medium of television. Advertising on television can give a product or service instant reliability and reputation. Different segments of the society can be captured by scheduling the time for advertisements like children can be reached during cartoon programming, farmers during the morning agricultural reports and housewives during the afternoon soap operas. TV offers the greatest possibility for creative advertising by taking the audience anywhere and shows them almost anything through the magic of a camera. TV audience is divided into very large segments, and television enables to reach a larger, yet, more diverse audience.

Most of the television commercials are produced by an outside advertising agency and the airtime is purchased from a television channel. The first ever television advertisement was broadcasted in the United States in 1941, wherein, the Bulova Watch company paid $9 to New York City NBC affiliate WNBT (now WNBC) for a 20-second spot aired before a baseball game between the Brooklyn Dodgers and Philadelphia Phillies. It simply displayed a Bulova watch over a map of the U.S., with a voiceover of the company's slogan "America runs on Bulova time". (Walker and Robert, 1941).

The vast majority of television advertisements today consist of brief advertising spots, ranging in length from a few seconds to several minutes. Advertisements of this sort have been used to sell every product imaginable over

61

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

the years, from household products to goods and services, to political campaigns. Many television advertisements feature catchy jingles (songs or melodies) or catch-phrases that generate sustained appeal, which may remain in the minds of television viewers long after the span of the advertising campaign.

Many studies and theories have been presented to explain the phenomenal success of television as entertainment media. The psychologist Geoffrey Beattie in his paper "Making Thought Visible: The New Psychology of Body Language" suggests that the success of television might be the result of an evolutionary process of our brain, which favored media combining sound and video. Professor Robert Kubey wrote an article on the magazine "Scientific American" trying to prove that television is addictive. Not backed by any statistic or study, it is believed that part of television's success is the fact that it requires low level of attention; it is not uncommon to see people fall asleep in front of the screen. It is also likely that Television would not have been so successful if it would have come equipped of a keyboard instead of buttons to change the channel. Many viewers complain that the latest remote controls are too difficult to use, and often devices seem to forget what really viewers want, the same that has helped TV to become one of the most well accepted media of our times: simplicity. Newer generations are certainly more acquainted to technology and might be able to benefit from an increased number of functionalities; however in the entertainment world this concept will always play a fundamental role.

The 'shared experience' of television advertising can also help boost brand awareness since it becomes part of the collective consciousness. The value of television advertisement lies often not only in the advertisement itself, but in the fact people talk about it with friends and colleagues. Another indirect benefit of television advertising is the degree of trustworthiness companies reach for the only fact of doing television advertisements, and often this has positive effects on the distribution chain since retailers are likely to give bigger orders and better use them only to change the channels and volume. The growing importance of television as advertising media has led to the only

reasonably reliable measurement system within the industry, which even more consolidated the predominant position of television among the different mass media channels. As a result television advertising is often seen as the safe option, as one planner once said 'No one ever got fired for recommending TV'.

Promotion Mix

Promotion Mix is a term used to describe the set of tools that a business can use to communicate effectively the benefits of its products or services to its customers. The Promotion Mix includes the tools like Advertising, Public Relations, Sales Promotion, Direct Marketing and Personal Selling. (Chunnawala and Sethia, 1994)

Advertising is a form of communication used to help to sell products and services. Typically, it communicates a message including the name of the product or service and how that product or service could potentially benefit the consumer. However, advertising also attempts to persuade potential customers to purchase or to consume more of a particular brand of product or service. (Rathor, 2003).

Public Relations is a management function which evaluates public attitudes, identifies the public policies and procedures of an individual or organization with the public interest, and executes a program of action to earn public understanding and acceptance. (Mohan Manendra, 2007)

Sales Promotion is the marketing activities that provide extra value or incentive to the sales force, distributors, or the ultimate consumer and can stimulate immediate sales. Sales promotion is generally broken into two major categories: consumer-oriented and trade-oriented activities. (Mathur, 2008)

Direct Marketing is a system of marketing by which organizations communicate directly with target customers to generate a response and/or a transaction. (Chunnawala and Sethia, 1994)

Personal Selling is a direct person-to-person communication whereby a seller attempts to assist and/or persuade prospective buyers to purchase a company's product or service or act on an idea. (Rathor, 2003)

Rural Markets

62

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

In the past years, due to the lack of facilities available in the rural areas, the rural consumer went to a nearby city to buy branded products and services. But today, the marketers have realized the potential in the rural market, which has become critical for them, be it for a branded shampoo or an automobile. Earlier, van campaigns, cinema commercials and a few wall paintings sufficed the purpose of the marketers to entice rural folks under their folds. But today, television has made the customer in a rural area quite literate about countless products that are on offer in the market place. Rural Marketing is planning and implementation of marketing function for rural areas. It is a two way marketing process which encompasses the discharge of business activities that direct the flow of goods from urban to rural areas for manufactured goods and vice versa for agricultural produce (Gopalaswamy, 2005).

2. Review of Literature

Advertising in Rural Markets is an upcoming and growing field of marketing, wherein not much research work has been done. Research findings related to the topic of the study have been reviewed as under:

(Kumar and Madhavi, 2006) conducted a study on Rural Marketing for FMCGs. The most preferred brands of toothpaste, shampoo and toilet soap in rural areas were identified on the basis of gender interpretation. The study revealed that quality is the first factor that influences rural customers followed by price, colour and taste. Among brand preference Colgate plays a vital role among female respondents whereas male respondents mostly use Pepsodent. Almost half of the respondents do not use shampoo because they are using conservative products only and among the users 60 percent of them use Clinic Plus. No significant relationship between gender and the use of shampoo was found. Majority of the respondents using soaps preferred Hamam as their brand of toilet soap.

An attempt to design an appropriate promotion mechanism to woo the rural consumer's and influence their buying behaviour was made by (Sakkthivel, 2006). He concluded that the strategies ought to be designed according to the factors influencing the rural consumer behaviour such as price, opinion leaders, easy finance schemes, benefits and personal bonds.

The rural market is a mix of multiple complexities, which has proved to be waterloo for many experienced marketers. The companies have started their journey to reach "destination rural consumer".

The rural markets in India have become an area that corporates just cannot afford to ignore was opined by (Vaish, 2006). The product offered to rural consumers may or may not be different but the ways these products are marketed ought to be different. Marketers always look for innovative ways to make their presence felt. Due to regional disparities, customized communication strategy for each region is need of the hour. The author is of the view that an effective communication is one that leads to purchase decision, brand registration in consumer's mind, brand recall and right brand associations. Interpersonal communication accounts for about 80% of the rural communication process. The communication package should generate lot of "word of mouth" publicity, so that the brand acquires "top of the mind" recall value. Marketers can use a mix of both conventional and unconventional media. The communication should be such so as to make the product category relevant to rural folks.

The extent and nature of demand in rural markets, resulted increase in rural incomes and changing rural lifestyles was examined by (Easwaran, 2006). The study examines the data, suggesting that in spite of this rise in income, migration to the cities continue to be high. At the same time non-farm incomes are on the rise, and the percentage of households depending fully or partially on non-farm incomes is also registering growth. This opens up opportunities in rural markets, whose characteristics are substantially different from those of urban markets. For substantial growth, it is essential to provide opportunities for employment in rural areas in order to reduce migration to cities, so that propensity to consume may go up in rural areas, and simultaneously pressure on urban infrastructure may be reduced.

A case study on "Unilever in India-Rural Marketing Initiatives" was performed by (Nagarajan, 2006). She found that seventy percent of the Indian population lives in rural areas. This segment commonly referred to as the "bottom of the pyramid", presents a huge opportunity for companies. Unilever's Indian subsidiary, Hindustan Lever Limited, considered as one of

63

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

the best managed companies in India, has understood the importance of rural marketing. The trigger point came when a local firm Nirma, through its new product formulation, pricing and distribution challenged, HLL's detergent business. Nirma's attack from below made HLL realize its vulnerability as well as identify a new opportunity. Since then, HLL has launched various initiatives to reach out to the rural consumer. It has changed its product formulations and deliveries. It has begun a number of initiatives in terms of widening distribution reach through traditional as well as unconventional channels. HLL has also empowered rural women by assisting them in obtaining financial assistance through its project Shakti.

Inspite of a wealth of empirical attention directed at understanding the structural relationships among affect, cognition, and attitude, the tasks and settings in many of these studies have inflated the relative impact of cognition in the persuasion process. The research conducted by (Homer, 2006) demonstrated the negative and positive forms of affect and direct and indirect effects on attitude influenced by brand familiarity. Cognition played a less dominant role in an attitude formation process for an unknown brand compared to situations in which consumers held preexisting impressions for well known brands. A means-end model is used to link concrete and abstract forms of cognition and attitude.

A study was designed to extend knowledge of cognitive processing of advertising messages by urban children in India. (Panwar and Agnihotri, 2006), collected data from 250 children aged between 7 and 12 years, drawn in the sample from five major towns of the relatively affluent western state of Gujarat (India) by using the cluster sampling approach. A simple questionnaire using three point rating scale was administered with the help of moderators. Data were analyzed using the SPSS software. It was found that socioeconomic background of the family plays a significant role in the understanding of advertising intents by children. The medium of instructions at the school also had significant relation to the child's ability to understand advertising intent. Predictably, age of the child was another important factor impacting upon the ability to decode an advertising message. In terms of parental control, it was observed that

in most cases, parents act as gatekeepers for children's media exposure and activity prioritization; therefore, they form an important audience for any communication related to children's products, services or activities. Media time usage, especially television watching, is highly controlled by parents; however, females seem to be more independent in terms of prioritizing their media interactions. It was also observed that in most households, consumption of electronic media is a group activity; therefore, the attitudes towards messages from electronic media tend to be influenced by the family and peer-group opinions on the message.

The researchers recommended to the marketers that the advertisement message directed towards children has to be entertaining and not necessarily humorous. A message narrating only the product attributes or benefits may not work well with children. Likewise selection of model/endorser is very important for messages directed at children. Creating buzz about an advertisement through unconventional channels could work in favor of the marketer, as advertising is a part of popular culture for children.

(Dertouzos and Garber, 2006), used the unusual detailed advertising data to specify and estimate an econometric model of advertising that is the sales relationships that is considerably less restrictive than is typical in the literature. In particular, the models estimated allowed: (1) advertising–sales relationships to differ across four media; (2) each relationship to take on the shape often discussed, but rarely estimated, in the literature; and (3) completely flexible time patterns of advertising effects over the month ads run and the following month. The authors estimated advertising–sales relationships are; in fact, S-shaped, and the estimated timing of effects of advertising on sales also differ greatly across media. Broadly, our substantive findings support advertising practice generally and army advertising decisions during the early 1980s. First, the advertising–sales relationships we estimate are consistent with conventional wisdom and advertising practice. More specifically, depending on the budget, advertising *through* television, radio, magazines, and (tentatively) newspapers can help to increase sales. Second, if only a rather small budget is available, it seems best to advertise only in print media; as budgets

expand, it becomes optimal to add radio advertising to the mix; and as budgets expand further, television should also be used. Due to significant changes in the media landscape, most notably the growth of cable, satellite, and Internet services, as well as evolving perceptions about military service, empirical results from the early 1980s should be used only with caution in the design of policies today. Still, it remains interesting that U.S. Army advertising during the early 1980s appears to have been very productive. In particular, our estimates suggest that the army advertising program increased potential high-quality enlistments by roughly 32% (relative to no advertising at all). Moreover, the allocation of spending across media was impressive; our estimates suggest that an optimal reallocation across media would have yielded only a 3.5% improvement in recruiting opportunities.

(Serra Inci Çelebi, 2007), conducted the study to investigate the credibility of advertising verses publicity and to examine the credibility of advertising including a promotional endorser and publicity including a promotional endorser. The author also compared the credibility of advertising across the different demographic segments and explored the important factors affecting consumers' shopping considerations of FMCG in Turkey. The data was gathered by a telephone survey from a sample of 717 of which 348 respondents wanted to participate from three of Turkey's largest cities, Istanbul, Ankara, and Izmir. The systematic sampling was exercised to select the sample. ?2 and t-tests were computed and the results of them were significant at 0.05 level.

For announcing new FMCGs in Turkey, advertising was found to be more credible by the participants with higher income. Respondents' shopping decisions of new FMCGs were affected by price and quality more than the other factors. Consumers tended to rely on publicity more than advertising.

(Raj and Selvaraj, 2007) talked about the Fast Moving Consumer Goods (FMCG) sector as a corner stone of the Indian economy. They said that the sector touches every aspect of human life. The FMCG producers have realized that there is a lot of opportunity for them to enter into the rural market. The sector is excited about the rural population whose incomes are rising and the lifestyles are changing. There are as many middle income households in the rural areas as there are in the urban. Thus, the rural marketing has been growing steadily over the years and is now bigger than the urban market for FMCGs. Globally, the FMCG sector has been successful in selling products to the lower and middle income groups and the same is true in India. Over 70% of sales are made to middle class households today and over 50% of the middle class is in rural India. The sector is excited about a burgeoning rural population whose incomes are rising and which is willing to spend on goods designed to improve lifestyle. Also, with a near saturation and cut throat competition in urban India, many producers of FMCGs are driven to chalk out bold new strategies for targeting the rural consumers in a big way. But the rural penetration rates are low. This presents a tremendous opportunity for makers of branded products who can convert consumers to buy branded products. Many companies including MNCs and regional players started developing marketing strategies to lure the untapped market. While developing the strategies, the marketers need to treat the rural consumer differently from their counterparts in urban because they are economically, socially and psycho graphically different to each other.

The paper basically covers the attractions for the FMCG marketers to go to rural, the challenges, the difference between the rural and the urban market and the suitable marketing strategy with the suitable example of companies and their experience in going rural. The authors concluded that it is certain that FMCG companies will have to really gain inroads in the rural markets in order to achieve double digit growth targets in future. There is huge potential and definitely there is lot of money in rural India but the smart thing would be to weigh in the roadblocks as carefully as possible. The companies entering rural market must do so for strategic reasons and not for tactical gains as rural consumer is still a closed book and it is only through unwavering commitment that the companies can make a dent in the market. Ultimately the winner would be the one with the required resources like time and money and also with the much needed innovative ideas to tap the rural markets.

(Tan and Chia, 2007), empirically explored the relationship between the general attitude towards advertising and the attitude

65

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

towards advertising in specific media that is television and print. The researchers concluded that future research could involve a replication of the current study with new indicators, to further strengthen the robustness of the structural model. Meanwhile, new advertising media such as the internet (with its many formats), mobile phones and iPods have appeared. Perhaps future public survey on advertising attitudes could use the structural framework proposed so that attitude towards advertising in general need not be confounded by the effect of subjects relating to different media of advertising when they are evaluating beliefs about advertising.

(Sehrawet, M. and Kundu, S.C., 2007), compared the buying behavior of rural and urban consumers to make out whether the residential background of consumers influences their buying decisions or not. The authors collected data from 1090 respondents of rural and urban residential backgrounds from eight cities and 16 villages of Haryana. The analysis revealed that rural and urban consumers vary significantly on the various aspects of packaging. Rural consumers found packaging more useful than their urban counter parts and they strongly believed that better packages contain better quality products. The ease of carriage, lightness of weigh, simplicity, transparency, and consistency of package has relatively less influence on buying decision of rural consumers than urban consumers. Although, labeling is considered to be an important part of packaging, yet, rural respondents gave less importance to it. However, rural respondents were found more environmentally conscious, and felt that packaging was environmental hazard. Today, when the rural customers are graduating from loose to packaged products, the marketers and packaging manufacturers face challenge of understanding their preferences and modify their strategies to suit their consumers.

In view of above, it can be safely concluded that though sufficient attention has been given to the TV advertising in general but relatively little attention has been given to understanding the role of TV advertising and other elements of Promotion mix and its effect on rural consumers.

3.   Need and Objectives of the Study

The need to undertake state and rural area specific study is to remove the shortcomings of above mentioned studies like intra group heterogeneity of markets, different market mean, differing market conditions and effect of environmental moderation which may distant the proposed relationship.

The primary and secondary objectives of the study include:

- To study the role of TV advertising in transforming way of life of rural consumers
- To identify the various elements of the Promotion Mix which help in increasing the sales of a company
- To know the level of trustworthiness that the rural respondents attach to various elements of the promotion mix
- To identify the factors responsible for deciding the optimal Promotion Mix

4.   Data Base and Methodology

Nature of Data: The most important factor on which the results of any research rely is the source of data to be collected. The present study is based on primary data.

Sources of Data: Primary data has been collected through a Non-Disguised structured questionnaire, which was later converted to vernacular language so as to make it understandable to rural masses. Questions containing 13 statements on 5- point Likert scale have been designed. In order to make the sample representative, 400 rural and semi urban respondents have been selected from various towns and villages of districts of Punjab viz. Amritsar, Jalandhar, Ludhiana with different demographic characteristics.

A Pilot survey of 50 respondents was conducted and the questionnaire was modified accordingly.

The data was analysed using statistical tools like Factor Analysis, Median, and Kruskal Wallis Test etc. These mathematical tools were employed using statistical softwares like SPSS, Statistica, meticulously. Factor analysis has been applied to verify the role of television advertisements in transforming the way of life of rural consumers. Factor analysis is a multivariate statistical technique in which the whole set of interdependent relationship is examined, generally used for data reduction and summarization (Malhotra, 2007, p. 586).

5.   Role   of   Television Advertisements In Transforming the Way of Life of Rural

66

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Consumers-A Factor Analytic Approach

Factor analysis has been applied to substantiate the role played by TV advertisements in transforming the way of life of rural consumers. A factor explains the correlations among a set of given variables. Factor analysis is a multivariate statistical technique in which the whole set of interdependent relationship is examined, generally used for data reduction and summarization (Malhotra, 2007, p. 586). In other

Sample Size

For conducting Factor Analysis, minimum sample size should be at least four or five times of the variables taken under consideration. To carry on the present study a total of 400 questionnaires were distributed and 399 the responses were found to be complete. Thus, present study qualifies the sample size requirement for applying Factor Analysis.

Reliability of the Scale

Table 1. Statements Regarding Role of Tv Ads In Transforming The Way Of Life Of Rural Consumers

Sr. No	Statements regarding role of TV ads in transforming the way of life of Rural consumers
1	After watching the Television advertisements, we have become variety seeking
2	Our buying behaviour has shifted from planned purchase to impulsive purchasing after the viewership of TV ads
3	The TV ads have made the consumers aware and confident about the product, which in turn has reduced the impact of opinion leaders in purchase of toiletries
4	Consumers profile has changed and is catching up with urban consumers due to TV advertisements
5	TV advertisements have brought about the change in concept of quality, from useful and low cost maintenance products to high technology products
6	TV ads have made the youth brand and trend conscious
7	TV ads have increased the spending habits among many
8	Consumers have become all the more materialistic, by TV ads, which has increased the corruption rate in the economy
9	We have changed to stereotypes as portrayed in the TV advertisements
10	Advertisements close to the religious sentiments are more authentic and genuine
11	TV advertising persuades both the senses of sound and sight
12	The characters created in television advertising become as much a part of life as other well known fictional characters
13	Television advertising is the dominant driving force which makes consumers yearn for improvement in their lifestyles

words, it simplifies the diverse relationships that exist between a set of observed variables by explaining some common factors that link together the apparently unrelated variables. The main purpose of this technique is to condense the information contained in a number of original variables into a smaller set of new composite dimensions with a minimum loss of information (Joseph, 1995).

In the present study, Exploratory Factor Analysis has been applied. A set of 13 statements listed in table 1 measured on a five point Likert scale (where 1 is strongly agree and 5 strongly disagree) regarding the role of TV advertising in altering the way of life of rural respondents (derived through a survey) have been taken into account.

Before applying factor analysis, it is essential to test the reliability of the scale. The reliability of scale can be tested by a widely used method called Cronbach's Alpha. It is the average of all possible split-half coefficients resulting from different ways of splitting the scale items. This coefficient varies from 0 to 1 but satisfactory value of Alpha should be more than 0.6. A value of 0.6 or less generally indicates unsatisfactory results (Malhotra, 2007, p. 282 and Hair, 2007, p.88). In the present study, we have also computed Cronbach's Alpha to test the reliability of scale. Its value has found to be 0.797 ensuring the reliability of used scale. After ensuring the reliability of scale, it is obligatory to check the

67

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

adequacy of collected data for the application of Factor Analysis.

Adequacy of the data for Factor Analysis

For checking the adequacy of the data for Factory Analysis, the various recommended techniques are:

a) Construction of Correlation Coefficient Matrix of Explanatory Variables

b) Construction of Anti-Image Correlation Matrix

c) Kaiser-Meyer-Oklin (KMO) Measure of Sampling Adequacy.

d) Bartlett's Test of Sphericity

Construction of Correlation Coefficient Matrix of Explanatory Variables

It is a lower triangle Matrix showing simple correlations among all possible pairs of variables included in the analysis. For the application of Factor Analysis, it is obligatory that the data matrix should have enough correlations. If visual inspection reveals no substantial number of correlations greater than 0.30, then the factor analysis is probably inappropriate. (Hair, 2007, p.99). The Correlation Coefficient Matrix has also been computed for the data to check the inter-correlation between various variables. For the factor analysis to be appropriate, the variables must be correlated.

Anti-Image Correlation Matrix

It is the matrix of partial correlations among variables. The diagonal contains the measures of sampling adequacy for each variable and the off-diagonal elements are the partial correlations among variables. If true factors existed in the data, the partial correlations would be small (Hair, 2007, p. 99). Present study has also computed Anti-Image correlations and found that the partial correlations are very low indicating that true factor existed in the data.

Kaiser-Meyer-Oklin (KMO) Measure of Sampling Adequacy

It is an index used to examine the appropriateness of factor analysis. High values (between 0.5 and 1.0) indicate adequacy of data for the use of Factor Analysis (Malhotra, 2007, p. 588). Here, the computed value of KMO statistic is 0.800 indicating the adequacy of data for Factor Analysis.

Bartlett's Test of Sphericity

It is a test often used to examine the hypothesis that the variables are uncorrelated in the population i.e. population correlation matrix is an identity matrix (Malhotra 2007, p. 588). This test finds the overall significance of correlation matrix and provides the statistical probability that the correlation matrix has significant correlations among at least some of the variables (Hair, 2007, p. 99). Here, Bartlett's Test's Chi-square value is 1.188E3 (approx), Df = 78, significant at 0.000. This significant value indicates that correlation coefficient Matrix is not an identity matrix. All this ensures the adequacy of data for application of Factor Analysis.

From the above discussion, the following results have been extracted:

(i)   Correlation Coefficient Matrix contains enough high correlations.

(ii) Anti-Image Correlation Matrix contains low partial correlations.

(iii) Value of KMO statistic is large.

(iv) Value of Bartlett's Test of Sphericity is significant.

All this confirms the adequacy of data for application of Factor Analysis. Now, after ensuring the reliability of scale and testing the adequacy of data, the set of 13 statements regarding the factors that recognize the role played by TV advertising on the way of life that is led by rural consumers were subjected to Factor Analysis. Principal Component Analysis (PCA) was used for extraction of factors and the number of factors to be retained was on the basis of Latent Root Criterion (Eigen Value Criterion). An Eigen value represents the amount of variance associated with the factor. Thus, only the factors having latent roots or Eigen values greater than 1 are considered significant; all the factors with latent roots less than 1 are considered insignificant and are disregarded (Hair, 2007, p.103). Therefore, factors with Eigen values more than one should be selected. Three components were found to have Eigen values greater than unity and total variance accounted for by these factors is 51.043 percent and remaining 48.957 percent was explained by other factors.

68

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Then, in the next step, we orthogonally rotated the principal factors using Varimax Rotation. This method minimizes the number of variables that have high loading on a factor and there by enhancing the interpretability of factors

can also be treated as the proportion of variance explained by the common factors. The size of communality is the index for assessing how much variance in a particular variable is accounted for by the factor solution. Large size of

Table 2. Varimax Rotated Factor Loading Matrix

Components				
Variables	**1**	**2**	**3**	**Communality**
VAR00001	.480	.191	-.134	.285
VAR00002	.802	-.039	.068	.649
VAR00003	.532	-.008	.180	.315
VAR00004	.710	.110	.110	.528
VAR00005	.717	.138	.257	.599
VAR00006	.665	.299	.248	.593
VAR00007	.146	.624	.011	.411
VAR00008	-.003	.768	.023	.590
VAR00009	.169	.614	.187	.440
VAR00010	.078	.589	.255	.418
VAR00011	.085	.370	.683	.610
VAR00012	.148	.079	.784	.642
VAR00013	.175	.063	.721	.554
Eigen Values	3.838	1.618	1.180	6.636
Percent of Variation	29.520	12.444	9.079	----
Cumulative Variation	29.520	41.963	51.043	----

(Malhotra, 2007, p. 595). Rotation does not affect the communalities and the percentage total variance explained. However, the percentage of variance accounted for by each factor does change. The variance explained by the rotated factors is redistributed by rotation.

The factor loadings greater than 0.45 should be retained (ignoring signs) because loadings below it are considered to be poor (Bhaduri, 2002). The study has also followed the same criterion for factor loadings. The Varimax Rotated Factor Loading Matrix has been presented in Table 2. Scrutiny of Table 2 revealed that there are three factors which together accounted for 51.043 percent variance. It shows that 51.043 percent of total variance is explained by the information contained in the factor matrix.

Thus, a model with these three factors is explaining 51.043 percent variance. Communality shows the amount of variance a variable shares with all the other variables being considered. It

communalities indicates that a large amount of variance in a variable has been extracted by factor solution while small size of communalities shows that a significant amount of variance in a variable has not been accounted for by the factor solution. Communalities are considered high if they are all 0.8 or greater but this is unlikely to occur in real data. Generally accepted communalities lie between 0.40 to 0.80 (Costello and Osborne, 2005). In our study most of the communalities were above 0.40 and many of them were above or very close to 0.6 also. We finally found that the variables X1, X2, X3, X4, X5, X6 loaded on factor 1, the variables X7, X8, X9 and X10 were loaded on factor 2 and variables X11, X12 and X13 were loaded on factor 3.

6. Interpretation of Factors

A factor loading represents the correlation between variable and its factor. Their signs are just like any other correlation coefficient. Like

69

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

signs mean the variables are positively related and opposite signs mean the variables are negatively related. In fact the variables carried out in this research study do not reveal any negative related factor loading. Factors can be labeled symbolically as well as descriptively. Symbolic tags are precise and help avoiding confusion

TRANSFORMATION IN RURAL BUYING BEHAVIOUR AND CONSUMER PROFILE (F1): Perusal of Table 2 reveals that it is the most significant factor with 29.520 percent of total

Table 3. Interpretation of Factors

Factors	Loadings	Statements included in the Factor
TRANSFORMATION IN CONSUMER PROFILE (F1):	0.480	After watching the Television advertisements, we have become variety seeking (X1)
	.0.802	Our buying behaviour has shifted from planned purchase to impulsive purchasing after the viewership of TV ads (X2)
	0.532	The TV ads have made the consumers aware and confident about the product, which in turn has reduced the impact of opinion leaders in purchase of toiletries (X3)
	0.710	Consumers profile has changed and is catching up with urban consumers due to TV advertisements (X4)
	0.717	TV advertisements have brought about the change in concept of quality, from useful and low cost maintenance products to high technology products (X5)
	0.665	TV ads have made the youth brand and trend conscious (X6)
EFFECT OF TV ADVERTISING ON ECONOMY (F2)	0.624	TV ads have increased the spending habits among many (X7)
	0.768	Consumers have become all the more materialistic, by TV ads, which has increased the corruption rate in the economy (X8)
	0.614	We have changed to stereotypes as portrayed in the TV advertisements (X9)
	0.589	Advertisements close to the religious sentiments are more authentic and genuine (X10)
IMPACT OF TV ADS ON LIFESTYLES OF RURAL MASSES (F3)	0.683	TV advertising persuades both the senses of sound and sight (X11)
	0.784	The characters created in television advertising become as much a part of life as other well known fictional characters (X12)
	0.721	Television advertising is the dominant driving force which makes consumers yearn for improvement in their lifestyles (X13)

(Rummel, 1970). Present study has also given symbolic labels to the factors. The factors along with their codes and factor loadings are given in Table 3

variance explained. Total six variables have been loaded on this factor. In this factor, a transformation in rural buying behaviour has been illustrated. The factors show that rural consumers

70

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

have become variety seeking, and have switched over to impulsive purchases from planned purchases. TV ads have made the consumers very rational which in turn has reduced the impact of opinion leaders. The rural consumer of today has changed its profile and is matching up with its urban counterparts.

1 depicts most significant and rank 5 depicts least significant element of promotion mix. Data collected (see table 4) signifies that Public relations are considered as the most significant element of promotion mix which increases the sales of a company. Public relations help in creating and increasing the goodwill for the

Table 4. Elements of Promotion Mix

S. No	Elements	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	MODE
1	Advertising	54 (13.5)	88 (22.0)	88 (22.0)	136 (34.0)	34 (8.5)	4
2.	Sales Promotion	56 (14.0)	135 (33.8)	100 (25.0)	64 (16.0)	45 (11.2)	2
3.	Direct Marketing	42 (10.5)	83 (20.8)	147 (36.8)	69 (17.2)	59 (14.8)	3
4.	Personal Selling	54 (13.5)	69 (17.2)	49 (12.2)	105 (26.2)	123 (30.8)	5
5.	Public Relations	198 (49.5)	25 (6.2)	12 (3.0)	26 (6.5)	139 (34.8)	1

EFFECT OF TV ADVERTISING ON ECONOMY (F2): Analysis of Table 2 shows that it is the second important factor with 12.444 percent variance explained talks about the effect of TV advertising on the economy as a whole. The inducing nature of TV ads have increased the spending habits of people, people have turned themselves to stereotypes and materialistic, which has acted as a catalyst to the corruption rate.

IMPACT OF TV ADS ON LIFESTYLES OF RURAL MASSES (F3): Examination of Table 2 shows that it is the third important factor with 9.049 percent variance explained, talks about the television advertising being the important component which affects the physical appearance and lifestyle of the rural respondents. By persuading the senses of sight and sound, TV advertising has ended up in influencing the rural consumers, who imitate the TV characters and thus, improve their living styles.

ELEMENTS OF PROMOTION MIX WHICH HELP IN INCREASING THE SALES

To study the role of elements of promotion mix which help the companies in increasing their sales, the respondents were asked to rate the elements in accordance to their significance. Rank

organization and thus retaining the customers over a period of time. The next significant element of promotion mix is Sales Promotion, which provides extra benefits to the customers through various promotional schemes etc. and is a very common and attractive feature of rural markets. Direct marketing holds its significances in making the products available to the consumers at their doorstep whereas advertising creates awareness about the product and enhances the exposure levels of customers. Personal selling though gives a chance to the consumers to interact directly with the company personnel, yet it is regarded as the least significant element of the promotion mix by the rural consumers.

Note: Figures in parenthesis indicate percentages

TRUSTWORTHINESS TOWARDS THE ELEMENTS OF PROMOTION MIX

To know the level of trustworthiness that the respondents attach to various elements of promotion mix, the respondents were categorized in three groups i.e. respondents who attach high, neutral and low trustworthiness towards the elements of promotion mix.

KRUSKAL- WALLIS TEST

71

Int. Jour. Of Business & Inf. Tech. | Vol-1 No. 1 March 2011

Kruskal Wallis test is a non-parametric test which investigates the equality of population medians among groups. It is the extension of Mann Whitney test to 3 or more groups. A null hypothesis was developed as, H0: There is no significant difference in the attitudes of three

mean rank of 191.35 in case of advertising, which depicts that they prefer and consider advertising as an important tool which increases the sales of the organization. It is followed by "neutral" trustworthiness group of respondents with mean rank of 179.27, 177.69 and 195.28 who prefer

Table 5

ELEMENTS	CATEGORIES OF RESPONDENTS	MEAN RANK
ADVERTISING	HIGH	191.35
	NEUTRAL	222.07
	LOW	207.02
	TOTAL	
SALES PROMOTION	HIGH	199.44
	NEUTRAL	179.27
	LOW	213.52
	TOTAL	
DIRECT MARKETING	HIGH	210.84
	NEUTRAL	177.69
	LOW	192.32
	TOTAL	
PERSONAL SELLING	HIGH	203.46
	NEUTRAL	195.28
	LOW	197.48
	TOTAL	
PUBLIC RELATIONS	HIGH	197.46
	NEUTRAL	215.48
	LOW	198.61
	TOTAL	

Table 6. Significance of Kruskal Wallis Test
* 5 % level of significance, ** 10 % level of significance

	ADVERTISING	SALES PROMOTION	DIRECT MARKETING	PERSONAL SELLING	PUBLIC RELATIONS
Chi Square	4.122*	3.748*	5.052**	.369*	1.427*
Df	2	2	2	2	2
P- value	.127	.154	.080	.831	.490

groups of respondents regarding the preference of the various elements of promotion mix. The three groups of respondents are used as a grouping variable and the elements of promotion mix are taken as the test variables. Table 5 shows that the "high" trustworthiness group of respondents has

sales promotion, direct marketing and personal selling as a significant element which increases sales, and "high" trustworthiness group of respondents with mean rank of 197.46 prefer public relations as the most significant element of

promotion mix, which increases the sales of the organization.

The p- value of significance for the various elements of promotion mix has been given along with the calculated chi square value

regarding the preference of direct marketing as the element of promotion mix.

FACTORS RESPONSIBLE FOR DECIDING THE OPTIMAL PROMOTION MIX

Table 7. Factors for Optimal Mix

S. No	FACTORS	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6	Rank 7	Rank 8	Rank 9	MODE
1	Available Budget	32 (8.0)	58 (14.5)	111 (27.8)	75 (18.8)	31 (7.8)	32 (8.0)	33 (8.2)	0 (0.0)	28 (7.0)	3
2	Promotional Message	89 (22.2)	64 (16.8)	36 (9.0)	21 (5.2)	76 (19.0)	29 (7.2)	1 (0.2)	30 (7.5)	54 (13.5)	1
3	Complexity of Product or Service	80 (20.0)	65 (16.2)	84 (21.0)	31 (7.8)	5 (1.2)	4 (1.0)	71 (17.8)	2 (0.5)	58 (14.5)	3
4	Market Size and Location	7 (1.8)	36 (9.0)	5 (1.2)	115 (28.8)	31 (7.8)	72 (18.0)	33 (8.2)	43 (10.8)	58 (14.5)	4
5	Distribution Channel	57 (14.2)	3 (0.8)	58 (14.5)	50 (12.5)	57 (14.2)	62 (15.5)	3 (0.8)	73 (18.2)	37 (9.2)	8
6	Product Life cycle stage	7 (1.8)	83 (20.8)	9 (2.2)	4 (1.0)	88 (22.0)	87 (21.8)	57 (14.2)	34 (8.5)	31 (7.8)	5
7	Strategies of Competitors	0 (0.0)	62 (15.5)	30 (7.5)	30 (7.5)	35 (8.8)	32 (8.0)	61 (15.2)	86 (21.5)	64 (16.0)	8
8	Government regulations	43 (10.8)	32 (8.0)	56 (14.0)	30 (7.5)	46 (11.5)	8 (2.0)	87 (21.8)	62 (15.5)	36 (9.0)	7
9	Ethical issues involved with the product	84 (21.0)	3 (0.8)	60 (15.0)	59 (14.8)	1 (0.82	57 (14.2)	35 (8.8	67 (16.8)	34 (8.5)	1

in table 6. The p- value for advertising, sales promotion, personal selling and public relations exceed 0.05 and hence, the results are in acceptance of null hypothesis at 5% level of significance i.e. there is no significant difference in the attitudes of three groups of respondents regarding the preference of the various elements of the promotion mix. The p- value for direct marketing is significant at 10 % level of significance, and is thus in rejection of null hypothesis i.e. there is a significant difference in the attitudes of three groups of respondents

In order to find the factors which help in deciding the optimal promotion mix, the respondents were asked to rank the factors from 1-9, where 1 depicts most important and rank 9 depicts least important factor. Perusal of table 7 portrays that the most important factors responsible for the deciding the optimal promotion mix are promotional messages and the ethical issues involved with the product. Next, important factor rated by the respondents is the available budget and complexity of product or service, followed by market size and location, product life cycle stage,

73

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

government regulations, distribution channel and strategies of competitors.

Note: Figures in parenthesis indicate percentages. The factors chosen by the rural consumers which they consider accountable for deciding the optimal promotion mix confirm the level of awareness among the rural respondents about the elements of promotion mix. Each of the elements of promotion mix has its own impact on the rural masses. They understand the significance of various elements of promotion mix in increasing the sales of the company, wherein public relations have been considered as the most important element. The rating given to the reasons responsible for their choice is quite rational.

7.   Conclusion to the Study

Changes in lifestyle, rising incomes and a focus on value, are pushing up growth for different product categories in the rural areas. Indications of larger disposable income and a perceptible shift in consumption priority in the rural sector also appear to be favouring the FMCG organizations. But, in order to be successful, organizations need to develop business models and marketing mix strategies that are developed in accordance with this changed scenario in the rural markets of India. It is the responsibility of the companies to supply a right product to the right customer at right time at the right place at the right price. The companies shall no longer decide the marketing mix for rural market in accordance with the urban consumer alone; but the rural customer shall decide it.

References

[1] Bhaduri, Saumitra N. (2002), "Determinants of Corporate Borrowing: Some Evidences from the Indian Corporate Structure", *Journal of Economics and Finance*, Vol. 26, Issue 2, (www.jeandf.bizland.com/summer02/summer02.htm accessed on 09/9/2005).

[2] Chunnawala, S.A. and Sethia, K.C. (1994) "*Foundation of Advertising Theory and Practice*", Himalaya Publishing House, Mumbai, pp. 17

[3] Dertouzos, James, N. and Garber, S. (2006), "Effectiveness of Advertising in Different Media", *Journal of Advertising*, Vol. 35, No. 2, pp. 111–122.

[4] Easwaran, S. (2006), "Wealth Creation through Rural Markets- Some Issues and Strategies", *Marketing Mastermind*, The ICFAI University Press, March, pp. 47-52

[5] Gopalaswamy, T.P. (2005), Rural Marketing-Environment, Problems, Strategies 2nd edition, Vikas Publishing House, New Delhi, pp.6

[6] Hair, Joseph, F. Jr., Anderson, E.R., Tatham L.R., and Black, C., William (2007), *Multivariate Data Analysis*, 5th Edition, Pearson Prentice Hall Publishing House, New Delhi.

[7] Homer, P.M. (2006), "Relationships among Ad-Induced Affect, Beliefs and Attitudes", *Journal of Advertising*, Vol. 35, No. 1, spring, pp. 35-51.

[8] Joseph, F. Jr., Anderson, E.R., Tatham L.R., and Black, C., William (1995), *Multivariate Data Analysis*, 4th Edition, Pearson Prentice Hall Publishing House, New Delhi.

[9] Kumar, S. A. and Madhavi, C. (2006), "Rural marketing for FMCG", *Indian Journal of Marketing*, April, pp. 19-23

[10] Malhotra, N. K. (2007), *Marketing Research -An Applied Orientation*, 3rd Edition, Pearson Education Publishing House, New Delhi.

[11] Maslow, A. H. (1954), "A Theory of Human Motivation", *Motivation and Personality*, Harper and Row Publishers Inc., New York, pp. 80-101

[12] Mathur, U.C. (2008), "*Advertising Management-Text and Cases*", New Age, International Publishers, New Delhi

[13] Mohan, M. (2007), "*Advertising Management- Concepts and Cases*", Tata McGraw Hill Publishing House, New Delhi

[14] Nagarajan, G. (2006), "Unilever in India-Rural Marketing Initiatives", *Marketing Mastermind*, The ICFAI University Press, February, pp. 69-81

[15] Panwar, J.S. and Agnihotri M. (2006), "Advertising message processing amongst urban children-An Indian experience with special reference to TV advertising", *Asia Pacific Journal of Marketing and Logistics*, Vol. 18 No. 4, pp. 303-327

[16] Raj, J.S. and Selvaraj P. (2007), "Social Changes and the Growth of Indian Rural Market:

74

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

An Invitation to FMCG Sector", *International Marketing Conference on Marketing and Society*, 8-10th April, IIMK.

[17] Rathor, B.S. (2003), "*Advertising Management*", Himalaya Publishing House, New Delhi

[18] Rummel, R.J. (1970), "Understanding Factor Analysis", (http://www.hawaii.edu/powerkills/UFA.HTM accessed on 07/7/2005)

[19] Sakkithivel, A.K. (2006), "Designing Integrated Promotion Mechanism to Influence Indian Consumer's Buying Behaviour", *Advertising Express*, The ICFAI University Press, November, pp. 37-42

[20] Sehrawet, M. and Kundu, S.C. (2007), "Buying Behaviour of Rural and urban Consumers in India: The Impact of Packaging", *International journal of Consumer Studies*, Vol. 31(6), pp. 630-638

[21] Serra Inci Çelebi (2007), "The credibility of advertising verses publicity for new FMCGs in Turkey", *Corporate Communications*, Volume: 12 , pp. 161 – 176

[22] Tan, S.J. and Chia L. (2007), "Are we measuring the same Attitude? Understanding the Media Effects on Attitude towards Advertising", *Marketing Theory*, Vol.7, pp. 356-377.

[23] Vaish, T. (2006) "Strategies for Rural Markets in India", *Marketing Mastermind,* The ICFAI University Press, February, pp. 35-41

[24] Walker and Robert, J. (1941), "Baseball on Television", *A Journal of Baseball History   and Culture*,   Vol.11, Number 2, pp.1-15

75

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Electronic Customer Relationship Management (E-CRM): Conceptual Framework and Developing a Model

Dr. Suman Kumar Dawn[1], Mr. Rajdeep Chowdhury[2]

[1]*Assistant Professor*
Centre for Management Studies
JIS College of Engineering (Under West Bengal University of Technology)
skd_hooghly@yahoo.co.in

[2]*Assistant Professor*
Department of Computer Application
JIS College of Engineering (Under West Bengal University of Technology)
dujon18@yahoo.co.in, dujon18rc@gmail.com

Abstract— *Businesses are in a constant race to increase profits, keep current customers and gain new ones, competing for customers on a globalised market like never before. With increased globalization, competition, higher customer turnover, growing customer acquisition costs and rising customer expectations combine forth the foundational concepts allied with basic nuances conjuring up the diurnal competitive world. E-CRM is very important for several companies and attained an increasing amount of interest among scholars and practitioners, especially in recent years. It is aimed at building unfathomable, strong, long-term relationships that keep customers coming back repeatedly and assure retention. It aims to help organizations building individual customer relationships in such a way that both the firm and the customer get the most out of the exchange, providing both parties with long term benefits and an extensive rapport. It is a comprehensive approach which provides seamless integration of every area of business that touches the customer, namely marketing, sales; customer service and field support, through the integration of people, process and technology. Taking advantage of revolutionary impact of the Internet on human psyche, E-CRM creates a mutual benefit relationship with all the customers, through integration of customer touch points as part of business process. Today, firms have realised the fact that their ability to compete in this competitive marketing environment is solely dependent on their building and thereby maintaining relationship with their target customers through Internet.*
In this paper, it is an earnest effort on our part to develop a comprehensive model for E-CRM which will be helpful for the Indian companies. The literature survey highlights the earlier research references in the area of electronic customer relationship management to augment the body of knowledge for this study.

Keywords— *E-CRM, WAP, SMS, Formulation Chart, Feedback & Survey Methodology [FSM]*

1.   Introduction

In the post liberalization and globalisation era, organizations are facing turmoil to satisfy and pacify customers. With the increased number of brands and services in the market, the consumers nowadays have more buying options than ever before. The success of a company depends on how efficiently it deals with different customers' needs and the ways to approach them. Therefore, the company needs to identify and satisfy these segments of customers with varying needs and demands. Sluggish growth rates, intensifying competition and technological developments compel the businesses to reduce costs and improve their effectiveness. The practice of customer relationship management has the potential to improve marketing productivity through improved marketing efficiencies and effectiveness.

At present scenario, E-CRM is emerging as the core marketing activity for businesses that can effectively counter the competitors in a fiercely competitive ambience. Effective E-CRM is all about the overall process of building and maintaining customer relationships by delivering superior customer value and satisfaction. E-CRM extends to all the stakeholders that create value for the customer. Value for the customer may be delivering the products at lower prices, higher

76

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

quality products and services, continuous stream of innovative new products and customization of products and services. By using technology, E-CRM helps the marketers to differentiate themselves from the competitors and can also offer the products or services either cheaply or at better rates than its competitors. The new customer is fickle, demanding, informed, and in the driver's seat ensuring more responsibility on the part of a seller.

et al., (2002) have described that E-CRM is the combination of software, hardware, application and management commitment. The emergence of mobile commerce has led to the introduction of new products, new ways of selling products to customers and new knowledge for companies in terms of how to manage interactions with customers.

For example, financial organizations are now taking advantage of mobile marketing services and in particular mobile banking, based on Wireless Application Protocol (WAP) technology, as a powerful new marketing tool to build long lasting and mutually rewarding relationships with new and existing customers (Rilvari, 2005).

Most major banks are also at present using mobile CRM in some form as a new channel for customer acquisition, as SMS text messaging is still in growth mode in new market segments, and also to project a new image for the company. Mobile operators such as Vodafone, Airtel, Tata Docomo, etc. are using SMS text messaging to enhance customer relationships. Mobile channels, especially SMS, are seen as immediate, automated, reliable, personal and customized options providing an efficient way to reach customers directly and manage customer relationships extensively. Another sector exploring E-CRM is retailing. This implies that E-CRM using mobile marketing may indeed offer an effective way to reach and build relationships with demanding customers in rapidly changing markets (Sinisalo et al., 2005).

Role of E-CRM in Modern Businesses

E-CRM is not at all applied to change the whole marketing activities but to enhance the marketing activities by presenting opportunities to companies to improve their effectiveness and also to deliver valued products to customers (Scullin et al., 2004). It may reduce the costs involved in communicating to customers, optimize work flows

as a result of integration with other enterprise systems, facilitate better market segmentation and would be able to enhance customer interactions and relationship (Adebanjo, 2003). The role of E-CRM in business systems is to improve customer service, retain valuable customers and to aid in providing analytical capabilities within an organization (Fjermestad and Romano, 2003). It allows organisations not only to retain customers, but enables more effective marketing, creates intelligent opportunities for cross selling and opens up the possibility or rapid introduction of new brands and products. To be able to deliver these benefits, organisations must be able to customize their product offering, optimize price, integrate products and services and deliver the service as promised and demanded by the customers. (Jukic et al., 2002).Using technology to optimise interactions with customers' companies can create a 360 degree view of customers to learn from past interactions to optimise future ones (Chen and Popovich, 2003).

It is also regarded as the infrastructure that enables the delineation of, and increases in, customer value and the correct means by which to motivate valuable customers to stay loyal (Fjermestad and Romano, 2003). Industries are now aware that by implementing E-CRM they can contact distinct customers who also make them more competitive (Ragins and Greco, 2003). E-CRM can be used as an approach to relationship management with multiple stakeholders including customers, employees, channel partners and suppliers. One of the reasons for popularity of E-CRM nowadays is that digital channels can create unique and positive experiences for customers and therefore the businesses can improve customer satisfaction and retain customer base (Wind et al., 2002). It is a highly interactive character which allows companies to respond directly to any customer's requests or problems. It also helps companies to establish, build and sustain long-term customer relationships (Winer, 2001).

Review of literature

In the old days, most business organisations stressed to attract target customers by using conventional marketing strategies and Ps'. In this highly competitive and informative era, these strategies are considered to be highly ineffective. In the context of service, CRM has been defined as attracting, maintaining and enhancing customer relationships in multi-service organisations (Berry, 1983). Here attracting customers is considered to be an intermediary step

77

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

in the relationship building process, with the ultimate aim of increasing loyalty of profitable customers and assured ones too.

Berry and Parasuraman (1991) has proposed that customer relationship management is mainly concerned about attracting, developing and retaining customer relationships. They have outlined five strategy elements for practicing customer relationship management. They are stated as: developing a core service around which to build a customer relationship, customizing the relationship to the individual customer, augmenting the core service with extra benefits, pricing services to encourage customer loyalty and providing proper education to employees so that they, in turn, will perform well for customers.

Jones and Sasser (1995) have told that customer relationship is influenced by the nature of the product or service, type of industry and competitive environment. Customer loyalty building in Internet-based relationships is particularly difficult in the highly competitive and new ambience as it depends largely on impersonal context of Internet-based transactions. According to Sheth, Sisodia and Sharma (2000) the Internet helps firms to understand the customer needs better, develop more customer centric programs and to satisfy their needs, offer enhanced value through managing customer information and also providing customized products and services. Handen (2000) defines CRM as the process of acquiring and retaining valued customers. He further states that in order to be successful in the future, organizations need to better understand customers' needs. Massey et al. (2001) have advocated that CRM is about attracting, developing and maintaining profitable customer relationships over time. This focus is critical in today's global economy, where a customer may opt for his choice with a click of the mouse. Loyal, repeat customers are intangible assets that provide a true competitive advantage to any organization. It is estimated that the cost of acquiring a new customers is about five times that of maintaining a current customer (Greenberg, 2001). According to Romano and Fjermestad (2001), E-CRM is concerned with attracting and keeping economically valuable customers and eliminating less profitable ones. Varadarajan and Yadav (2002) have advocated that the Internet is both a

boon and a bane for customer relationship management. On one hand, the lowered costs of market entry increase the competition for customer attention and sales, while concurrently reducing seller margins through reductions in buyer search costs. This places additional pressures on firms to seek out their most valuable customers and devise programs and strategies to retain them.

Apte et al. (2002) have argued that traditional CRM activities remain distinct from web-enabled CRM (E CRM). Web-enabled CRM (E-CRM) is recognised by most firms as an additional channel for communication or sales and the firms are recognising that open standard Internet TCP/IP protocols, XML and Internet telephony are not only cost effective but also enable better contacts with customers. According to Lee-Kelley et al. (2003), E-CRM refers to the marketing activities, tools and techniques delivered via the internet which includes email, world wide web, chat rooms, e-forums, etc., with a specific aim to locate, build and improve long term customer relationships to enhance their individual potential.

2.   Conceptual foundation of CRM & E-CRM

In true sense, CRM allows an organization to deliver its products and services according to the customer's preferences. Croteau and Li (2003) have told that CRM is a customer focused business strategy that aims to increase customer satisfaction and customer loyalty to offering a more responsive and customized service to each customer. With the advent of internet, CRM has enhanced an organization's capability by providing access to its customers and suppliers via the web. This web experience and communication through the wireless web is called E-CRM. The internet is advancing E-CRM and it has features that are attractive to customers and business organizations. The differences between CRM and E-CRM are underlying technology and its interfaces with users and other systems. In E-CRM, the customer with a self service browser based window can place orders, check order status, review purchase history, request additional information about products, send emails and engage in a host of other activities. These capabilities provide customers freedom in terms of place and time.
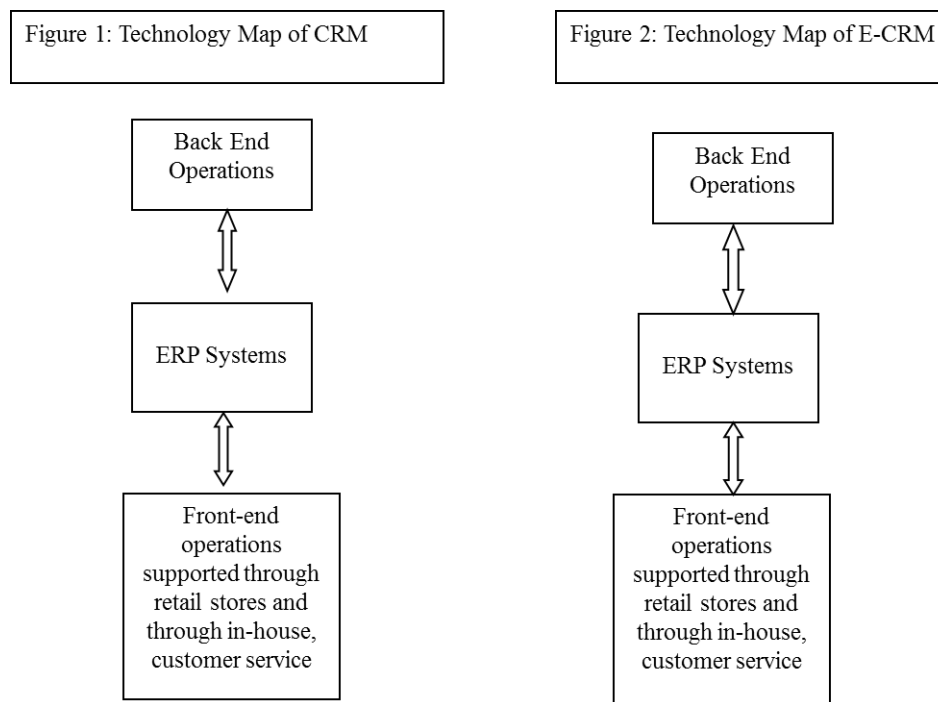
78

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Figure 1: Technology Map of CRM	Figure 2: Technology Map of E-CRM

```
        Back End                              Back End
        Operations                            Operations
           ⇕                                     ⇕
        ERP Systems                           ERP Systems
           ⇕                                     ⇕
        Front-end                             Front-end
        operations                            operations
    supported through                   supported through
      retail stores and                   retail stores and
    through in-house,                   through in-house,
      customer service                    customer service
```

Figure 1 and Figure 2 depict a common high level technology map of traditional CRM and E-CRM systems respectively.

In general, CRM systems use client/server technologies where all programs and applications are run on one or more centralized server. The front-end operations of the system interface with the back-end operations through traditional ERP systems. The system does not use data warehouses. ERP systems act as data repositories and capture data from both the front-end and back-end operations. The usual customer touch points are retail stores and the organization's customer service and support centers viz; personal contact through retail outlets, telephone and fax.

With advent of E-CRM, the interface between the front-end and back-end operations is not only through ERP but also utilizes data warehouses. Data warehouse are logical collection of information, gathered from several operational databases, used to create business intelligence in support of business activities and decision making. Data warehouses are multidimensional databases (Hang et.al., 2004).

The users in E-CRM are the employees of the organization or the retail store's personnel. The system provides access via a set of predefined menus and choices, which can not customized by the user. Any customization requires making significant changes at the system level.

In E-CRM, an individual can easily customize these applications and menus through their web-based user interfaces. On the other hand, in E-CRM all applications are designed and implemented for optimal web interaction and experience. The browser is the medium and it allows access to appropriate information without any reference to the podium/platform of the client. From the customer's perspective, it is just like accessing different web pages.

In E-CRM, all applications are designed for the entire enterprise including all customers, suppliers and partners.

Growth of E-CRM in India

E-CRM consists of a set of strategies, organizational culture and technological solutions that enhance an organization's ability to see the distinctions in its customers' and prospects' behavior and needs, track new opportunities to better serve their customers and act instantly and profitably, on those distinctions and opportunities. The aim of E-CRM is to optimise the combined use of technology and human resources of businesses, so as to gain insight into the behavior of the customer.

Technology like call center services and software may prove helpful only if they can improve the customer services and relation to the benefit of the customer.

The E-CRM services consist of the following major segments:

- Consulting services

79

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

- Implementation services
- CRM Outsourcing services
- Training services

E-CRM acts jointly with the business system to improve relationship between companies and consumers. From a technological perspective, it involves capturing customer data from across the organization cross-functional points and consolidating all internally and externally acquired customer related data in a central database. Electronic and interactive media such as the internet and email are seen as playing the most significant role in operationalising CRM, as they support effective customized information between the organization and the customers. Now, E-CRM is including other e-technologies and new e-channels like mobile telephony, customer call centers and voice response systems. The use of these technologies and channels means that companies are managing customer interactions with either no human contact at all, or involving reduced levels of human intermediation on the supplier side (Anon, 2002).

The Indian ITES market has its roots in the mid 1990s, when companies such as American Express, British Airways and GE Capital set up captive units for customer support and transaction processing services. Over the past decade, India has emerged as a preferred location for organizations planning to outsource a variety of services ranging from call centers and other customer interaction services, insurance claims processing, payroll processing, medical transcription, E-CRM, SCM, to back-office operations such as accounting, data processing and data mining.

The ITES industry in India includes the following broad segments – call centers, medical transcription, back office operations, pay roll services, revenue accounting and other operations, insurance claims processing, content development and animation, etc.

Table – 1 depicts year-wise revenue of Indian ITES industry.

Table 1: Growth of Indian ITES Industry

Serial Number	Year	US$ (In Billion)	Rs. (In Crore)
1	1999-2000	0.54	2400
2	2000-2001	0.88	4100
3	2001-2002	1.45	7100
4	2002-2003	2.10	10100
5	2003-2004	3.4	15500
6	2004-2005	5.2	23500
7	2005-2006	7.2	32400
8	2007-2008	9.5	NA
9	2008-2009	12.5	NA

Source: Nasscom

ITES differ from software services. They are remotely delivered service comprising of a value chain. ITES are more cost effective than software services. Its vertical market focus is much higher than the software market with a different profile of people.

NASSCOM had identified the following activities as IT Enabled Services, namely;

(i) BPO/back office operations/data entry/data conversion, (ii) Customer interaction Services (Including Call Centers), (iii) Medical transcription/translation services, (iv) Legal databases, (v) Digital content development, (vi) Support centers, (vii) Payroll, (viii) Website services,

(ix) Network consultancy and management, and,

(x) Data search & market research.

80

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011
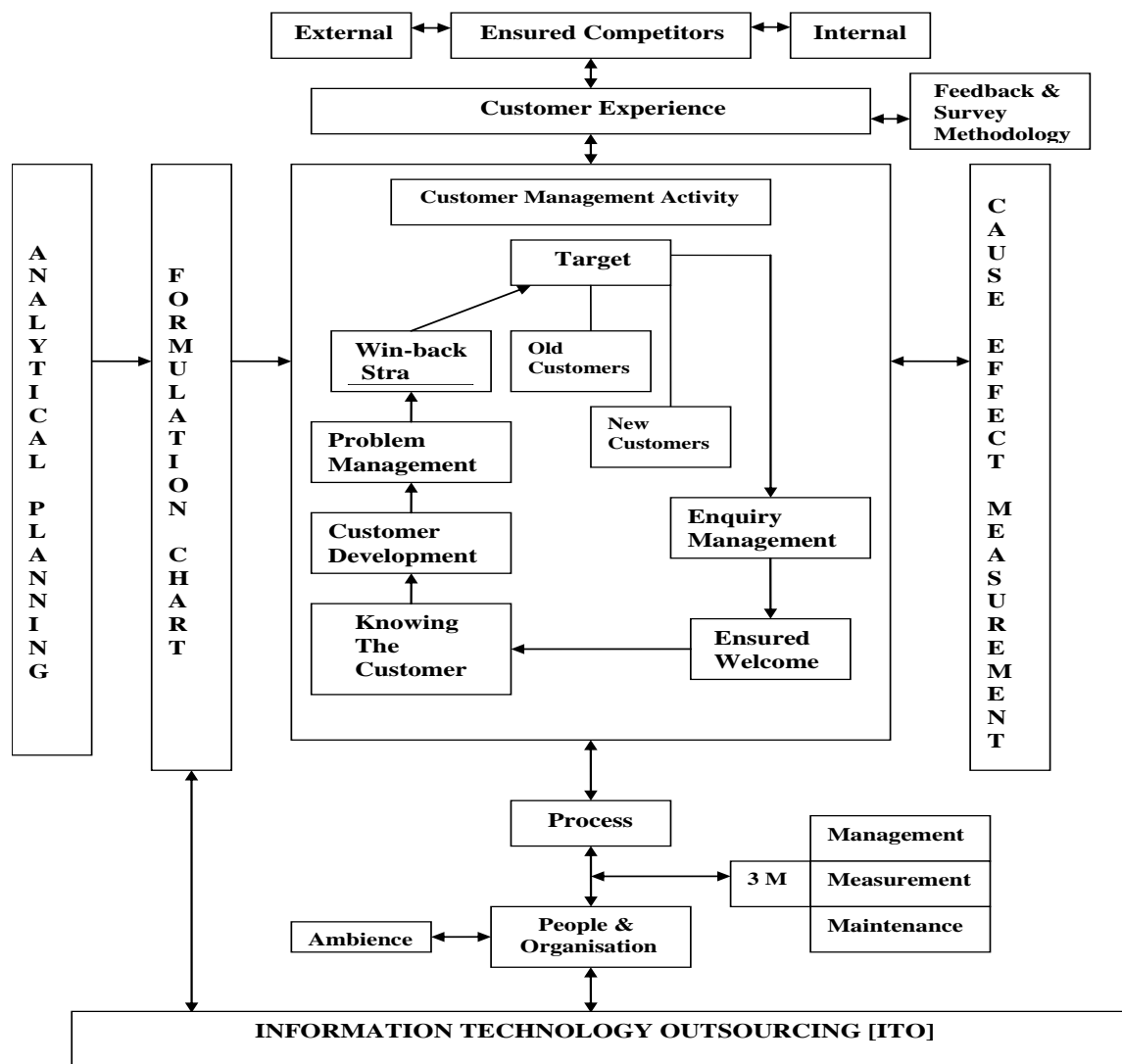
Figure 3: E-CRM Model

An effective E-CRM model for modern business

E-CRM is particularly a modern business weapon and a set of strategic tools that provide companies with a clear picture of what they have achieved so far in customer management; how they compare/stand with others, and how they can improve what they are doing. Web-based CRM or E-CRM offers the customer more flexibility and convenience and gives companies the opportunity to optimise cost. There are several issues and challenges in implementing enterprise-wide E-CRM strategy.

The major steps in implementing enterprise-wide E-CRM are: (i) Understanding customers, (ii) Developing infrastructure in information and technology, (iii) Understanding people and organisation, (iv) Management commitment, (v) Process management, (vi)

Understanding competitors, (vii) Enforcing customer management activity, and, (viii) Measuring customer activity.

Figure 3 depicts an effective diagram of E-CRM (Electronic Customer Relationship Management). We have made an attempt to design an effective E-CRM model for the organisations. If implemented, then the organisations will perform better and will be able to retain the customers in the long run.

(a) Analytical planning

E-CRM initiates its inception with understanding the value and behavior of distinguished customers and groups. This understanding is derived mainly form internal information and knowledge sources, drives more questions, which will in turn help ensured competitor assessment and external analysis activity. Once a clear and comprehensive

81

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

understanding has been evolved, customers and prospects need to be segmented, so that planning activity can be as effective as possible.

(b) Formulation chart as in Proposition

Once the customers to be managed are lucid enough, propositions need to be formulated via some concept of charting the tools that will match the needs of those customers and that will be attractive enough for new customers. There will be distinguished propositions formulated for distinguished groups. These propositions need to be defined at a much detailed level that drives the experience the customer can expect in dealing with the organization, its products and its partners / channels.

(c) Information Technology Outsourcing [ITO]

Technology facilitates organizations to acquire, manage and use the vast amount of information involved in managing customers to the tee. An organization needs to understand what information is available, what is missing and how to manage the information available at its disposal. The technology then needs to deliver the current information to relevant people at the right time in order for them to fulfill their role in managing customers.

Accompanying internet-enabled software applications, such as Enterprise Resource Planning [ERP] packages, e-commerce applications, relationship management packages and enterprise portal applications have caused business to change processes, adopt best of breed practices, slash costs and introduce efficiencies into supply chain management, customer relationship management and internal operations. ERP vendors' market supply chain management, enterprise resource planning and customer relationship management packages today in its true sense. One of the customer relationship management software, SIEBEL has solutions for automotive, communication, consumer goods, apparel and footwear, health care, finance, technology and energy sectors.

(d) People & organization

People and the Organization within which they work, have the greatest effect on overall customer relationship management. An organization's customer management people need to be recruited, managed, developed and motivated with a supporting structure comprehensively dedicated to the role pre-defined.

People & Organization mainly cover the fragmented nuances:

(i) Organizational structure, (ii) Role identification, (iii) Competency analysis and gap analysis, (iv) Training requirement, (v) Objective/goal setting, (vi) Monitoring & evaluation, (vii) Supplier selection and management, and, (viii) Ambience / working environment.

(e) Process Management

Consistent processes are essential to all areas of customer relationship management for achieving constant improvements. Also processes need to be constantly reviewed for acceptability from both the customers' point of view and the organization's point of view.

Process management mainly covers the fragmented nuances:

(i) Process identification, (ii) Process documentation, (iii) Process communication, (iv) Process acceptability monitoring, (v) Process benchmarking, and, (vi) Process improvement.

Process can be associated with the 3M Theory conceptualized by the authors during the innovative design phase of the proposed model.

3M Theory can be fragmented into the following three, namely:

(i) Management, (ii) Measurement, and, (iii) Maintenance.

(f) Customer Management Activity

Customer Management Activity deals mainly with the Targeting of customers, both old and new. New customers are provided with new and improved services and also reshaping and revitalizing old services. This activity commences with enquiring an individual's interest on products, welcoming new customers and upgrading the relationship with existing/old customers, understanding the customers' needs, developing the mutual relationship with customers through adaptation of suitable segmentation strategies and finally managing problems by way of taking intensive care activity. It not only improves the solutions for customers, but also ensures in getting more consistent solutions. Further it improves the quality of customer handling and thereby also reduces the costs per customer call.

(g) Cause effect measurement:

Measurement of all elements of customer management activity forms the feedback into the planning process that ensures continual improvement. It also enables individuals and channels to understand how they are performing their roles and how much they are contributing

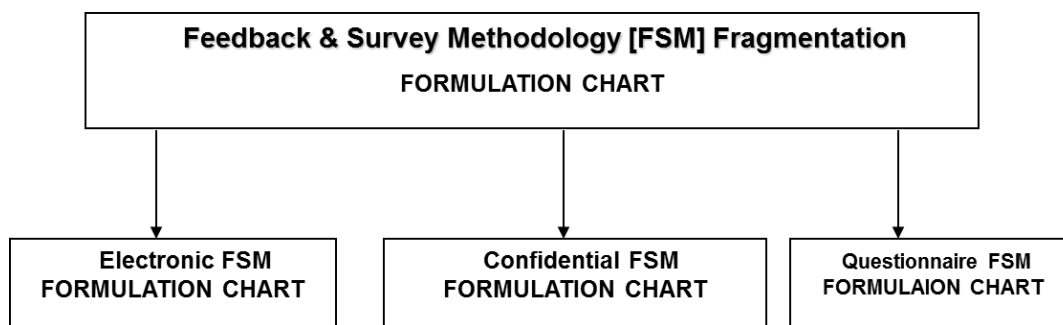towards the overall customer relationship management success of the organization.

Measurement activity needs to be supplemented with the understanding of customer experience in dealing with the organization. The links of customers' feelings and their preferences need to be clearly understood if customer loyalty is to be maximized.

Customer experience covers:

(i) Customer satisfaction monitoring, (ii) Customer loyalty analysis, and, (iii) Benchmarking.

personalization, customization and interactivity in the CRM process. These enhance the value-creating activities and also extend the abilities of respective firms to establish, nurture and sustain long-term customer relationships than ever before. While traditional CRM activities remained distinct from web-enabled CRM or E-CRM, it is being increasingly recognized that web-enabled CRM is not only cost-efficient but also ensures better contacts with customers.

In this paper, we have attempted to design an effective E-CRM model for the organizations. The major steps in implementing this proposed model

```
┌─────────────────────────────────────────────────────────┐
│    Feedback & Survey Methodology [FSM] Fragmentation     │
│                  FORMULATION CHART                       │
└─────────────────────────────────────────────────────────┘
        │                    │                    │
        ▼                    ▼                    ▼
┌──────────────┐    ┌──────────────┐    ┌──────────────┐
│ Electronic FSM│    │Confidential FSM│   │Questionnaire FSM│
│FORMULATION    │    │FORMULATION     │   │FORMULAION      │
│CHART          │    │CHART           │   │CHART           │
└──────────────┘    └──────────────┘    └──────────────┘
```

(h) Feedback & Survey Methodology [FSM]

Feedback & Survey Methodology [FSM] is a concept that ensures proper return value of a customer, which thereby ensures performance on the whole.

The Feedback & Survey Methodology can be visualized as a two component module, comprising of estimation sub-module along with the deviation sub-module encountered along with. The estimation sub-module furnishes the comparison between the pre-defined estimation and the actual exaction attained. The deviation sub-module furnishes the standard deviation of expected outcome with actual outcome and the graphical representation establishing that.

Feedback & Survey Methodology [FSM] can be further fragmented into three sub categories, namely; (i) Electronic FSM, (ii) Confidential FSM, and, (iii) Questionnaire FSM.

would be:

(i) Feasibility study and implementation methodologies, (ii) Formulation chart initialization and extensive implementation, (iii) Meeting up with initial targets, (iv) Identification of available areas of competitive advantage, and, (v) The existence of proper and well-knitted Feedback & Survey Methodology [FSM], ensuring nuances of varied genre.

There is an ongoing need to examine the response of customers to a company's E-CRM strategies. Developing an effective E-CRM system requires careful pre-planning and a commitment throughout the essence of the organisation to become customer oriented.

References:

1. Adebanjo, D. (2003): 'Classifying and selecting e-CRM applications: an analysis- based proposal', *Management Decision*, vol. 41, no.6, pp. 570–87

2. Anon (2002): 'Unraveling E-CRM', *CRM Market Watch*, Issue 8, 28 February, pp. 12-13

3. Apte. C., Bing Liu, Edwin P.D., Pendnault and Padhraic Symth (2002): 'Business Applications of Data Mining', *Communications of the ACM*, 45 (August), pp.49-53

3.   Conclusion

As technologies continue to develop into the future in tandem with the proliferation of customer base, companies must attempt to harness the opportunities available to deliver sustainable competitive advantage in the digital world of E-CRM. The Internet enables to identify customer/visitor, cost-efficient data collection,

83

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

4. Berry and Persuraman (1991): *'Marketing Services –Competing through Quality'*, New York: Free Press

5. Berry, L.L. (1983): 'Relationship Marketing of Services, Growing Interest, Emerging Perspectives', *Journal of Academy of marketing Services,* vol. 23, no. 4, pp. 236-245

6. Chen, I.J and K. Popovich (2003): 'Understanding customer relationship management (CRM): people, process and technology', *Business Process Management Journal*, vol. 9, no. 5, pp. 672-88

7. Croteau, Anne-Marie & Li.P. (2003): 'Critical Success factor at CRM technological Initiative', Canadian Journal of Administrative Services, vol.20, no.1, pp.21-30

8. Fjermestad, J. and N.C. Romano (2003): 'Electronic customer relationship management: revisiting the general principles of usability and resistance: an integrative implementation framework', *Business Process Management Journal*, vol. 5, no. 9, pp. 572-91

9. Greenberg, P. (2001): *'CRM at the speed of light: Capturing and Keeping customers in internet Real time'*, New York, Osborne /Mc Graw-Hill

10. Haag, S., Cumming, M., & McCubbery, D.J. (2004): 'Management Information Systems for the Information Age', 4th edition, New York, McGraw Hill

11. Handen, L. (2000): 'Putting CRM to work: the rise of the relationship. In Stanley A. Brown (Ed.), Customer relationship Management : A Strategic Imperative in the world of e-business', New York: John Wiley & Sons p.8

12. Jones T.O. and Sassar W.E. Jr. (1995): 'Why Satisfied Customers Defects', *Harvard Business Review*, 73 (November- December), pp.88-99

13. Lee-Kelley, L., G. David and M. Robin (2003): 'How eCRM can enhance customer loyalty', *Marketing Intelligence and Planning*, vol. 21, no. 4, pp. 239-48

14. Massey, A.P., Montoya –Weiss M., & Holcom, Kent (2001): 'Reengineering the customer relationship: leveraging Knowledge Assets at IBM.' *Decision Support Systems* , vol.23, pp. 155-170

15. Nenad Jukic et al. (2002): 'Implementing Polyinstantiation as a Strategy for Electronic Commerce Customer Relationship Management', *International Journal of Electronic Commerce,* vol. 7 no. 2. p. 10

16. Ragins, E.J. and A.J. Greco (2003): 'Customer relationship management and e- business: more than a software solution', *Review of Business*, Winter, pp. 25–30

17. Rilvari, J. (2005): 'Mobile banking: a powerful new marketing and CRM tool for financial services companies all over Europe', *Journal of Financial Services Marketing*, vol. 10, no. 1, pp. 11-20

18. Romano, N.C., Fjermestad, J. (2001): 'Customer relationship management research: An assessment of research', *International Journal of Electronic Commerce*, 6, pp.59-111

19. Scullin, S., J. Fjermestad and N.C. Romano (2004): 'E-relationship marketing: changes in traditional marketing as the outcome of electronic customer relationship management', *The Journal of Enterprise Information Management*, vol. 17, no.6, pp. 410-15

20. Sheth, J.N., Rajendra S. Sisodia, and Arun Sharma (2000): 'Antecedents and Consequences of the Growth of Customer – Centric Marketing', *Journal of the Academy of Marketing Science* , 28 (Winter), pp.55-66

21. Sinisalo, J., J. Salo, M. Leppäniemi and H. Karjaluoto (2005): 'Initiation stage of mobile customer relationship management', *The E-Business Review*, vol. 5, pp. 205-09

22. Varadarajan, P.R. and Manjit S. Yadav (2002): 'Marketing Strategy and the Internet: An Organising Framework', *Journal of the Academy of Marketing Science*, 30(Fall), pp.296-312

23. Wind et al.(2002): *'Convergence Marketing: Strategies for Reading the New Hybrid Consumer'*, Prentice-Hall, Englewood Cliffs, NJ

24. Winer R.S. (2001): 'A Framework for Customer Relationship Management', *California Management Review,* vol. 43 no. 4, p. 89

84

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

25. Wright, L.T., M. Stone and J. Abbott (2002): 'The CRM imperative: practice vs. theory in the telecommunications industry', *Journal of Database Marketing*, vol. 9, no. 4, pp. 339-49

About the Authors

Suman Kumar Dawn is Assistant Professor, Centre for Management Studies, JIS College of Engineering affiliated to West Bengal University of Technology. He is M.Sc (Mathematics) from IIT Kharagpur, MBA (Marketing) and Ph.D. from The University of Burdwan. His areas of interest are Marketing Research, Advertising and Sales Promotion, Strategic Management, Quantitative Techniques and Operations Research. He has accumulated 10 years of teaching experience and 7 years of industry experience. He has published numerous research papers in referred National Journals / International Journals. He has referred presentations in National / International Conferences and Seminars.
Contact Email: skd_hooghly@yahoo.co.in

Rajdeep Chowdhury is Assistant Professor, Department of Computer Application, JIS College of Engineering affiliated to West Bengal University of Technology. He has completed MCA from JIS College of Engineering, Kalyani under West Bengal University of Technology. His fields of interest are Cryptography, Network Security, Strategic Management and Data Mining. He has finished several courses related to Computer Application, Software Engineering and Project Management, Object Oriented Design and Analysis. He has accumulated 4 years of teaching experience. He has published numerous research papers in referred National / International Journals. He has referred presentations in National / International Conferences and Seminars.
Contact Email: dujon18@yahoo.co.in

85

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Fuzzy AHP for Contractor Evaluation in Project Management- A Case Study

Golam Kabir

Lecturer, Department of Industrial and Production Engineering,
Bangladesh University of Engineering and Technology (BUET), Dhaka-1000, Bangladesh,
gk.raju@yahoo.com

Abstract: *Selecting the best contractor is one of the most essential and important decisions a construction company has to make for any project. In order to respond the dynamic and uncertain environment and to have cutting edge over the rival, a systematic and structured approach is needed to evaluate and select the most qualified and effective contractor for the improvement of the overall project. In this paper, Fuzzy Analytical Hierarchy Process (FAHP) methodology is adopted based on both the subjective and objective criteria for evaluation of contractor in a Bangladeshi construction company as a decision making problem. Fuzzy linguistic concepts are often used to enhance the traditional analytic hierarchy process (AHP) in capturing the fuzziness and subjectiveness of decision makers' judgments. This fuzzy set theory based multi-attribute decision making method is found to be quite constructive and effective in industrial environment.*

Keywords: *Contractor evaluation, Decision making, Fuzzy AHP, Fuzzy extent analysis.*

1. Introduction

In increasingly competitive global markets, accurate and efficient decision-making has become more important than ever before. Decision analysis can be used to determine an optimal strategy when a decision maker faced with several decision alternatives and an uncertain or risk filled pattern of future events [1]. The goodness of a selected alternative depends on the quality of the data used in describing the decision situation. Decision-making involving multiple, sometimes conflicting, objectives and/or criteria is called Multi Criteria Decision-Making, MCDM. Often the criteria include not only quantitative factors but also qualitative factors. In trying to select the `best' contractor the task facing a construction client is a multiple criteria decision-making (MCDM) process, in which a large number of criteria need to be evaluated [2]. Most of these criteria are related to each other in a complex way. Furthermore, many usually conflict, such that a gain in one criterion requires a trade-off in another(s). As contractor selection problem decision criteria are a mix of both qualitative and quantitative characteristics, DMs have to base their decisions on both quantitative analysis and subjective (typically experiential) judgments. DMs may intuitively and it easier to make subjective judgments by using verbal expressions (i.e. linguistic variables) [3]. However, this can cause problems during evaluation of alternatives, because it is difficult to process (e.g. aggregate) these two types of measure (i.e. quantitative and linguistic). It is, therefore, necessary that any MCDM method be capable of aggregating these two types of measures in a rational and consistent manner; ultimately providing a ranking of all decision alternatives.

In practice, contractor selection is normally a two stage process whereby contractors are first pre-qualified (for example, to get onto a select list or be invited to tender for a given project). Subsequently, their tender submissions are evaluated in the second stage. This paper describes a method to perform that second stage; this being mainly to simplify the narrative for elucidation of the technique. Contractor prequalification (an evaluation problem) is defined by Moore [4] as the screening of contractors by project owners and their representatives according to a predefined set of criteria deemed necessary for successful project performance, in order to determine the contractor's competence of ability to participate in the project bid. Another formal definition by Clough & Sears [5] is that prequalification means that the contracting firm wishing to bid on a project needs to be qualified before it can be issued bidding documents or before it can submit proposal. Several academics have studied the decision criteria used by clients for choosing a contractor. Diekmann [6] applied the utility function to form a contractor evaluation model to aid contractor selection for a hybrid unit-price cost-plus contract. Nguyen [7] proposed and applied an FS model to contractor pre-qualification and tender evaluation. Russell et al. [8] developed a rule-based expert system called `QUALIFIER-2' for contractor pre-qualification. Herbsman and Ellis [9] proposed a contractor selection approach, the A-

86

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

plus-B method, that used both construction cost and time as selection criteria. Hatush & Skitmore [10] found that all clients use a `similar' set of criteria for contractor selection, but that the way clients quantify these criteria can be very different in practice. Holt et al. [11] developed a multi-attribute analysis method to evaluate construction bids and Alsugair [12] proposed a framework of 36 evaluating factors grouped into nine classes. Holt [13] defined contractor evaluation as the process of investigating or measuring contractor attributes, and contractor selection as the process of aggregating the results of evaluation to identify an optimum choice.

In any decision making process, since human perceptions and judgments are involved and are dynamic in nature, it calls for rational and structural approach towards solution [14]. Analytic Hierarchy Process (AHP) is one of the most widely used multiattribute decision making methods [15] - [18], which involves developing of a set of alternatives and a common set of objectives [14]. The selection of the most appropriate alternative depends upon its ability to the maximum fulfillment of the objectives set. However, AHP experiences difficulty in capturing uncertain and imprecise judgment of domain experts. This may be caused by lack of experimental information and other uncontrollable factors. A variant of AHP, called Fuzzy AHP, comes into implementation in order to overcome the compensatory approach and the inability of the AHP in handling linguistic variables. In one of the earliest works of fuzzy AHP, Van Laarhoven & Pedrycz [19] judge the fuzzy comparison scales represented by triangular fuzzy numbers whereas, in another work, fuzzy priorities of comparison ratios are determined by trapezoidal membership functions [20]. Chang [21] introduces a new approach for handling pair-wise comparison scale based on triangular fuzzy numbers followed by use of extent analysis method for synthetic extent value of the pairwise comparison [22].

Many of the FAHP applications on various cases can be found in literature based on Chang's extent analysis. Kwong & Bai [23] applied this method to prioritize customer requirements in the QFD. On the other hand, Bozdag et al. [24] utilized this approach in the evaluation of CIM alternatives. Kahraman et al. [25] developed an analytical selection tool to measure the costumer satisfaction in catering firms in Turkey. A methodology to improve the quality of decision-making in software development project under uncertain conditions was proposed by Buyukozkan et al. [26]. Relationship between competitiveness and technology management was established by Erensal et al. [27]

using FAHP-based on Chang's extent analysis. Tolga et al. [28] develops fuzzy replacement analysis, based on the economic aspect of technology selection, for creating an operating system selection framework for decision makers. Wu & Kreng [29] submitted a paper, including a FAHP approach, to evaluate alternatives of knowledge portal development tools by considering judgments of five experts. Recently the numbers and trends of papers in literature regarding with the FAHP applications increase. Chan & Kumar [30] proposed a model on supplier global development problem by utilizing FAHP as a multiple criteria decision-making approach. Chan & Kumar [30] proposed risk-based global supplier development model utilizing with fuzzy extended AHP-based approach [31]. Bozbura et al. [32] and Bozbura & Beskese [33] proposed systematic by utilizing a methodology based on the extent FAHP in fuzzy environment to determine the priorities of human capital measurement indicators. Kang & Lee [34] structured FAHP-based ranking system for semiconductor fabrication. The trends on utilizing of FAHP in published papers have been continued in many of the disciplines in various themes despite the shortage of applications on maritime and transportation cases.

The aim of this study is to find out the methods for evaluating contractor's strengths and selection of contractors with the objective of an overall improvement of any particular project of a Bangladeshi construction company using fuzzy Analytic Hierarchy Process. In this work, the methodology of extent analysis is adopted on the basis of pair-wise comparison technique between objectives and alternatives using triangular fuzzy numbers. The rest of the paper is organized as follows. The following section gives a general description about fuzzy AHP methodology. After that a real-life industrial case is explained using fuzzy AHP technique to fulfill the objective of the study. The outcome of the study is discussed in next section and the last section contains some conclusions reached in this paper.

2. Fuzzy Analytic Hierarchy Process

Nevertheless, there is an extensive literature which addresses the situation in the real world where the comparison ratios are imprecise judgments. In the conventional AHP, the pair wise comparisons for each level with respect to the goal of the best alternative selection are conducted using a nine-point scale. So, the application of Saaty's AHP has some shortcomings as follows [15] , [16]; (1) The AHP method is mainly used in nearly crisp decision

applications, (2) The AHP method creates and deals with a very unbalanced scale of judgment, (3) The AHP method does not take into account the uncertainty associated with the mapping of one's judgment to a number, (4) Ranking of the AHP method is rather imprecise, (5) The subjective judgment, selection and preference of decision-makers have great influence on the AHP results. In addition, a decision-maker's requirements on evaluating alternatives always contain ambiguity and multiplicity of meaning. Furthermore, it is also recognized that human assessment on qualitative attributes is always subjective and thus imprecise. Therefore, conventional AHP seems inadequate to capture decision-maker's requirements explicitly. In order to model this kind of uncertainty in human preference, fuzzy sets could be incorporated with the pairwise comparison as an extension of AHP. The fuzzy AHP approach allows a more accurate description of the decision making process.

Zadeh [35] came out with the fuzzy set theory to deal with vagueness and uncertainty in decision making in order to enhance precision. Thus the vague data may be represented using fuzzy numbers, which can be further subjected to mathematical operation in fuzzy domain. Thus fuzzy numbers can be represented by its membership grade ranging between 0 and 1. A triangular fuzzy number (TFN) $M^{t(r)}$ is shown in Figure 1.
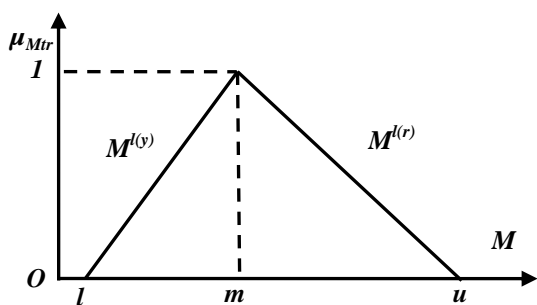

Figure 1. A Triangular Fuzzy Number $M^{t(r)}$

A TFN is denoted simply as (l/m, m/u) or (l, m, u), represents the smallest possible value, the most promising value and the largest possible value respectively. The TFN having linear representation on left and right side can be defined in terms of its membership function as:

$$\mu\,(x\backslash M) = \begin{cases} 0, & x < l, \\ (x\text{-}l)\,/\,(m\text{-}l), & l \le x \le m, \\ (u\text{-}x)\,/\,(u\text{-}m), & m \le x \le u, \\ 0, & x > u, \end{cases}$$

(1)

A fuzzy number with its corresponding left and right representation of each degree of membership is as below:

$$M = (\,M^{l(y)},\,M^{l(r)}\,) = (\,l+(m\text{-}l)\,y,\,u+(m\text{-}u)\,y\,),\,y\,\varepsilon[0,1] \quad (2)$$

where l(y) and l(r) denotes the left side representation and the right side representation of a fuzzy number respectively.

The fuzzy summation $\oplus$ and fuzzy subtraction Θ of any two TFN is also TFNs, but the multiplication $\otimes$ of any two TFNs is only approximate TFNs. The data can be assessed using Table 1, which shows the linguistics scale along with corresponding triangular fuzzy scale.

If $M_1 = (a_1,\,b_1,\,c_1)$ and $M_2 = (a_2,\,b_2,\,c_2)$ are two TFNs, then their operational laws can be expressed as follows:

$$M_1 \oplus M_2 = a_1 + a_2,\,b_1 + b_2,\,c_1 + c_2$$
(3)
$$M_1 \Theta M_2 = a_1 - a_2,\,b_1 - b_2,\,c_1 - c_2$$
(4)
$$M_1 \otimes M_2 = a_1 a_2,\,b_1 b_2,\,c_1 c_2$$
(5)
$$\lambda \otimes M_1 = \lambda a_1,\,\lambda b_1,\,\lambda c_1 \text{ where } \lambda > 0, \lambda \in R$$
(6)
$$M_1^{-1} = (1/\,c_1,\,1/\,b_1,\,1/\,a_1)$$
(7)

The following section outlines the extent analysis method on FAHP. Let $X = \{x_1, x_2,\ldots, x_n\}$ be an object set and $U = \{u_1, u_2,\ldots, u_m\}$ be a goal set. As per Chang [21], [22] each object is taken and analysis for each goal, g_i, is performed, respectively. Therefore m extent analysis values for each object can be obtained, as under:

$$M_{g_i}^1,\,M_{g_i}^2,\,\ldots,\,M_{g_i}^m,\,i = 1, 2, 3,\ldots.,n$$

where all the $M_{g_i}^m$ ($j = 1, 2,\ldots,m$) are TFNs whose parameters are, depicting least, most and largest possible values respectively and represented as (a, b, c). The steps of Chang's extent analysis [21] can be detailed as follows [25], [27], [32], [33], & [36]:

Step 1: The value of fuzzy synthetic extent with respect to i th object is defined as
$$S_i = \sum_{j=1}^{m} M_{g_i}^j \otimes [\sum_{i=1}^{n} \sum_{j=1}^{m} M_{g_i}^j]^{-1}$$
(8)

To obtain $\sum_{j=1}^{m} M_{g_i}^j$ perform the fuzzy addition operation of m extent analysis values for a particular matrix such that

88

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

$$\sum_{j=1}^{m} M_{g_i}^j = \left(\sum_{j=1}^{m} a_j,\ \sum_{j=1}^{m} b_j,\ \sum_{j=1}^{m} c_j\right)$$
(9)

And to obtain $\left[\sum_{i=1}^{n} \sum_{j=1}^{m} M_{g_i}^j\right]^{-1}$ perform the fuzzy addition operation of $M_{g_i}^m$ ($j = 1, 2,\ldots, m$) values such that

$$\sum_{i=1}^{n} \sum_{j=1}^{m} M_{g_i}^j = \left(\sum_{i=1}^{n} a_i,\ \sum_{i=1}^{n} b_i,\ \sum_{i=1}^{n} c_i\right)$$
(10)

And then compute the inverse of the vector such that

$$\left[\sum_{i=1}^{n} \sum_{j=1}^{m} M_{g_i}^j\right]^{-1} = \left(\frac{1}{\sum_{i=1}^{n} c_i},\ \frac{1}{\sum_{i=1}^{n} b_i},\ \frac{1}{\sum_{i=1}^{n} a_i}\right)$$
(11)

Step 2: The degree of possibility of $M_2 = (a_2, b_2, c_2) \geq M_1 = (a_1, b_1, c_1)$ is defined as

$$V(M_2 \geq M_1) = \sup[\min(\mu_{M_1}(x),\ \mu_{M_2}(x))]$$
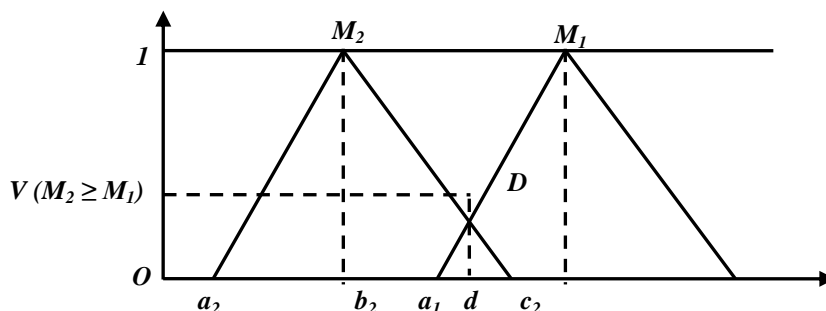
Figure 2. The intersection between *M1* and *M2*

$$V(M_2 \geq M_1) = hgt(M_1 \cap M_2) = \begin{cases} 1, & \text{if } b_2 \geq b_1 \\ 0, & \text{if } a_1 \geq c_2 \\ \dfrac{a_1 - c_2}{(b_2 - c_2) - (b_1 - a_1)}, & \text{otherwise} \end{cases}$$
(12)

Where d is the ordinate of the highest intersection point D between μ_{M_1} and μ_{M_2} as shown in Figure 2.

To compare M_1 and M_2, both the values of $V(M_1 \geq M_2)$ and $V(M_2 \geq M_1)$.

Step 3: The degree of possibility for a convex fuzzy number to be greater than k convex fuzzy numbers M_i ($i = 1,2,\ldots, k$) can be defined by

$$V(M \geq M_1, M_2,\ldots, M_k) = V[(M \geq M_1)\ and\ (M \geq M_2)$$

And can be equivalently expressed as follows:

$$and\ \ldots\ (M \geq M_k)]$$
$$= \min V(M \geq M_i),\ (i = 1, 2, 3,\ldots, k)$$
(13)

Assuming that

$$d'(A_i) = \min V(S_i \geq S_k)$$
(14)

for $k = 1, 2, 3,\ldots, n;\ k \neq i$. Then the weight vector is given by

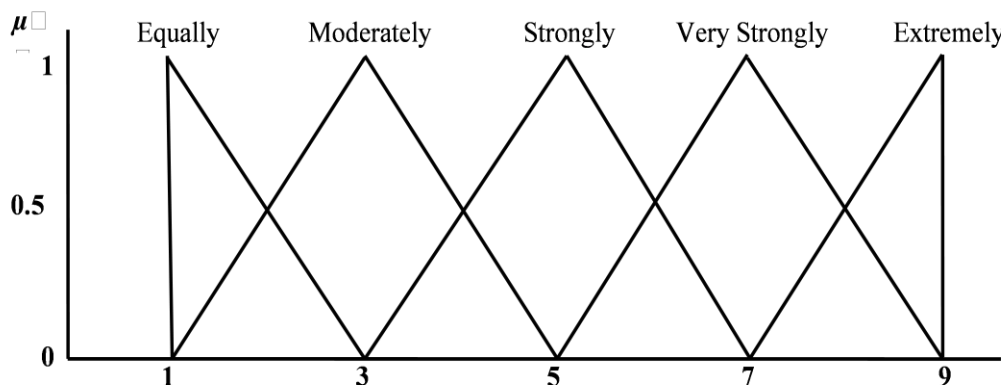$$W' = (d'(A_1), d'(A_2),\ldots, d'(A_n))^T$$
(15)

Figure 3. Linguistic variables for the importance weight of each criterion

where $A_i = (i = 1, 2, 3, …, n)$ are n elements

Step 4: By normalizing, the normalized weight vectors are

$$W = (d (A_1), d (A_2), ….., d (A_n))^T \qquad (16)$$

where *W* is a non-fuzzy number.

1. Case Study

For applying the fuzzy AHP to evaluate the best prequalifying contractor for accomplishing a project, a real time case study is presented in this paper. This case study is involved to sub-contractor evaluation problem of Navana Construction Limited, a fully-fledged construction wing of Navana group of Bangladesh. This case

The data can be assessed using Figure 3 and Table 1, which shows the linguistics scale along with corresponding triangular fuzzy scale.

study involved four senior engineers from the construction department of Navana Construction Limited nominated by the chief engineer, who often had to deal with the sub-contractor evaluation for construction projects, supervise the ongoing projects and had sufficient knowledge in project management field.

1.1 Model Development

Table 1. Linguistic variables describing weights of the criteria and values of ratings

| Linguistic scale for importance	Fuzzy numbers	Membership function	Domain	Triangular fuzzy scale
Just equal	1			(1, 1, 1)
Equally important		$\mu_M(x) = (3-x) / (3-1)$	$1 \le x \le 3$	(1, 1, 3)
Weakly important	3	$\mu_M(x) = (x-1) / (3-1)$	$1 \le x \le 3$	(1, 3, 5)
		$\mu_M(x) = (5-x) / (5-3)$	$3 \le x \le 5$	
Essential or Strongly important	5	$\mu_M(x) = (x-3) / (5-3)$	$3 \le x \le 5$	(3, 5, 7)
		$\mu_M(x) = (7-x) / (7-5)$	$5 \le x \le 7$	
Very strongly important	7	$\mu_M(x) = (x-5) / (7-5)$	$5 \le x \le 7$	(5, 7, 9)
		$\mu_M(x) = (9-x) / (9-7)$	$7 \le x \le 9$	
Extremely Preferred	9	$\mu_M(x) = (x-7) / (9-7)$	$7 \le x \le 9$	(7, 9, 9)
If factor *i* has one of the above numbers assigned to it when compared to factor *j*, then *j* has the reciprocal value when compare to *i*			Reciprocals of above $M_1^{-1} = (1/u_1, 1/m_1, 1/l_1)$	

Source: Bozbura & Beskese (2007)
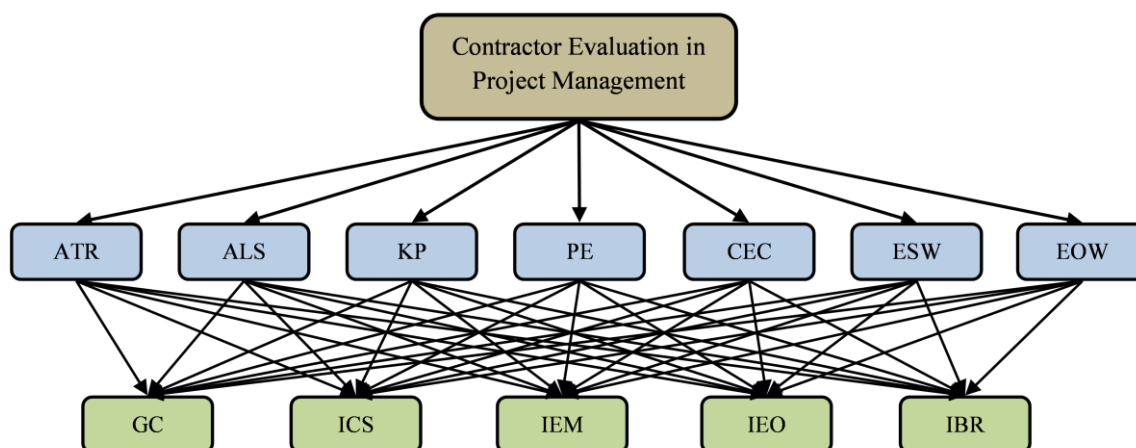
Figure 4. Hierarchical representation of contractor evaluation in project management

90

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Table 2. Aggregated fuzzy comparison matrix of the attributes with respect to the overall objective

Attributes	ATR	ALS	KP	PE	CEC	ESW	EOW	Weights
ATR	1,1,1	1.6,2.4,3.9	2.5,3.9,5.7	1.4,2.1,3.2	1.5,2.5,3.9	0.3,0.4,0.6	1.3,2.0,3.1	0.183
ALS	0.8,1.2,1.8	1,1,1	1.5,2.5,3.9	1.1,2.2,3.5	0.8,1.5,2.6	0.2,0.4,0.6	1.1,2.3,3.7	0.136
KP	0.3,0.4,0.6	0.9,1.6,2.7	1,1,1	0.3,0.4,0.6	0.7,1.4,2.3	0.1,0.3,0.6	0.4,0.9,1.3	0.054
PE	0.9,1.4,2.1	0.7,1.4,2.3	2.1,3.3,5.3	1,1,1	1.1,2.2,3.5	0.3,0.4,0.6	0.8,1.5,2.6	0.138
CEC	0.8,1.4,2.4	1.4,2.3,3.5	1.2,2.1,3.3	0.7,1,1.6	1,1,1	0.7,1.4,2.3	0.8,1.5,2.6	0.132
ESW	2.4,3.7,5.6	2.1,3.2,5.1	2.8,4.3,6.1	2.2,3.3,5.3	1.4,2.1,3.1	1,1,1	2.1,3.6,5.5	0.213
EOW	0.5,1.3,2.3	0.6,1.3,2.2	1.6,2.4,3.4	1.4,2.4,3.6	1.2,2.1,3.1	0.5,1.2,2.3	1,1,1	0.143

To select the criterion for selecting alternatives balanced scorecard approach [37] is used. The criteria are selected as: Annual Turnover (ATR), Availability of Liquid assets (ALS), Key Personnel (KP), Plant and Equipments (PE), Contract Execution Capacity (CEC), Experience with Similar Works (ESW) and Experience with Other Works (EOW). To preserve confidentiality, this study was unable to mention the real name of the organizations under investigation. This is because of sensitivity of data collection from these organizations. The five contractors are referenced as Inconsistency of TFN used can be checked and the consistency ratio (CR) may be calculated [15]. The results obtained are: largest eigen value of matrix, λ_{max} = 7.571; Consistency Index (C.I.) = 0.09517; Randomly Generated Consistency Index (R.I.) = 1.32 and C.R. = 0.0721 As CR < 0.1 the level of inconsistency present in the information stored in comparison matrix is satisfactory [15].

S_{ATR} = (9.6, 14.3, 21.4) $\otimes$ (1/131.3, 1/86.2, 1/54.4) = (0.073, 0.166, 0.393)
S_{ALS} = (6.5, 11.1, 17.1) $\otimes$ (1/131.3, 1/86.2, 1/54.4) = (0.05, 0.128, 0.314)
S_{KP} = (3.7, 6.0, 9.1) $\otimes$ (1/131.3, 1/86.2, 1/54.4) = (0.028, 0.07, 0.167)
S_{PE} = (6.9, 11.2, 17.4) $\otimes$ (1/131.3, 1/86.2, 1/54.4) = (0.053, 0.13, 0.32)

GC, ICS, IEM, IEO and IBR representing the short form of the organizations.

1.2 Analysis and Findings

The fuzzy evaluation matrix of the criteria was constructed through the pairwise comparison of different attributes relevant to the overall objective using the linguistic variables and triangular fuzzy numbers (Figure 3 and Table 1). The aggregated experts' opinions for the seven criteria or attributes is computed and displayed in Table 2. Relative weights of each attributes with respect to the overall objective are computed by fuzzy extent analysis.

S_{CEC} = (6.6, 10.7, 16.7) $\otimes$ (1/131.3, 1/86.2, 1/54.4) = (0.05, 0.124, 0.307)
S_{ESW} = (14, 21.2, 31.7) $\otimes$ (1/131.3, 1/86.2, 1/54.4) = (0.107, 0.246, 0.583)
S_{EOW} = (7.1, 11.7, 17.9) $\otimes$ (1/131.3, 1/86.2, 1/54.4) = (0.054, 0.136, 0.33)

The degrees of possibility of superiority of S_U can be calculated by Eqs. (12) and is denoted by V ($S_{ATR} \geq S_{ALS}$). Therefore, the degree of possibility of superiority for the first requirement- the values are calculated as
V ($S_{ATR} \geq S_{ALS}$) = 1, V ($S_{ATR} \geq S_{KP}$) = 1,
V ($S_{ATR} \geq S_{PE}$) = 1, V ($S_{ATR} \geq S_{CEC}$) = 1,
V ($S_{ATR} \geq S_{ESW}$) = 0.86, V ($S_{ATR} \geq S_{PDO}$) = 1,
For the second requirement- the values are calculated as
V ($S_{ALS} \geq S_{ATR}$) = 0.864, V ($S_{ALS} \geq S_{KP}$) = 1,

91

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Table 3. Fuzzy comparison matrix of alternatives with respect to annual turnover (AT)

Attributes	GC	ICS	IEM	IEO	IBR	Weight
GC	1,1,1	0.89,1.6,2.25	0.65,1.07,1.88	0.82,1.47,2.76	0.8,1.37,3.19	0.246
ICS	0.44,0.62,1.12	1,1,1	2.02,3.08,4.64	0.80,1,1.47	1.17,2.36,4.53	0.273
IEM	0.53,0.93,1.53	0.22,0.34,0.50	1,1,1	0.68,1.11,1.66	0.80,1,1.72	0.167
IEO	0.36,0.68,1.21	0.68,1,1.26	0.60,0.90,1.47	1,1,1	0.76,0.93,1.25	0.164
IBR	0.31,0.73,1.26	0.22,0.42,0.86	0.58,1,1.26	0.80,1.08,1.32	1,1,1	0.150

$V(S_{ALS} \geq S_{PE}) = 0.99$, $\quad V(S_{ALS} \geq S_{CEC}) = 1$,
$V(S_{ALS} \geq S_{ESW}) = 0.637$, $\quad V(S_{ALS} \geq S_{EOW}) = 0.97$,
For the third requirement- the values are calculated as
$V(S_{KP} \geq S_{ATR}) = 0.495$, $\quad V(S_{KP} \geq S_{ALS}) = 0.668$,
$V(S_{KP} \geq S_{PE}) = 0.656$, $\quad V(S_{KP} \geq S_{CEC}) = 0.684$,
$V(S_{KP} \geq S_{ESW}) = 0.254$, $\quad V(S_{KP} \geq S_{PDO}) = 0.631$,
For the fourth requirement- the values are calculated as
$V(S_{PE} \geq S_{ATR}) = 0.873$, $\quad V(S_{PE} \geq S_{ALS}) = 1$
$V(S_{PE} \geq S_{KP}) = 1$, $\quad V(S_{PE} \geq S_{CEC}) = 1$,
$V(S_{PE} \geq S_{ESW}) = 0.647$, $\quad V(S_{PE} \geq S_{EOW}) = 0.98$,
For the fifth requirement- the values are calculated as
$V(S_{CEC} \geq S_{ATR}) = 0.848$, $V(S_{CEC} \geq S_{ALS}) = 0.985$, $V(S_{CEC} \geq S_{KP}) = 1$, $\quad V(S_{CEC} \geq S_{PE}) = 0.977$,
$V(S_{CEC} \geq S_{TQM}) = 0.621$, $V(S_{CEC} \geq S_{EOW}) = 0.955$,

For the sixth requirement- the values are calculated as
$V(S_{ESW} \geq S_{ATR}) = 1$, $\quad V(S_{ESW} \geq S_{ALS}) = 1$,
$V(S_{ESW} \geq S_{KP}) = 1$, $\quad V(S_{ESW} \geq S_{PE}) = 1$,
$V(S_{ESW} \geq S_{CEC}) = 1$, $\quad V(S_{ESW} \geq S_{EOW}) = 1$,

For the seventh requirement- the values are calculated as
$V(S_{EOW} \geq S_{ATR}) = 0.895$, $V(S_{EOW} \geq S_{ALS}) = 1$,
$V(S_{EOW} \geq S_{KP}) = 1$, $\quad V(S_{EOW} \geq S_{PE}) = 1$,
$V(S_{EOW} \geq S_{CEC}) = 1$, $\quad V(S_{EOW} \geq S_{ESW}) = 0.67$,

With the help of Eqs. (13) and (14), the minimum degree of possibility of superiority of each criterion over another is obtained. This further

Inconsistency of TFN used can be checked and the consistency ratio (CR) may be calculated [15]. The results obtained are: $\lambda_{max} = 5.433$; CI = 0.10825; RI = 1.12 and CR = 0.09665. As CR < 0.1 the level of inconsistency present in the information stored in comparison matrix is satisfactory [15].

$S_{GC} = (4.16, 6.51, 11.08) \otimes (1/42.14, 1/27.68, 1/19.13) = (0.09, 0.235, 0.58)$

decides the weight vectors of the criteria. The weight vector is given as
W' = (0.86, 0.637, 0.254, 0.647, 0.621, 1, 0.67)
The normalized value of this vector decides the priority weights of each criterion over another. The normalized weight vectors are calculated as
W = (0.183, 0.136, 0.054, 0.138, 0.132, 0.213, 0.143)
The normalized weight of each attributes for evaluation of contractor is depicted in Figure 4. Figure 5 show that the Experience with Similar Works (ESW) and Annual Turnover (ATR) has higher priority than the other attributes. As a result, Experience with Similar Works (ESW) and Annual Turnover (ATR) are the attributes affecting most for evaluation of contractor for construction projects. Aggregated fuzzy comparison matrix of the alternatives with respect to the annual turnover (AT) is given in Table 3. Relative weights of each alternative with respect to the annual turnover (AT) are computed by fuzzy extent analysis.
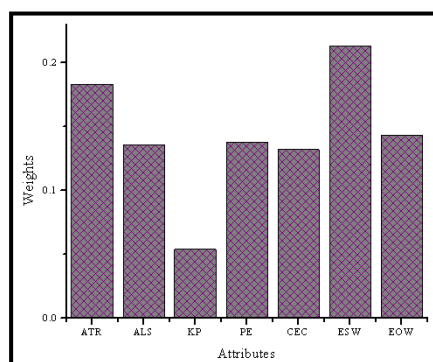

Figure 5. Normalized weights of attributes for evaluation of contractor for construction project

$S_{ICS} = (5.43, 8.06, 12.76) \otimes (1/42.14, 1/27.68, 1/19.13) = (0.13, 0.291, 0.67)$
$S_{IEM} = (3.23, 4.38, 6.41) \otimes (1/42.14, 1/27.68, 1/19.13) = (0.077, 0.158, 0.34)$
$S_{IEO} = (3.4, 4.51, 6.19) \otimes (1/42.14, 1/27.68, 1/19.13) = (0.08, 0.163, 0.32)$
$S_{IBR} = (2.91, 4.23, 5.7) \otimes (1/42.14, 1/27.68, 1/19.13) = (0.07, 0.153, 0.30)$

The degrees of possibility of superiority of S_U can be calculated by Eqs. (14) and (15) and is denoted by $V(S_{GC} \geq S_{ICS})$. Therefore, the degree of possibility of superiority for the first requirement- the values are calculated as

$V(S_{GC} \geq S_{ICS}) = 0.9$, $V(S_{GC} \geq S_{IEM}) = 1$,
$V(S_{GC} \geq S_{IEO}) = 1$, $V(S_{GC} \geq S_{IBR}) = 1$,

For the second requirement- the values are calculated as

$V(S_{ICS} \geq S_{GC}) = 1$, $V(S_{ICS} \geq S_{IEM}) = 1$,
$V(S_{ICS} \geq S_{IEO}) = 1$, $V(S_{ICS} \geq S_{IBR}) = 1$,

For the third requirement- the values are calculated as

$V(S_{IEM} \geq S_{GC}) = 0.75$, $V(S_{IEM} \geq S_{ICS}) = 0.61$,
$V(S_{IEM} \geq S_{IEO}) = 0.98$, $V(S_{IEM} \geq S_{IBR}) = 1$,

For the fourth requirement- the values are calculated as

$V(S_{IEO} \geq S_{IEM}) = 1$, $V(S_{IEO} \geq S_{IBR}) = 1$,

For the fifth requirement- the values are calculated as

$V(S_{IBR} \geq S_{GC}) = 0.70$, $V(S_{IBR} \geq S_{ICS}) = 0.55$,
$V(S_{IBR} \geq S_{IEM}) = 0.98$, $V(S_{IBR} \geq S_{IEO}) = 0.96$,

With the help of Eqs. (16) and (17), the minimum degree of possibility of superiority of each criterion over another is obtained. This further decides the weight vectors of the criteria. The weight vector is given as

$W' = (0.9, 1, 0.61, 0.60, 0.55)$

The normalized value of this vector decides the priority weights of each criterion over another. The normalized weight vectors are calculated as

$W = (0.246, 0.273, 0.167, 0.164, 0.150)$

Fuzzy comparison matrix of the alternatives with respect to the other attributes is given in Table 4-9 using the same calculation given above. Table

Table 4. Fuzzy comparison matrix of alternatives with respect to availability of liquid assets (ALS)

Attributes	GC	ICS	IEM	IEO	IBR	Weight
GC	1,1,1	0.8,1.2,1.8	1.4,2.1,3.2	1.8,2.5,3.1	1.4,2.1,3.2	0.210
ICS	1.6,2.4,3.9	1,1,1	0.7,1,1.6	1.5,2.5,3.9	1.5,2.5,3.9	0.200
IEM	0.9,1.4,2.1	1.2,2.1,3.6	1,1,1	1.6,2.4,3.9	0.8,1.5,2.6	0.201
IEO	0.7,1.2,1.8	0.8,1.4,2.4	0.8,1.2,1.8	1,1,1	0.7,1.4,2.3	0.193
IBR	0.7,1.4,2.4	0.8,1.4,2.4	1.4,2.3,3.5	1.2,2.1,3.3	1,1,1	0.196

Table 5. Fuzzy comparison matrix of alternatives with respect to key personnel (KP)

Attributes	GC	ICS	IEM	IEO	IBR	Weight
GC	1,1,1	1.4,2.1,3.2	2.5,3.9,5.7	1.5,2.5,3.9	1.3,2.0,3.1	0.226
ICS	0.9,1.4,2.1	1,1,1	1.5,2.5,3.9	1.3,2.0,3.1	0.9,1.4,2.1	0.204
IEM	0.3,0.4,0.6	0.9,1.6,2.7	1,1,1	1.6,2.4,3.9	0.7,1.4,2.3	0.185
IEO	0.8,1.4,2.4	0.5,1.3,2.3	0.8,1.2,1.8	1,1,1	1.6,2.4,3.9	0.192
IBR	0.5,1.3,2.3	1.4,2.1,3.2	1.2,2.1,3.3	0.8,1.2,1.8	1,1,1	0.193

Table 6. Fuzzy comparison matrix of alternatives with respect to plant and equipment's (PE)

Attributes	GC	ICS	IEM	IEO	IBR	Weight
GC	1,1,1	0.8,1.2,1.8	1.4,2.1,3.2	0.7,1.4,2.3	1.8,2.5,3.1	0.215
ICS	1.6,2.4,3.9	1,1,1	2.2,3.3,5.3	1.4,2.1,3.1	1.1,2.2,3.5	0.216
IEM	0.9,1.4,2.1	0.3,0.8,1.3	1,1,1	0.8,1.2,1.8	1.1,2.2,3.5	0.184
IEO	1.2,2.1,3.3	0.7,1.4,2.3	1.6,2.4,3.9	1,1,1	1.6,2.4,3.9	0.207
IBR	0.7,1.2,1.8	0.7,1.2,2.5	0.7,1.4,2.3	0.8,1.2,1.8	1,1,1	0.178

$V(S_{IEO} \geq S_{GC}) = 0.75$, $V(S_{IEO} \geq S_{ICS}) = 0.60$,

10 shows the overall priority values for contractor evaluation in project management using fuzzy AHP.

93

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Table 7. Fuzzy comparison matrix of alternatives with respect to contract execution capacity (CEC)

Attributes	GC	ICS	IEM	IEO	IBR	Weight
GC	1,1,1	1.6,2.4,3.9	2.5,3.9,5.7	1.4,2.1,3.2	1.5,2.5,3.9	0.254
ICS	0.8,1.2,1.8	1,1,1	1.5,2.5,3.9	1.1,2.2,3.5	0.8,1.5,2.6	0.206
IEM	0.3,0.4,0.6	0.9,1.6,2.7	1,1,1	0.3,0.4,0.6	0.7,1.4,2.3	0.128
IEO	0.9,1.4,2.1	0.7,1.4,2.3	2.1,3.3,5.3	1,1,1	1.1,2.2,3.5	0.209
IBR	0.8,1.4,2.4	1.4,2.3,3.5	1.2,2.1,3.3	0.7,1,1.6	1,1,1	0.203

Table 8. Fuzzy comparison matrix of alternatives with respect to experience with similar works (ESW)

Attributes	GC	ICS	IEM	IEO	IBR	Weight
GC	1,1,1	1.4,2.1,3.2	1.8,2.5,3.1	0.8,1.4,2.4	1.3,2.0,3.1	0.208
ICS	0.9,1.4,2.1	1,1,1	1.6,2.4,3.9	1.3,2.0,3.1	1.4,2.1,3.2	0.209
IEM	0.7,1.2,1.8	0.8,1.2,1.8	1,1,1	0.7,1,1.6	0.9,1.4,2.1	0.176
IEO	1.5,2.5,3.9	0.5,1.3,2.3	1.3,2.0,3.1	1,1,1	1.6,2.4,3.9	0.215
IBR	0.5,1.3,2.3	0.7,1.4,2.4	1.4,2.1,3.2	0.8,1.2,1.8	1,1,1	0.192

Table 9. Fuzzy comparison matrix of alternatives with respect to experience with other works (EOW)

Attributes	GC	ICS	IEM	IEO	IBR	Weight
GC	1,1,1	1.6,2.4,3.9	0.7,1.4,2.3	0.1,0.3,0.6	1.5,2.5,3.9	0.182
ICS	0.8,1.2,1.8	1,1,1	1.6,2.4,3.9	0.8,1.5,2.6	0.5,1.3,2.3	0.190
IEM	1.2,2.1,3.3	0.8,1.2,1.8	1,1,1	0.9,1.3,1.9	0.8,1.5,2.6	0.191
IEO	2.8,4.3,6.1	1.4,2.3,3.5	1.4,2.1,3.1	1,1,1	2.1,3.6,5.5	0.244
IBR	0.8,1.4,2.4	1.3,2.0,3.1	1.2,2.1,3.1	0.5,1.2,2.3	1,1,1	0.193

Table 10. Overall priority values for contractor evaluation in project management using fuzzy AHP

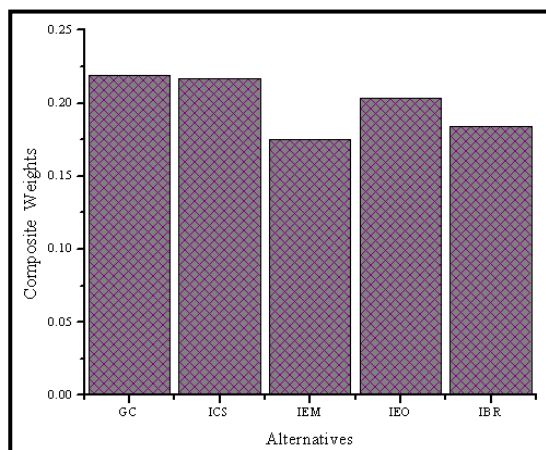| Alternatives	Attributes and Weights							Composite Weights	Over-all Ranking
	ATR	ALS	KP	PE	CEC	ESW	EOW		
	0.183	0.136	0.054	0.138	0.132	0.213	0.143		
GC	0.246	0.210	0.226	0.215	0.254	0.208	0.182	0.21931	1
ICS	0.273	0.200	0.204	0.216	0.206	0.209	0.190	0.21686	2
IEM	0.167	0.201	0.185	0.184	0.128	0.176	0.191	0.17498	5
IEO	0.164	0.193	0.192	0.207	0.209	0.215	0.244	0.20347	3
IBR	0.150	0.196	0.193	0.178	0.203	0.192	0.193	0.18438	4

Figure 6. Composite weights of the alternatives for contractor evaluation in project management

Finally, the composite priority weights of each alternative can be calculated by multiplying the weights of each alternative by the weights of the corresponding criteria. The highest score of the alternatives gives the idea about the appropriate choice of contractor. The order of ranking the alternatives using fuzzy AHP method results as follows:

GC > ICS > IEO > IBR > IEM

According to the final scores (Table 10 & Figure 6), it can be concluded that GC is the best qualified contractor to perform the project followed by contractor ICS.

2. Discussions

In recent years' projects are becoming very common phenomenon in all the organizational business units. Especially for the construction companies, every construction work they perform is an example of ideal project. The primary challenge of project management was to achieve all of the project goals and objectives while adhering to classic project constraints usually scope, quality, time and budget. The secondary and more ambitious challenge was to optimize the allocation and integration of inputs necessary to meet pre-defined objectives. The new challenge may be considered like dealing with the number of alternatives that have grown dramatically in the field of project Management. Managers have to deal more with conflicting goals now days. In case of construction projects selecting the best contractor among many contractors may be considered as one of this particular type.

handle uncertainty level of the decision environment by using hybrid neuro-fuzzy models like quick fuzzy backpropagation algorithm. Advantage of this

In this paper, fuzzy AHP technique is used to synthesize the opinions of the decision makers to evaluate the most effective, eligible and qualified sub-contractor of construction projects. The FAHP approach proved to be a convenient method in tackling practical MADM problems. It demonstrated the advantage of being able to capture the vagueness of human thinking and to aid in solving the research problem through a structured manner and a simple process. Initially, a set of criteria of selection are identified. The set of criteria of selection is established based on the balanced scorecard technique. From the given information, crisp pairwise comparisons are constructed and subsequently converted into fuzzy pairwise comparisons. These fuzzy pairwise comparisons for four experts are next aggregated. Then, fuzzy extent analysis is carried out to get the weights of the criteria as well as scores obtained by the alternatives for each criterion; all the fuzzy scores obtained are aggregated. It has been found that GC can be the feasible, qualified and effective contractor for the construction projects from the expert perception using fuzzy AHP. The findings of the study using fuzzy AHP technique are finally placed to the management of the industry for effective implementation to evaluate and select the best qualified contractor for construction projects.

3. Conclusions

The principle of evaluate contractor using fuzzy AHP technique works well in dynamic and uncertain industrial environment. Moreover, the fuzzy extent analysis gives advantage of estimating weights of the criteria and scores for the alternative strategies. The ranking based knowledge extraction for evaluation of contractor shows a relatively effective direction for the selection of contractor for construction projects. The appropriateness of fuzzy AHP is not limited to the selection of possible best contractor only. If Project managers feel a need to improve the effectiveness and efficiency of their decision making process, fuzzy AHP should be considered in case the decision problem includes multiple objectives, conflicting criteria, incommensurable units, and aims at selecting the best alternative from a set of alternatives. It may be noted that the fuzzy AHP model is not without its own risks and limitations. Further development of FAHP application could be the improving of the determination of the weights of each component and to

algorithm is its psychological background simulating the data aggregation by experts.

95

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

References

[1]. Anderson, D. R., Sweeney, D. J. & Willams, T. A., An Introduction to Management Science, 11th Edition, South-Western College, 2004.

[2]. Hatush, Z. & Skitmore, M., "Contractor selection using multicriteria utility theory: an additive model", Building and Environment, Vol. 33, pp. 105-115, 1998.

[3]. Poyhonen, M. A., Hamalainen, R. P. & Salo, A. A., "An experiment on the numerical modeling of verbal ratio statements", Journal of Multi-Criteria Decision Analysis, Vol. 6, pp. 1-10, 1997.

[4]. Moore, M. J., "Selecting a contractor for fast-track projects: Part I, principles of contractor evaluation", Plant Engineering, Vol. 39, pp. 74-75, 1985.

[5]. Clough, R. H. & Sears, G. A., Construction Contracting, 6th edition. New York, NY: John Wiley and Sons, 1994.

[6]. Diekmann, J. E., "Cost-Plus Contractor Selection: A Case Study", Journal of the Technical Councils of ASCE, Vol. 107, No. 1, pp. 13-25, 1981.

[7]. Nguyen, V. U., "Tender evaluation by fuzzy sets", Journal of Construction Engineering and Management, Vol. 111, pp. 231-243, 1985.

[8]. Russell, J. S., Skibniewski, M. J. & Cozier, D. R., "Qualifier-2: knowledge-based system for contractor prequalification", Journal of Construction Engineering and Management, Vol. 116, pp. 157-171, 1990.

[9]. Herbsman, Z. J. & Ellis, R. D., "Multiparameter Bidding System-Innovation in Contract Administration", Journal of Construction Engineering and Management, ASCE, Vol. 118, No. 1, pp. 142-150, 1992.

[10]. Hatush, Z. & Skitmore, M., "Criteria for contractor selection", Construction Management and Economics, Vol. 15, pp. 19-38, 1997.

[11]. Holt, G. D., OLmolaiye, P. O. & Harris, F. C., "Applying Multi-Attribute Analysis to Contractor Selection Decision", European Journal of Purchasing and Supply Management, Vol. 1, No. 3, pp. 139-148, 1995.

[12]. Alsugair, A. M., "Framework for Evaluating Bids of Construction Contractors", Journal of Management in Engineering, ASCE, Vol. 15, No. 2, pp. 72-78,1999.

[13]. Holt, G. D., "Which Contract Selection Methodology?" International Journal of Project Management, Vol. 16, No. 3, pp. 153-164, 1998.

[14]. Saaty, T. L., Decision Making for Leaders: The Analytical Hierarchy Process for Decisions in a Complex World, Pittsburgh: RWS Publications, 2000.

[15]. Saaty, T. L., The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation, Pittsburgh: RWS Publications, 1998.

[16]. Saaty, T. L. & Vargas, L. G., Decision Making with the Analytic Network Process: Economic, Political, Social and Technological Applications with Benefits, Opportunities, Costs and Risks, New York: Springer, 2006.

[17]. Saaty, T. L., "Decision making with the Analytic Hierarchy Process", International Journal of Services Sciences, Vol. 1, No. 1, pp. 83-97, 2008.

[18]. Bhushan, N. & Ria, K., Strategic Decision Making: Applying the Analytic Hierarchy Process, London: Springer-Verlag London Limited, 2004.

[19]. Van Laarhoven, P. J. M. & Pedrycz, W., "A fuzzy extension of Saaty's priority theory", Fuzzy Sets and Systems, Vol. 11, No. 3, pp. 229-241, 1983.

[20]. Buckley, J. J., "Fuzzy hierarchical analysis", Fuzzy Sets and Systems, Vol. 17, No. 3, pp. 233-247, 1985.

[21]. Chang, D. Y., "Extent analysis and synthetic decision", Optimization Techniques and Applications, Vol. 1, pp. 352-355, 1992.

[22]. Chang, D. Y., "Applications of the extent analysis method on fuzzy AHP", European Journal of Operational Research, Vol. 95, No. 3, pp. 649-655, 1996.

[23]. Kwong, C. K. & Bai, H., "Determining the importance weights for the customer requirements in QFD using a FAHP with an extent analysis approach", IIE Transactions, Vol. 35, No. 7, pp. 619-626, 2003

[24]. Bozdag, C. H., Kahraman, C., Cebeci, U. & Ruan, D., "Fuzzy group decision making for selection among computer integrated manufacturing systems", Computers in Industry, Vol. 51, No. 1, pp. 13-29, 2003.

[25]. Kahraman, C., Cebeci, U. & Ruan, D., 'Multi-attribute comparison of catering service companies using fuzzy AHP: the case of Turkey", International Journal of Production Economics, Vol. 87, No. 2, pp. 171-184, 2004.

[26]. Buyukozkan, G., Kahraman, C. & Ruan, D., "A fuzzy Multicriteria decision approach for software development strategy selection", International Journal of General Systems, Vol. 33, No. 2-3, pp. 259-280, 2004.

[27]. Erensal, Y. C., Oncan, T. & Demircan, M. L., "Determining key capabilities in technology management using fuzzy analytic hierarchy process: A case study of Turkey", Information Sciences, Vol. 176, No. 18, pp. 2755-2770, 2005.

[28]. Tolga, E., Demirean, M. L. & Kahraman, C., "Operating system selection using fuzzy replacement analysis and analytic hierarchy

96

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

process", International Journal of Production Economic, Vol. 97, pp. 89-117, 2005.

[29]. Wu, C. & Kreng, V. B., "Evaluation of knowledge portal development tools using a FAHP approach: The case of Taiwanee stone industry", European Journal of Operational Research, Vol. 176, No. 3, pp. 1795-1810, 2007.

[30]. Chan, F. T. S. & Kumar, N., "Global supplier development considering risk factors using fuzzy extended AHP-based approach", Omega, Vol. 35, No. 4, pp. 417-431, 2007.

[31]. Nagahanumaiah, B. R. & Mukherjee, N. P., "Rapid tooling manufacturability evaluation using fuzzy-AHP methodology", International Journal of Production Research, Vol. 45, No. 5, pp. 1161-1181, 2007.

[32]. Bozbura, F. T., Beskese, A. & Kahraman, C., "Prioritization of human capital measurement indicators using fuzzy AHP", Expert Systems with Applications, Vol. 32, No. 4, pp. 1100-1112, 2007.

[33]. Bozbura, F. T. & Beskese, A., "Prioritization of organizational capital measurement indicators using fuzzy AHP", International Journal of Approximate Reasoning, Vol. 44, No. 2, pp. 124-147, 2007.

[34]. Kang, H. Y. & Lee, A. H. I., "Priority mix planning for semiconductor fabrication by fuzzy AHP ranking", Expert Systems with Applications, Vol. 32, No. 2, pp. 560-570, 2007.

[35]. Zadeh, L. A., "Fuzzy sets", Information and Control, Vol. 8, pp. 338-353, 1965.

[36]. Kahraman, C., Cebeci, U. & Ulukan, Z., "Multi-criteria Supplier Selection Using Fuzzy AHP", Logistics Information Management, Vol. 16, No. 6, pp. 382-394, 2003.

[37]. Kaplan, R. S. & Norton, D. P., "Using the balanced scorecard as a strategic management system", Harvard Business Review, January-February, pp. 75-85, 1996.

Golam Kabir is a Lecturer in the Department of Industrial and Production Engineering at Bangladesh University of Engineering and Technology (BUET), Dhaka, Bangladesh. He received a BSc in 2009 and currently doing MSc. in Industrial and Production Engineering from Bangladesh University of Engineering. He has to credit a number of domestic and international journal publications. His research interest includes fuzzy inference system, quality management, sustainable development, intelligent scheduling and production optimization.

97

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

Financial Development and Economic Growth in India: An Empirical Analysis

P K Mishra[#1], B B Pradhan[*2]

[#]*Siksha O Anusandhan University, Bhubaneswar, Odisha, India-751030*

[1]*Corresponding Author*

[1]`pkmishra1974@gmail.com`

[*] *Siksha O Anusandhan University, Bhubaneswar, Odisha, India-751030*

[2]`registrar@soauniversity.ac.in`

Abstract— The most recent global financial recession is there to give the impression that financial system is the life-blood of an economy. Financial system can surge or pull behind the overall economic expansion of a country. Thus, in the aftermath of the global downsizing a study investigating the causal relation between financial sector development and real economic growth is extremely relevant. This study, therefore, investigates the relationship between financial development and economic growth in India for the period 1960 to 2009 using the vector error correction model. The research problem revolves around the issue whether financial development causes economic growth or reversely taking into account the positive effect of industrial production index. The application of unit root test shows that the research variables are all stationary at their first differences and thus, integrated of orders one. Similarly, the application of cointegration test reveals that all the variables of the study are having long-run equilibrium relationship between them. At last, we have estimated the vector error correction model to establish the Granger causal relation hypothesized in the study. And, it is inferred that real economic growth has a positive influence on the financial sector taking into account the positive effect of the growth of industrial production.

Keywords— India, Stock Market, Bank Credit, Economic Growth, Causality

JEL Classification Code - C22, C32, E44, O16

1. Introduction

In recent years, it has been realised that a stable and efficient financial system is the pre-requisite for a robust economic development of any country. An efficient financial sector, both in developed and developing countries help provide better financial services, and enable the economy to increase its Gross Domestic Product (GDP) growth rate. An inefficient financial system may be crisis-prone, with potentially devastating effects. Thus, the role of financial development in the process of economic development of a country is very significant and keeps much relevance especially in the aftermath of recent global financial meltdown. The effects of financial sector on real economy can hardly be over-emphasized, as puts "one of the most important problems in the field of finance .... is the effect that financial structure and development have on economic growth"[12].

Researchers and financial economists have identified two important channels through which an improvement in the financial system can affect economic growth. First, financial sector development can lead to economic growth through the capital accumulation channel. Economic growth depends on capital accumulation through both domestic and foreign capital investment. An efficient financial system is essential for mobilizing savings and channelling them towards capital accumulation. In this way, financial development and economic growth are linked. Second, the Total Factor Productivity channel suggests that an efficient financial system facilitates the adoption of modern technology to boost development of the knowledge- and technology-intensive industries,

98

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

through the provision of efficient credit facilities and other financial services.

Thus, study of the dynamics of the relationship between economic growth and financial development of a country has been an extensive subject of empirical research since last few decades. The moot point of these works is whether financial development causes economic growth or the other way around. So, the main objective of this empirical study is to investigate the causal relationship between economic growth and financial development taking into account the effect of industrial production index in a developing country like India.

The recent revival of interest in the link between financial development and real economic growth stems mainly from the insights and techniques of endogenous growth models, which have shown that there can be self-sustaining growth without exogenous technical progress and that the growth rate can be related to preferences, technology, income distribution and institutional arrangements. Furthermore, the most recent financial sector downsizing and corresponding economic meltdown across the globe provides strengths to reinvestigate the causality between financial sector development and economic growth, especially in an emerging market economy like India. All these provide the theoretical underpinning that early contributors lacked: financial intermediation can be shown to have not only level effects but also growth effects.

2. Literature Review

There exists voluminous literature, both theoretical and empirical examining the possible relationship between financial sector development and the real economic growth of a country. The well-known McKinnon-Shaw hypothesis contend that financial liberalization in the form of an appropriate rate of return on real cash balances is a vehicle of promoting economic growth [27]-[38]. The essential tenet of this hypothesis is that a low or negative real interest rate will discourage saving. This will reduce the availability of loanable funds for investment which in turn, will lower the rate of economic growth. Thus, the "McKinnon - Shaw" model posits that a more liberalized financial system will induce an increase in saving and investment and therefore, promote economic growth.

The endogenous growth theory has reached to similar conclusions with the McKinnon-Shaw hypothesis by explicitly modelling the services provided by financial intermediaries such as risk-sharing and liquidity provision. This theory also suggests that financial intermediation has a positive effect on steady-state growth [13]-[35], while the government intervention in the financial system has a negative effect on economic growth [2].

There are three ways in which the development of financial sector might affect economic growth under the basic endogenous growth model [31]. First, it can increase the productivity of investments. Second, an efficient financial sector reduces transaction costs and thus increases the share of savings channelled into productive investments. An efficient financial sector improves the liquidity of investments. Third, financial sector development can either promote or decline savings.

Many models emphasize that well-functioning financial intermediaries and markets ameliorate information and transactions costs and thereby foster efficient resource allocation and hence, faster long-run growth [13]-[3]-[4]-[20].

The financial markets also improve firm efficiency by eliminating the premature liquidation of firm capital, enhancing the quality of investments and therefore, increasing the economic growth [22]-[33]. Enhanced stock market liquidity reduces the disincentives for investing in long-duration and higher-return projects, since investors can easily sell their stake in the project before it matures, and is expected to boost productivity growth [4].

During liquidity shocks, investors can sell their shares to another agent. Financial markets may also promote growth by increasing the proportion of resources allocated to firms. Through the diversification of productivity risk, even risk-averse investors can invest in firms. Portfolio diversification, through the stock market, may have an additional growth effect by encouraging specialization of production [33].

It is also argued that financial markets affect technological choice [33]. In this model, agents can choose between two technologies: One technology is highly flexible and allows productive diversification, but has low productivity; the other is rigid, more specialized, and more productive. Financial markets, in contrast, allow individuals to hold a diversified portfolio to insure themselves

99

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

against negative demand shocks and, at the same time, to choose the more productive technology. In such a model, productivity growth is achieved through a broader division of labour and specialization of enterprises. Specialization, however, carries risk. Financial intermediaries support specialization by permitting investors to hedge with a diversified portfolio. Specialization in the absence of a properly functioning financial sector, however, may be too risky individual investor. If it is, financing for efficiency improving projects dries up.

King and Levine employ an endogenous growth model in which the financial intermediaries obtain information about the quality of individual projects that is not readily available to private investors and public markets [21]. This information advantage enables financial intermediaries to fund innovative products and productive processes, thereby inducing economic growth. In certain studies, it is proposed that financial development promotes economic growth through the two important channels: the channels of capital accumulation and technological innovation [23], while other studies have identified innovation as the main channel of transmission between finance and growth [21]. Financial markets evaluate the potential innovative projects, and finance the most promising ones through efficient resource allocation.

There are many empirical studies investigating the relation between financial sector development and real economic growth. Mohtadi and Agarwal examined the relationship between stock market development and economic growth for 21 emerging markets over 21 years (1977 to 1997), using a dynamic panel method [29]. Results suggest a positive relationship between several indicators of the stock market performance and economic growth both directly, as well as indirectly by boosting private investment behaviour. Thus it lends support both to the financial intermediation literature as well as to the traditional growth literature.

Beck, Levine, and Loayza evaluated the empirical relation between the level of financial intermediary development, and (i) economic growth, (ii) total factor productivity growth, (iii) physical capital accumulation, and (iv)private savings rates [2]. The study finds that the financial intermediaries exert a large, positive impact on total factor productivity growth, which feeds

through to overall GDP growth and the long-run links between financial intermediary development and both physical capital growth and private savings rates are tenuous.

Filer, Hanousek, and Campos contributed to the most enduring debates in financial economics that whether financial development causes economic growth or whether it is a consequence of increased economic activity, using Granger causality test and found little evidence of a causal relationship running from stock market development to economic growth [10].

Choong, Yusop, Law and Sen using the Autoregressive Distributed Lag (ARDL) bounds test approach, found that stock market development is cointegrated with economic growth in Malaysia [6]. This study also suggests that stock market development has a significant positive long-run impact on economic growth. Granger causality test based on Vector Error Correction Model (VECM) further reveals that stock market development Granger-causes economic growth. Hence, this study provides robust empirical evidence in favour of finance-led growth hypothesis for the Malaysian economy.

Boulila and Trabelsi investigated the empirical causal relationship between financial development and economic growth using unit root and co-integration techniques within Bi-Variate Vector Auto-Regressive (BVAR) framework based on Tunisian data during the periods 1962-1998 and 1963-1987 [5]. The main results of the study are: (i) causality is running from growth to financial development during the sub-period of financial control 1963-1987 (ii) the evidence shows, however, a bi-directional causality for the whole period only when credit and investment ratio are used to measure financial and economic development (iii) the results seem to give a weak support to the hypothesis that financial system is a leading sector in the growth process.

Chou and Chin verified the complementarities between financial and real innovations by developing a parsimonious model of the financial sector that is integrable into a growth model with endogenous technological progress [7]. This paper contends that the financial innovations lead to long run growth solely through the technological innovation channel.

Waqabaca examined the relationship between financial development and economic growth in Fiji

using time series data from 1970-2000 [45]. Firstly, an analysis of a broad set of financial indicators has been performed for Fiji that provides support for the evolvement of Fiji's financial sector over the three decade review period. Secondly, the paper examines empirically the causal link between financial development and economic growth in Fiji using unit root and co-integration techniques within a Bi-variate Vector Auto-Regressive (BVAR) framework. Results reveal a positive relationship between financial development and economic growth for Fiji with the direction of causation running predominantly from economic growth to financial development. This outcome is consistent with results found for countries which have less sophisticated financial systems.

Nieuwerburgh, Buelens, and Cuyvers investigated the long-run relationship between financial market development and economic development in Belgium [30]. The paper uses a new data set of stock market development indicators to argue that financial market development substantially affected economic growth and finds strong evidence that stock market development caused economic growth in Belgium, especially in the period between 1873 and 1935. Institutional changes affecting the stock exchange explain the time-varying nature of the link between stock market development and economic growth.

Schclarek theoretically studied the role of the financial system in promoting macroeconomic stability and growth [34]. It also explained endogenously the development of the financial system as part of the growth process. The productive sector engages in R&D activities, and finances its activities through access to the financial system. While vertical innovation spurs economic growth, horizontal innovation creates new industry sectors, and thus enhances industry diversification. Higher industry diversification deepens the financial system by improving its ability to finance the productive sector. Economies that are more diversified, and thus, more financially developed, have higher growth rates and are less volatile. There is a role for the government to subsidize innovation, especially horizontal innovation.

Shan and Jianhong examined the impact of financial development on economic growth in China using a VAR model [37]. Innovation accounting analysis is applied to examine interrelationships between variables in the VAR system and therefore, differs from the more usual approach. The study finds that financial development comes as a second force (after the contribution from labour input) in leading economic growth in China. This study has supported the view in the literature that financial development and economic growth exhibit a two-way causality and hence, is against the so-called finance-led growth hypothesis.

Chou devised a simple way of incorporating the financial sector into a growth model that is pedagogically useful [8]. Financial innovation raises the efficiency of financial intermediation by increasing the variety of financial products and services, resulting in improved matching of the needs of individual savers with those of firms raising funds for expanding future production. The resulting capital accumulation leads to economic growth. The paper discusses the comparative statics and simple dynamics of this model and uses the model to study the effects of financial liberalization as well as changes in patent laws and accounting standards.

Stefani investigated the relationship between financial development and economic growth in Brazil between 1986 and 2006, using a cointegrated VAR model [39]. It finds that there exists a positive and significant relationship between these phenomena, with the measures of financial development being the driving forces.

Kamat, Kamat, and Murthy explained the time series properties of financial infrastructure and economic growth indicators to investigate the nexus between new developments in financial intermediation with the economic growth for India over the periods 1971-2004 [17].

Deb and Mukherjee examined the causal relationship between stock market development and economic growth for the Indian economy over the last decade or so by applying the techniques of Unit root test and long run Granger non-causality test proposed by Toda and Yamamoto and the results are in line with the supply-leading hypothesis in the sense that there is strong causal flow from the stock market development to economic growth [9].

In general, theoretical models and empirical analyses have provided conflicting predictions and implications about both the impacts of financial development on economic growth and the

repercussions of overall financial development on economic performance. Therefore, this study tries to fill the theoretical and empirical gaps created by the different economic school of thoughts related to the impact of financial development on economic growth for a developing economy like India. India is considered one of the most important developing countries of Asia characterized by a satisfactory rate of economic growth, a sound monetary and fiscal economic policy, and controlled rate of inflation and unemployment rates, a healthy and competitive economy avoiding the negative effects of financial crisis in an unstable economic environment. Thus, the study of the causality between financial sector development and economic growth in the context of India for the sample period from 1960 to 2009 is likely to uncover an important implication for the policy makers and researchers.

It is with this backdrop, the rest of the paper is organised as follows: Section 3 discusses the data and methodology of the study; Section 4 makes the empirical analysis; and Section 5 concludes the study.

3. Data and Methodology

The very objective of the study is to re-examine the dynamics of the causal relationship between financial sector development and real economic growth in the aftermath of global financial meltdown in the context of India for the period spanning from 1960 to 2009. To this end, the following model is to be estimated:

$GDP = f(SM, BC, IIP)$, Where GDP is the Real Gross Domestic Product, SM is the general stock market index, BC is the domestic bank credits to private sector, IIP is the Industrial Production Index.

This model is used to estimate the effects of stock and credit market development on economic growth through the effect of industrial production in the vector autoregressive model framework. The use of this methodology predicts the cumulative effects taking into account the dynamic response among economic growth and the other examined variables [32]. In line with the empirical studies such as [20]-[42]-[44], the variable of economic growth (GDP) is measured by the rate of change of real GDP, while the credit market development is expressed by the domestic bank credits to private sector (BC) as a percentage of GDP. This measure

has a basic advantage from any other monetary aggregate as a proxy for credit market development. Although it excludes bank credits to the public sector, it represents more accurately the role of financial intermediaries in channelling funds to private market participants [24]-[41]. The general stock market index is used as a proxy for the stock market development in the country. The general stock market index (SM) expresses in a better way the stock market development, while the industrial production index (IIP) measures the growth of industrial sector and its effect on economic growth [19]-[30]-[36]-[40]-[42]-[43].

This study uses annual data for the sample period 1960 to 2009 and all the time series data are obtained from the database on International Financial Statistics, provided by International Monetary Fund. Then, all-time series data are expressed in their logarithm forms to stay away from the problems of heteroscedasticity.

The estimation methodology employed in this study is the cointegration and error correction modelling technique. The entire estimation procedure consists of three steps: first, unit root test; second, cointegration test; third, the error correction model estimation. Unit root test examine the stationarity and integration of the model variables. Cointegration test investigates the existence of long-run equilibrium relationship between the stationary model variables. And, the error correction model estimation tries to uncover the causal relation between financial sector development and real economic growth in India.

3.1. Unit Root Test

The econometric methodology, first examines the stationarity properties of each time series of consideration. The present study uses Augmented Dickey-Fuller (ADF) unit root test to examine the stationarity of the data series. It consists of running a regression of the first difference of the series against the series lagged once, lagged difference terms and optionally, a constant and a time trend. This can be expressed as follows:

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \alpha_2 Y_{t-1} + \sum_{j=1}^{p} \alpha_j \Delta Y_{t-j} + \varepsilon_t \ ... \ (1)$$

The additional lagged terms are included to ensure that the errors are uncorrelated. In this ADF procedure, the test for a unit root is conducted on the coefficient of Y_{t-1} in the regression. If the coefficient is significantly different from zero, then

the hypothesis that Y_t contains a unit root is rejected. Rejection of the null hypothesis implies stationarity. Precisely, the null hypothesis is that the variable Y_t is a non-stationary series ($H_0 : \alpha_2 = 0$) and is rejected when α_2 is significantly negative ($H_a : \alpha_2 < 0$). If the calculated value of ADF statistic is higher than McKinnon's critical values, then the null hypothesis (H_0) is not rejected and the series is non-stationary or not integrated of order zero, I(0). Alternatively, rejection of the null hypothesis implies stationarity. Failure to reject the null hypothesis leads to conducting the test on the difference of the series, so further differencing is conducted until stationarity is reached and the null hypothesis is rejected. If the time series (variables) are non-stationary in their levels, they can be integrated with I(1), when their first differences are stationary.

3.2. Cointegration Test

Once a unit root has been confirmed for a data series, the next step is to examine whether there exists a long-run equilibrium relationship among variables. This is called cointegration analysis which is very significant to avoid the risk of spurious regression. Cointegration analysis is important because if two non-stationary variables are cointegrated, a VAR model in the first difference is mis-specified due to the effects of a common trend. If cointegration relationship is identified, the model should include residuals from the vectors (lagged one period) in the dynamic VECM system. In this stage, Johansen's cointegration test is used to identify cointegrating relationship among the variables. The Johansen method applies the maximum likelihood procedure to determine the presence of cointegrated vectors in non-stationary time series. The testing hypothesis is the null of non-cointegration against the alternative of existence of cointegration using the Johansen maximum likelihood procedure.

In the Johansen framework, the first step is the estimation of an unrestricted, closed p^{th} order VAR in k variables. The VAR model as considered in this study is:

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + ... + A_p Y_{t-p} + BX_t + \varepsilon_t \ ... (2)$$

Where Y_t is a k -vector of non-stationary I(1) endogenous variables, X_t is a d -vector of exogenous deterministic variables, $A_1 .... A_p \ and \ B$ are matrices of coefficients to be estimated, and ε_t is a vector of innovations that may be contemporaneously correlated but are uncorrelated with their own lagged values and uncorrelated with all of the right-hand side variables.

Since most economic time series are non-stationary, the above stated VAR model is generally estimated in its first-difference form as:

$$\Delta Y_t = \Pi Y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta Y_{t-i} + BX_t + \varepsilon_t ....(3)$$

Where,

$$\Pi = \sum_{i=1}^{p} A_i - I, \quad and \quad \Gamma_i = -\sum_{j=i+1}^{p} A_j$$

Granger's representation theorem asserts that if the coefficient matrix Π has reduced rank $r < k$, then there exist $k \times r$ matrices $\alpha \ and \ \beta$ each with rank r such that $\Pi = \alpha \beta'$ and $\beta' Y_t$ is I(0). r is the number of co-integrating relations (the *co-integrating rank*) and each column of β is the co-integrating vector. α is the matrix of error correction parameters that measure the speed of adjustments in ΔY_t.

The Johansen approach to cointegration test is based on two test statistics, viz., the trace test statistic, and the maximum eigenvalue test statistic.

3.2.1 Trace Test Statistic

The trace test statistic can be specified as:

$$\tau_{trace} = -T \sum_{i=r+1}^{k} \log(1 - \lambda_i),$$ where λ_i is the $i \, th$ largest eigenvalue of matrix Π and T is the number of observations. In the trace test, the null hypothesis is that the number of distinct cointegrating vector(s) is less than or equal to the number of cointegration relations (r).

3.2.2 Maximum Eigenvalue Test

103

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

The maximum eigenvalue test examines the null hypothesis of exactly r cointegrating relations against the alternative of $r+1$ cointegrating relations with the test statistic: $\tau_{max} = -T\log(1-\lambda_{r+1})$, where λ_{r+1} is the $(r+1)^{th}$ largest squared eigenvalue. In the trace test, the null hypothesis of $r=0$ is tested against the alternative of $r+1$ cointegrating vectors.

It is well known that Johansen's cointegration test is very sensitive to the choice of lag length. So first a VAR model is fitted to the time series data in order to find an appropriate lag structure. The Schwarz Criterion (SC) test is used to select the number of lags required in the cointegration test.

3.3. Vector Error Correction Model

Once the cointegration is confirmed to exist between variables, then the third step requires the construction of error correction mechanism to model dynamic relationship. The purpose of the error correction model is to indicate the speed of adjustment from the short-run equilibrium to the long-run equilibrium state.

A Vector Error Correction Model (VECM) is a restricted VAR designed for use with non-stationary series that are known to be cointegrated. Once the equilibrium conditions are imposed, the VECM describes how the examined model is adjusting in each time period towards its long-run equilibrium state. Since the variables are supposed to be cointegrated, then in the short-run, deviations from this long-run equilibrium will feedback on the changes in the dependent variables in order to force their movements towards the long-run equilibrium state. Hence, the cointegrated vectors from which the error correction terms are derived are each indicating an independent direction where a stable meaningful long-run equilibrium state exists.

The VECM has cointegration relations built into the specification so that it restricts the long-run behaviour of the endogenous variables to converge to their cointegrating relationship while allowing for short-run adjustment dynamics. The cointegration term is known as the error correction term since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments. The dynamic specification of the VECM allows the deletion of the insignificant variables, while the error correction term is retained. The size of the error correction term indicates the speed of adjustment of any disequilibrium towards a long-run equilibrium

state. In this study the error correction model as suggested by Hendry has been used [15]. The general form of the VECM is as follows:

$$\Delta X_t = \alpha_0 + \lambda_1 EC^1_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta X_{t-i} + \sum_{j=1}^{n} \alpha_j \Delta Y_{t-j} + \varepsilon_{1t} \quad ....(4)$$

$$\Delta Y_t = \beta_0 + \lambda_2 EC^2_{t-1} + \sum_{i=1}^{m} \beta_i \Delta Y_{t-i} + \sum_{j=1}^{n} \beta_j \Delta X_{t-j} + \varepsilon_{2t} \quad ....(5)$$

Where Δ is the first difference operator; EC_{t-1} is the error correction term lagged one period; λ is the short-run coefficient of the error correction term ($-1 < \lambda < 0$); and ε is the white noise. The error correction coefficient (λ) is very important in this error correction estimation as greater the co-efficient indicates higher speed of adjustment of the model from the short-run to the long-run.

The error correction term represents the long-run relationship. A negative and significant coefficient of the error correction term indicates the presence of long-run causal relationship. If the both the coefficients of error correction terms in both the equations are significant, this will suggest the bi-directional causality. If only λ_1 is negative and significant, this will suggest a unidirectional causality from Y to X, implying that Y drives X towards long-run equilibrium but not the other way around. Similarly, if λ_2 is negative and significant, this will suggest a unidirectional causality from X to Y, implying that X drives Y towards long-run equilibrium but not the other way around.

On the other hand, the lagged terms of ΔX_t and ΔY_t appeared as explanatory variables, indicate short-run cause and effect relationship between the two variables. Thus, if the lagged coefficients of ΔX_t appear to be significant in the regression of ΔY_t, this will mean that X causes Y. Similarly, if the lagged coefficients of ΔY_t appear to be significant in the regression of ΔX_t, this will mean that Y causes X.

4. Empirical Analysis

At the outset, we have tested the stationarity by ADF unit root test and the results are reported in Table-1. It is clear that the hull hypothesis of no

Table 1: Results of Augmented Dickey-Fuller Unit Root Test

Variables in their First Differences with intercept and Trend	ADF Statistic	Critical Values	Decision
GDP	-5.3547	At 1% : -4.161 At 5% : -3.506 At 10% : -3.183	Reject Null hypothesis of no unit root at 1% level
SM	-7.616	At 1% : -4.161 At 5% : -3.506 At 10% : -3.183	Reject Null hypothesis of no unit root at 1% level
BC	-6.399	At 1% : -4.161 At 5% : -3.506 At 10% : -3.183	Reject Null hypothesis of no unit root at 1% level
IIP	-5.3546	At 1% : -4.161 At 5% : -3.506 At 10% : -3.183	Reject Null hypothesis of no unit root at 1% level

Table 2: Results of Johansen's Cointegration Test

Hypothesized Number of Cointegrating Equations	Eigen Value	Trace Statistics	Critical Value at 5% (p-value)	Maximum Eigen statistics	Critical Value at 5% (p-value)
None[*]	0.469	68.941	54.07(0.001)	30.464	28.588(0.02)
At Most 1[*]	0.404	38.477	35.19(0.02)	24.876	22.299(0.02)
At Most 2	0.145	13.601	20.26(0.31)	7.550	15.892(0.60)
At Most 3	0.118	6.050	9.164(0.18)	6.050	9.164(0.18)

*** denotes rejection of the hypothesis at the 0.05 level**

Table 3: Estimates for VECM Regression

Independent Variables	Δ (LGDP)	Δ (LSM)	Δ (LBC)	Δ (LIIP)
Error Correction Term	-0.033479[*] [-2.69646]	-0.043442 [-0.53437]	-0.062427[*] [-4.66207]	0.009531 [0.99160]
$\Delta(LGDP_{t-1})$	0.373141 [2.70725]	0.359254 [0.39808]	0.178865 [1.20327]	0.263462[*] [2.46916]
$\Delta(LSM_{t-1})$	0.008141 [0.32284]	-0.110200 [-0.66744]	0.055236[*] [2.03107]	-0.025449 [-1.30365]
$\Delta(LBC_{t-1})$	-0.020272 [-0.14412]	0.268671 [0.29172]	0.003692 [0.02434]	0.172069 [1.58022]
$\Delta(LIIP_{t-1})$	0.147097 [0.80902]	-0.802377 [-0.67398]	-0.029670 [-0.15131]	0.349815 [2.48524]

*t-statistic within [ ]; * significant at 5% level*

first differences since the ADF test statistic values are less than the critical values at 10%, 5% and 1% levels of significances. Thus, all the variables are stationary at their first differences and integrated of same order, i.e., I(1). These variables can be cointegrated as well, if there are one or more linear combinations among the variables that are stationary.

In the next step, the cointegration between the stationary variables has been tested by the Johansen's Trace and Maximum Eigenvalue tests. The results of these tests are shown in Table-2. The results show that there exists more than one cointegrating vectors whereby there are two cointegrating vectors between the GDP and other variables. In this study, we have not discussed more on the interpretation of the number of cointegrating vectors due to the problems of interpretation when dealing more than one cointegrating vector [26]. Nevertheless, this empirical decision proposes that *GDP* and other variables could be cointegrated in the long-run. Both the trace and maximum eigenvalue tests produce the same result. This gives the conclusion that in the long-term GDP moves together with other variables towards equilibrium.

It is obvious from the above cointegrated vector that stock market development, credit market development and industrial production index have a positive effect on economic growth in the long-run. According to the signs of the vector cointegration components and based on the basis of economic theory the above relationship can be used as an error correction mechanism in a VAR model.

The estimation of a Vector Error Correction Model (VECM) requires selection of an appropriate lag length. The number of lags in the model has been determined according to Schwarz Information Criterion (SIC). The lag length that minimizes the SIC is 1. Then an error correction model with the computed t-values of the regression coefficients is estimated and the results are reported in Table-3.

The results of the estimated vector error correction model suggested that a short-run increase of stock market index per 1% induces an increase of economic growth per 0.008%, but an increase of bank lending per 1% reduces economic growth per 0.02%, while an increase of productivity per 1% induces an increase of economic growth per 0.14% in India. The negative effect of credit market expansion on economic growth may be due to high rate of inflation in recent days.

The estimated coefficient of error correction term in GDP equation is statistically significant, and has a negative sign, which confirms that there is not any problem in the long-run equilibrium relation between the independent and dependent variables at 5% level of significance, but its relative value (-0.033) for India shows a satisfactory rate of convergence to the equilibrium state per period.

For causality issues, the Granger causality test has been applied and for this purpose, the number of appropriate time lags is selected in accordance with the VAR model. The results of Granger Causality test are reported in Table-4.

Table 4: Results of Granger Causality Test

Null	F-	Probability	Decision
LSM does	0.00500	0.99501	Accept
LGDP does	3.93127	0.02704	Reject
LBC does	2.71370	0.07764	Reject
LGDP does	0.21954	0.80378	Accept
LIIP does	0.24407	0.78451	Accept
LGDP does	4.73932	0.01380	Reject
LBC does	3.97644	0.02603	Reject
LSM does	1.99549	0.14834	Accept
LIIP does	3.30541	0.04620	Reject
LSM does	1.43592	0.24907	Accept
LIIP does	0.07798	0.92511	Accept
LBC does	1.59550	0.21458	Accept

(Number of lags = 2)

According to Granger causality tests, there is a unidirectional causality between stock market development and economic growth with direction from GDP growth to stock market growth; a unidirectional causality between credit market development and economic growth with direction from credit market growth to economic growth; a unidirectional causal relationship between economic growth and productivity with direction from economic growth to productivity; a unidirectional causal relationship between credit market development and stock market development with direction from credit market development to stock market development; and a unidirectional causal relationship between productivity and stock market development with direction from productivity to stock market development.

Thus, it can be inferred that credit market development has an influence on the economic growth in India; so the government of the country should take necessary initiatives to make the fundamentals of the credit market robust such that this sector can weather out any domestic and cross-border contagions. The credit market development is further significant in exerting an impact on the stock market development. Furthermore, the increase in productivity of the industrial sector has seen to influence the stock market development but not the credit market development. This might be the indication of shift in preference of the industrialists from bank credits to share capital to finance their endeavours. Thus, necessary steps should be made to make the stock market of the country more efficient and less volatile. In addition, an interesting result is noticed in this study that the economic growth of the country has significant impacts on the stock market development as well as industrial sector development. It is quite obvious that the market participants and entrepreneurs of the country and abroad have always an eye on the move of the economy as a whole. Whenever economy moves ahead at a greater pace, they show swarm like appearance in the market thereby contributing to the development of the capital market and hence to the industrial sector development. But this type of herding behaviour often makes the market volatile and threatens the growth of the national economy in the short run.

Therefore, looking at the long run sustainable development of the political economy of the country, the financial sector should be made robust and efficient, because a well-functioning financial system accelerates economic growth taking into account the positive effect of the growth of industrial production.

5. Conclusion

This paper is an attempt to investigate the dynamics of the causal relation between financial sector development and economic growth in India over the sample period 1960 to 2009. The study presumes that the financial system of the country is mainly characterized by the effect of stock market development, and credit market development. However, credit market development is determined by the banking growth through the size of bank lending directed to private sector at times of low inflation rates. Stock market development is determined by the trend of general stock market index. The empirical analysis suggested that the variables that determine economic growth present a

unit root, and they are also cointegrated. Since a cointegrated relationship among relevant economic variables is established, the next problem is how these variables adjust in response to a random shock. This is a matter of the short-run disequilibrium dynamics. The short run dynamics of the model is studied by analysing how each variable in a cointegrated system responds or corrects itself to the residual or error from the cointegrating vector. This justifies the use of the term error correction mechanism. The error correction (EC) term, picks up the speed of adjustment of each variable in response to a deviation from the steady state equilibrium. The VEC specification forces the long-run behaviour of the endogenous variables to converge to their cointegrating relationships, while accommodates the short-run dynamics. The dynamic specification of the model suggests deletion of the insignificant variables while the error correction term is retained.

The results of Granger causality tests indicated that there is a unidirectional causality between stock market development and economic growth with direction from GDP growth to stock market growth; a unidirectional causality between credit market development and economic growth with direction from credit market growth to economic growth; a unidirectional causal relationship between economic growth and productivity with direction from economic growth to productivity; a unidirectional causal relationship between credit market development and stock market development with direction from credit market development to stock market development; and a unidirectional causal relationship between productivity and stock market development with direction from productivity to stock market development for India. Such empirical evidence keeps much relevance in recent years in the context of a developing country like India. In light of the most recent global financial slowdown, the policy makers and planners should device prudential norms and implement necessary reforms to ensure an efficient financial system and rapid economic expansion in the country. To this end, the role of regulators and the government as well is very significant. The market design and micro-structure should be made very strong to surge financial sector development. However, further studies are warranted to uncover the specific role of financial markets in contributing to the economic growth of India.

107

Int. Jour. Of Business & Inf. Tech.   Vol-1 No. 1 March 2011

References

[1] Akaike, H., *Information Theory and an Extension of the Maximum Likelihood Principle,* Petrov, B. and Csaki, F. (eds), 2nd International Symposium on Information Theory, Budapest, Akademiai Kiado, 1973.

[2] Beck, T., Levine, R., & Loayza, N.: "Finance and The Sources of Growth". *Journal of Financial Economics* , Vol.58, pp.261-300, 2000.

[3] Bencivenga, V. and Smith, B.: "Financial Intermediation and Endogenous Growth", *Review of Economics and Studies*, 58, pp. 195-209., 1991.

[4] Bencivenga, V., Smith, B. and Starr, R.,: "Equity Markets, Transaction Costs and Capital Accumulation: An Illustration", *The World Bank Economic Review*, 10(2), pp. 241-265, 1996.

[5] Boulila, G., & Trabelsi, M.:"Financial Development and Long-Run Growth:Granger Causality in a bivariate VAR Structure, Evidence from Tunisia: 1962-1997", 2002 . (Unpublished).

[6] Choong, C. K., Yusop, Z., Law, S. H., & Sen, V. L. : "Financial Development and Economic Growth in Malaysia: The Stock Market Perspective". *Journal of Financial Economics*, pp.178-183, 2001.

[7] Chou, Y. K., & Chin, M. S.: "Financial Innovations and Technological Innovations as Twin Engines of Economic Growth". *Working Paper*, University of Melbourne , pp.1-46, 2004.

[8] Chou, Y. K.: "Modelling Financial Innovation and Economic Growth: Why the Financial Sector Matters to the Real Economy". *Journal of Economic Education*, pp.78-91, 2007.

[9] Deb, S. G., & Mukherjee, J.:"Does stock Market Development Cause Economic growth? A Time Series Analysis for Indian Economy". *International Research Journal of Finance and Economics* , Issue.21,pp.142-149, 2008.

[10] Filer, R. K., Hanousek, J., & Campos, N. F.: "Do Stock Markets Promote Economic Growth?", *Working Paper*, City University of New York , pp. 1-21, 2000.

[11] Geweke, J.,: *Inference and causality in economic time series models*, Griliches, Z. and Indriligator, D., (eds), Handbook in Econometrics, Amsterdam, North Holland, 1984.

[12] Goldsmith, R. W.: *Financial Structure and Development*. New Haven: CT: Yale University Press, 1969.

[13] Greenwood, J. and Jovanovic, B.,: "Financial Development, Growth and Distribution of Income", *Journal of Political Economy*, 98, pp. 1076-1107, 1990.

[14] Guiso, L., Jappelli, T., Padula, M. and Pagao, M.: "Financial Market Integration and Economic Growth in the EU", *Economic Policy,* pp. 523-577, 2004.

[15] Hendry, D. F.: "Econometric Modeling with Cointegrated Variables: An Overview", *Oxford Bulletin of Economics and Statistics*, vol.48, pp.201-212, 1986.

[16] Hondroyiannis, G., Lolos, S. and Papapetrou, E.: "Financial Markets and Economic Growth in Greece, 1986-1999", *Working Paper, Bank of Greece*, vol. 17, 2004.

[17] Kamat, M. S., Kamat, M. M., & Murthy, I. B. : "Financial Infrastructure and Economic Performance: Causality-Cointegration Using Unrestricted Vector error Correction Models". *The Indian Journal of Commerce* , Vol.60, No.4. pp.16-37, 2007.

[18] Katos, A.: *Econometrics: Theory and practice*, Thessaloniki, Zygos (eds), 2004.

[19] Katsouli, E.: *Money, Finance and Capitalist Development*, Philip Arestis and Malcolme Sawyer, (March 2003), Economic Issues.

[20] King, R. and Levine, R.: "Finance and Growth: Schumpeter Might be Right", *Quarterly Journal of Economics*, 108(3), pp. 717-737, 1993.

[21] King, R. and Levine, R.: "Finance Entrepreneurship and Growth", *Journal of Monetary Economics*, 32, pp. 513-542, 1993.

[22] Levine, R.: "Stock Markets, Growth, and Tax Policy", *Journal of Finance*, 46, pp. 1445-1465, 1991.

[23] Levine, R.: "Financial Development and Economic Growth: Views and Agenda",

Journal of Economic Literature, 35(2), pp. 688-726, 1997.

[24] Levine, R., Loyaza, N. and Beck, T.: "Financial Intermediation and Growth: Causality and Causes", *Journal of Monetary Economics*, 46, pp. 31-77, 2000.

[25] Levine, R. and Zervos, S.: "Stock Markets, Banks and Economic Growth", *The American Economic Review*, 88(3), pp. 537-558, 1998.

[26] Maddala, G.S. and Kim, I-M.: *Unit roots, cointegration, and structural change*. Cambridge: Cambridge University Press. pp. 233-242, 1998.

[27] McKinnon, R.: *Money and capital in economic development*, Washington, DC, Brookings Institution, 1973.

[28] Nieuwerburgh, S., Buelens, F. and Cuyvers, L.: "Stock Market and Economic Growth in Belgium", *Explorations in Economic History*, 43(1), pp. 13-38, 2006.

[29] Mohtadi, H., & Agarwal, S.: "Stock Market Development and Economic Growth: Evidence From Developing Countries". *Working Paper*, University of Wisconsin-Milwaukee, pp.1-19, 1998.

[30] Nieuwerburgh, S. V., Buelens, F., & Cuyvers, L.: "Stock Market Development and Economic Growth in Belgium". New York University Working Paper No. FIN-05-024, 2005.

[31] Pagano, M.: "Financial Markets and Growth: An overview", *European Economic Review*, 37, pp. 613-622, 1993.

[32] Pereira, A., and Xu, Z.: "Export Growth and Domestic Performance", *Review of International Economics*, 8, pp. 60-73, 2000.

[33] Saint-Paul, G.: "Technological Choice, Financial Markets and Economic Development", *European Economic Review*, 36, pp. 763-781, 1992.

[34] Schclarek, A.: "Industry Diversification, Financial Development and Productivity-Enhancing Investments" *Seminar Paper Presented at Lund University*, 20 September, pp.1-24, 2006.

[35] Shan, J., Morris, A. and Sun, F.: "Financial Development and Economic Growth", *Review of International Economics,* 9(3), pp. 443-54, 2001.

[36] Shan, J.: "Does financial development lead economic growth? - A vector Autoregression Appraisal", *Applied Economics*, 37, pp. 1353-1367, 2005.

[37] Shan, J., & Jianhong, Q.: "Does Financial Development 'Lead' Economic Growth? The Case of China". *Annals of Economics and Finance* , Vol.1, pp.231-250, 2006.

[38] Shaw, E.: *Financial Deepening in Economic Development*, Oxford University Press, 1973.

[39] Stefani, P. : "Financial Development and Economic Growth in Brazil: 1986-2006". *Economics Bulletin* , Vol.3, No.69, pp.1-13, 2007.

[40] Vazakidis, A.: "Testing Simple versus Dimson Market Models: The case of Athens Stock Exchange", *International Research Journal of Finance and Economics*, pp. 26-34, 2006.

[41] Vazakidis, A. and Adamopoulos, A.: "Credit Market Development and Economic Growth", *American Journal of Economics and Business Administration*, Vol.1, No.1, pp.34-40, 2009.

Author Biography

P K Mishra: He is currently Assistant Professor of Applied Economics at Siksha O Anusandhan University, Orissa, India. He has qualified Masters in Analytical and Applied Economics from Utkal University, India, M.Phil in Financial Economics from Annamalai University, India, and Diploma in Business Administration from NILEM, India, and Doctoral Degree in Economics from Utkal University, India. He has got more than 40 research papers published in several indexed and referred journals of national and international repute. His principal research areas consist of capital market issues, international finance, and macroeconomic growth of Asian countries. He has authored 9 text and reference books at the national level. He has been teaching applied economics for more than 10 years.

IJBIT

International Journal of Business and Information Technology

Call for Paper

The journal welcomes high quality original research papers, survey paper, review paper, tutorial, technical notes as well as the discussion papers.

- Management Information System
- Information System and Technology
- Business Administration
- Business Finance
- Software Project Management
- Marketing Management
- Marketing
- Internet Marketing

- Electronic Commerce
- Accounting
- Business Management
- Human Resource Management
- Organizational Behaviour
- Entrepreneurship
- Consumer Behaviour