

## Data Mining: Architecture, Techniques and its uses

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### **Abstract**

Data Mining refers to extracting useful information or knowledge from large amount of data. It is beneficial in every field like business, medicine, education sectors, health care, industrial, management, engineering, web data, banking, customer relationship management, fraud detection etc. It is also known as knowledge discovery process. Data mining is an integral part of Knowledge Discovery in Database (KDD). In this paper different types, architecture of data mining are describe in details with the help of block diagram. Its techniques also define which are summarization, classification, association rules, prediction, clustering and regression etc.

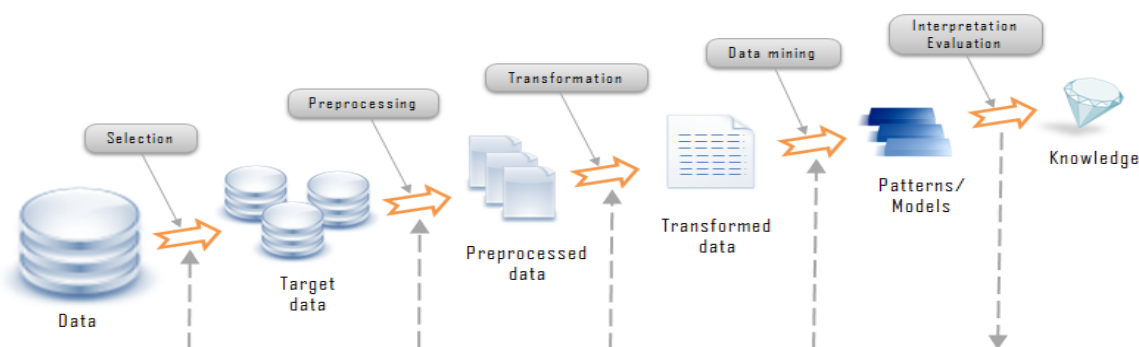
**Keywords:** Data mining, Architecture, Aspects, Techniques and uses

### **Introduction of Data Mining**

Data mining is a field of research which are very popular today. A large amount of data is available in every field of life such as: banking, medicine, insurance, education sectors etc. due to advances of digitization techniques. Data mining is a process of selecting interested pattern to from a large amount of data or information. Data Mining is similar to Data science. It is an interdisciplinary turf about scientific methods, process, and system to take out knowledge from data in various forms.

Data mining is defined as a set of techniques for automatically analyzing interesting data in the data. Many organizations now have huge amounts of data stored in databases that needs to be analyzed. Traditionally, data has been analyzed by hand to discover interesting knowledge. In general, data mining techniques are designed understand the past or predict the future. Data mining techniques are used to take decisions based on facts rather than instinct. There are various types of techniques are used classification, association rules, prediction, clustering and regression etc. In this paper data mining is introduce in details.

### **Aspects of Data Mining**



The sequences of steps identified in extracting knowledge from data are:

Data mining is just one part of the process of discovering useful knowledge from data, referred to collectively as Knowledge Discovery in Databases (KDD). In brief, KDD outlines a process of knowledge discovery as a series of iterative steps:

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- 1) Data Cleaning
- 2) Data Integration
- 3) Data selection,
- 4) Data transformation,
- 5) Data Mining,
- 6) Pattern Evaluation, and
- 7) Knowledge

### **1. Data Cleaning**

Basically, we collect the different types of data which includes errors, noise, value missing etc. So, we need to clean up the data. In data cleaning step, noisy and inconsistent data is removed.

### **2. Data Integration**

In this step integrate or combines the different sources.

### **3. Data Selection**

In this step, data relevant to the analysis task are retrieved from the database. In the first step we are unable to collect the data. For this, we select only those data which we think useful for data mining.

### **4. Data Transformation**

Basically, the data even after cleaning is not ready for mining. In this step, data is transformed into appropriate forms for mining. Thus, the techniques used in data transformation are: aggregation, normalization etc.

### **5. Data Mining**

After transformation the data mining steps has come. Now we can apply data mining techniques on the data. It takes only the interesting patterns. Data mining uses the techniques clustering and association analysis.

### **6. Pattern Evaluation**

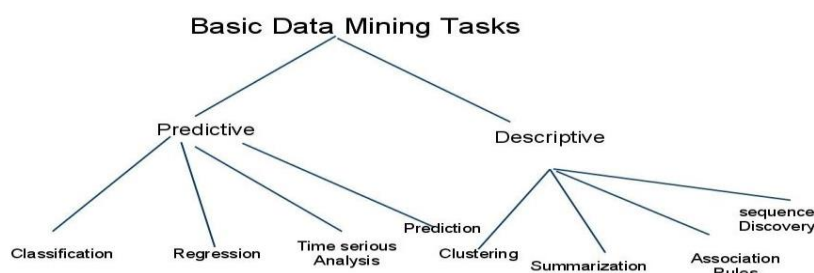
Generally in this step, data patterns are evaluated.

### **7. Knowledge Presentation**

As this step is beneficial to us. Generally, in this step, knowledge is represented.

### **Data Mining Techniques**

Data mining is the combination of two tasks predictive and descriptive. In predictive task includes the classifications, prediction and time series analysis and on the other hand descriptive task includes: association, clustering and summarization. A medical practitioner annoying to detect a disease based on the health check test results of a patient can be considered as a analytical data mining task. Descriptive data mining tasks usually finds data relating patterns and comes up with fresh, important information from the accessible data set.



### **(I) Classification**

Classification is a derivation of a model to determine the class of an object based on its attributes. A collection of records will be available, each record with a set of attributes. A classification model has relationships between attributes and objects of the class. Additionally, you can use classification as a feeder to, or the result of, other techniques.

### **(II) Prediction**

Prediction derives the relationship between a thing you know and a thing you need to predict for future reference. Prediction is nothing but finding out the knowledge or some pattern from the large amounts of data.

### **(III) Time - Series Analysis**

Time series analysis comprises methods for analyzing time series data in order to extract meaningful statistics and other characteristics of the data. Time series is important because it imparts knowledge about what has taken place in the past and what will take place in time to come. Examples of time series are heights of ocean tides etc. Time series are drawn by line charts. Time series are used in signal processing, pattern recognition, weather forecasting, earthquake prediction, control engineering and largely in any domain of applied science and engineering which involves temporal measurements. Stock market prediction is an important application of time-series analysis.

### **(IV) Association**

Association discovers the connection among a set of items. Association identifies the relationships between objects. Such type of connections of objects is called association rules.

### **(V) Clustering**

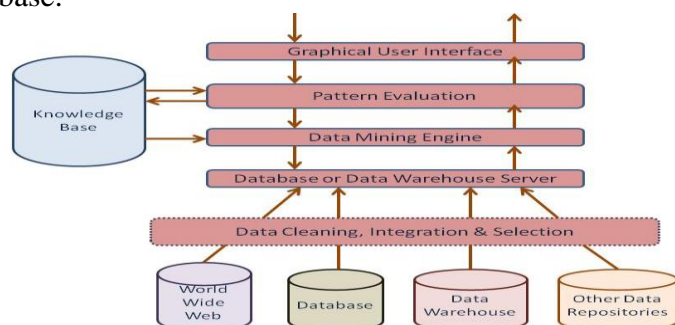
Cluster or you can say groups are used to identifying the classes, for a set of objects whose classes are unknown. Clustering is used to identify data objects that are similar to one another. The main advantage of clustering over classification is that, it is flexible to change and helps single out useful features that differentiate groups. Clustering requirements in scalability, high dimensionality, ability to handle noisy data etc. There are various types of clustering methods like as: density based, hierarchy, partitioned, model based etc.

### **(VI) Summarization**

A set of relevant data is summarized which result in a smaller set that gives aggregated information of the data. Data Summarization is a term for a short winding up of a big paragraph. Data summarization has the great importance in the data mining.

### **Data Architecture**

The major components of any data mining system are data warehouse server, data source data mining engine, graphical user interface, pattern evaluation module and knowledge base.



## **1. Data Sources**

There are so many documents present. That is a database, data warehouse, World Wide Web. That is the actual sources of data. Sometimes, data may reside even in plain text files or spreadsheets. World Wide Web or the Internet is another big source of data. Organizations usually store data in databases or data warehouses. Data warehouses may contain one or more databases.

## **2. Database or Data Warehouse Server**

The database data warehouse server contains the actual data that is ready to be processed. Hence, the server handles retrieving the applicable information. That is based on the data mining request of the user.

## **3. Data Mining Engine**

In data mining system data mining engine is the interior component. As It consists a number of modules. That we used to perform data mining tasks that includes: association, classification, clustering, prediction, etc.

## **4. Pattern Evaluation Modules**

This module is mainly responsible to take only interesting pattern. It interacts with the data mining engine. Its main focus is to search only interesting patterns.

## **5. Graphical User Interface**

Graphical user interface to communicate between the data mining system and user. Also, this module helps the user use the system easily and efficiently. When the user specifies a job, this element interacts with the data mining system. Thus, displays the result in an easily understandable manner.

## **6. Knowledge Base**

In whole data mining process, the knowledge base is beneficial. It might be useful for guiding the search or evaluating the interestingness of the result patterns. The knowledge base might even consist of user plan and data from user experiences. That can be useful in the process of data mining. The data mining engine might get inputs from the information. That is the base to make the result more accurate and reliable. The pattern estimation module interacts with the knowledge base.

## **Uses of Data Mining**

Its scope is vast. It is used in various fields by various organizations which are given below:

**Healthcare:** Data mining holds to improve healthcare systems. This will also allow healthcare professionals to improve the quality of care and reduce costs.

**Education:** There is a new emerging field, called Educational Data Mining. Data mining can be used by an organization to take accurate decision and also to calculate the results of the student. The institution can focus on what to teach and how to teach.

**Investigate analysis:** Data mining is helpful in data cleaning, data pre-processing and integration of databases. The researchers can get any related data from the database that may bring any change in the research.

**Business analysis:** Business analysis is the most needed practice to know status of your business and its competitors and the domain where improvement is needed.

**Banking:** Data mining is useful in solving different business troubles in banking and finance sector through finding the pattern, correlation in business information and market prices.

**Digital Security:** Analyzing the vast data allows you to prevent fraud and unauthorized people from signing in to accounts by identifying anomalies and creating algorithms to sort the frauds from the normal profiles.

### **Conclusions**

We have learned aspects of Data Mining and knowledge discovery, Elements of Data Mining and applications or uses etc. Data mining is a powerful tool that used in the field of medical, health care, banking, security or fraud detection, education, managerial businesses etc. This paper provides a new perspective of a researcher regarding applications of data mining in social welfare/ benefits.

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## **Financial Performance of DCC Bank with Special Reference To Shivamogga District**

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**ASHOKA M\*\***

### **Abstract**

*A cooperative bank is a financial entity which belongs to its members, who are at the same time the owners and the customers of their bank. Co-operative banks are often created by persons belonging to the same local or professional community or sharing a common interest. Cooperative banks generally provide their members with a wide range of banking and financial services (loans, deposits, banking accounts etc.). Co-operative banks differ from stockholder banks by their organization, their goals, their values and their governance. Present paper attempts to examine the financial performance of DCC Bank of Shivamogga district through selective indicators. This paper also studies the percentage and growth rate of investment, working Capital, Shares, Loan Distribution and Profit in DCCB. To achieve the objectives of the paper data has been collected from various secondary sources and analyzed by using simple statistical tools.*

**Keywords:** *Credit, deposit, cooperative bank, district central cooperative banks (DCCBs), interest*

### **Introduction**

A co-operative bank is a financial entity which belongs to its members, who are at the same time the owners and the customers of their bank. Co-operative banks are often created by persons belonging to the same local or professional community or sharing a common interest. Co-operative banks generally provide their members with a wide range of banking and financial services (loans, deposits, banking accounts etc.). Co-operative banks differ from stockholder banks by their organization, their goals, their values and their governance. In most countries, they are supervised and controlled by banking authorities and have to respect prudential banking regulations, which put them at a level playing field with stockholder banks. Depending on countries, this control and supervision can be implemented directly by state entities or delegated to a co-operative federation or central body. Co-operative banking is retail and commercial banking organized on a co-operative basis. Co-operative banking institutions take deposits and lend money in most parts of the world. Co-operative banking, includes retail banking, as carried out by credit unions, mutual savings and loan associations, building societies and co-operatives, as well as commercial banking services provided by manual organizations (such as co-operative federations) to co-operative Businesses.

The structure of commercial banking is of branch banking type; while the cooperative banking structure is a three tier federal one as follows,

1. A State Co-operative Bank works at the apex level (i.e. works at State level).

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2. The Central Co-operative Bank works at the Intermediate Level. (i.e. District Co-operative Banks Ltd. works at district level)

3. Primary co-operative credit societies at base level (At village level).

The Shivamogga district cooperative central bank has been registered under Cooperatives Societies Act in the year 1953 vide register No: ARS/1041/18-10-1953 as a central financing agency of PACS. The area of operation of the bank is confined to Shivamogga District consisting of 7 taluks. The district is divided into 2 revenue sub division, namely; Malanad and semi malanad areas. The Malanad area is covered by Thirthahalli, Hosanagar, Sagar and Sorabtaluks. The semimalanad area is covered by Shivamogga, Bhadravathi and Shikaripurataluks. The financial needs of the farmers and the financial operations of the bank could vary across these regions. The enquiry into the working of the DCC bank could reveal interesting facts about the bank's performance according to the geographical variations. The Bank aimed at providing financial assistance to the public of shivamogga District especially agriculturist & help for the effective functioning of rural cooperative societies and other societies / institutions in the cooperative field.

#### **About the Bank**

1) It was established in 1953.

2) It is a co-operative bank.

3) D.C.C. means (District central co-operative bank).

4) The area of operation at that time was undivided Shivamogga district.

5) The bank bifurcated on 28<sup>th</sup> Feb 2003.

6) The area of operation of the existing bank restricted to newly shivamogga district with effect from 1<sup>st</sup> March 2003.

7) The main branch is in shivamogga city. In shivamogga district there are 196 villages & talukas are here.

8) There are 18 branches throughout shivamogga district

9) There are 416 co-operative credit societies they got their membership. In that 182 are primary Co-operative credit society & the bank except the membership & nominations.

10) The bank will accept 4 types of membership. a) State government. b) Co-operative society in shivamogga district. C) Associate members (both individual & other than co-operative societies).

11) Co-operative means it is voluntary association of person who join together to safe guard their interests.

12) It is based on the principles of mutual self-help quality democracy & freedom.

13) They started bank with Rs. 25,000 share capital & Rs. 20,000 as deposit.

14) In the board of Director there are 13 members.

15) Representative of apex bank ----01.

16) State Government nominee----04.

17) Period of Board of management is 5 years.

18) Board of Directors elects President & Vice-President.

19) The period of President & vice-president is 1 term-2.5 years & 2 terms – 2.5 years.

The following table 1 explains that particular and year wise financial performance of DCC Bank shivamogga since 2013-14 to 2017-18, this percentage indicates the difference between target and achievement of DCC bank.

**Table 1: Financial Performance of DCC Bank, Shivamogga since 2013-14 to 2017-18**

Particulars	2013-14	2014-15	2015-16	2016-17	2017-18
Shares	91.30	91.30	91.30	91.30	91.30
Funds	96.99	96.99	96.99	96.99	96.99
Deposits	90.60	90.60	90.60	90.60	90.60
Borrowing loans	88.88	88.88	88.88	88.88	88.88
liabilities	73.91	73.91	73.91	73.91	73.91
Balance loans	94.03	94.03	94.03	94.03	94.03
Loans distribution	88.57	88.57	88.57	88.57	88.57
Working capital	90.63	90.63	90.63	90.63	90.63
Profit	77.89	77.89	77.89	77.89	77.89

Source: Annual Report 2013-14 to 2017-18

The financial performance like target was not reached at every year except 2015-16& 2016-17 which comes under fund mobilized i.e., 101.13% & 104.45%. Other hand achievement always lacking behind the target at every items in general profit in particular heights 104.45% of achievement has been achieved in funds during 2016-17 and lowest 66.26%, and 67.63% in profit during the year 2015-16& 2016-17 followed by 73.91% in reserves in the year 2013-14. On the Basis of above Table if can be concluded that target has not been reached it shows that bank is not working properly in the financial matter due to lack of in efficiency of administrations recovery of loan, generation of funds & distribution of fund, awareness of the people etc. Year wise total percentage of financial performance of DCC Bank, Shivamogga since 2013-14 to 2017-18 is shows in table no. 2.

**Table 2: Year wise Total Percentage of Financial Performance of DCC bank**

Particulars	2013-14	2014-15	2015-16	2016-17	2017-18	Total
Shares	15.52	16.28	20.55	21.27	26.38	100
Funds	18.03	18.1	19.76	21.64	22.46	100
Deposits	12.99	15.45	18.19	24.33	29.04	100
Borrowing loans	12.2	14.37	26.94	17.18	29.39	100
liabilities	8.53	14.3	24.7	25.08	27.39	100
Balance loans	14.85	15.48	20.29	20.75	28.63	100
Loans distribution	12.73	18.29	21.12	18.96	28.91	100
Working capital	13.15	15.39	21.39	22.06	28.01	100
Profit	21.88	17.57	18.61	19	22.94	100

Source: Annual Report 2013-14 to 2017-18

The total percentage shows that yearly distributed out of total percentage it may be calculated particular year to total sum, the highest percentage recovered among all items 2017-18 compared to four years there is low percentage in 2013-14 period. Followed by 2014-15 the highest percentage in 2017-18 that is 29.4% in Deposits followed by 29.31 in bank loan during some of period so which was lowest in 2013-14 in the same period loan distribution was very less. From above table so it is concluded that uncial two years the percentage particulars where very low so which have been increased more during 2017-18, So its shows that average percentage has been increased after 2012-13. On other hand it is positive indicator in financial performance among all items. Table 3.Reveals that year wise growth rate of financial performance of DCC Bank, shivamogga. Science 2013-14 to 2017-18.



**Table 3: Year wise Growth rate of Financial Performance of DCC Bank**

Particulars	2015-15	2015-16	2016-17	2017-18
Shares	4.90	27.56	4.64	32.93
Funds	0.38	9.18	10.45	4.56
Deposits	18.98	21.10	47.24	36.23
Borrowing loans	17.74	102.98	-79.91	99.36
liabilities	67.72	122.01	4.35	27.18
Balance loans	4.22	32.42	3.11	53.03
Loans distribution	43.69	22.23	-16.99	78.17
Working capital	17.09	45.62	5.12	45.21
Profit	-19.67	4.73	1.76	18.05

Source: Annual Report 2013-14 to 2017-18

The highest 67.72% of growth rate was reserve followed by 18.98% in deposits and lowest 0.38% imp fund generation in the year 2015-16 in the same year there where negative growth rate that is -19.67% in profit on the other hand the growth rate of Bank loan & Reserves has bank increased tremendously that is 102.98% & 122.01% in the year 2016-17 there is positive growth rate among all particulars during the same year, Negative rate can see in bank loan that is -79.91% in 2016-17 which was highest in previous year followed by -16.99% in loan distribution s, The growth rate in financial performance increased among all particulars during 2017-18 highest 99.36% growth rate was bank loan followed by 78.17% in loan distribution & lowest growth rate 4.56% in funds there was no negative growth rate in same year. It is summarize that growth rate financial performance is better for every year on the other hand there is always positive growth among all particulars except Bank loan, loan distribution and profit positive growth rate is good indicator for financial traction of DCC Bank, Shivamogga.

#### **Weakness**

- High oriented cause due to excessive labour force.
- Low turnover of funds resulting in low profits
- Defective marketing strategy lacks effective advertising and publicity.
- Needs updating with the times in terms of effective utilization of funds
- R&D is not effective in as much as it has not made any brake through in new Products& policies.
- The large proportion of the target area is formers. It has very few offers to General loans like house loans & other loans.
- Unskilled labour coupled with excess labour hampers profitability and Product lies under utilized

#### **Findings and Conclusion**

The following are major findings of financial performance of DCC Bank, Shivamogga these are (1) Target has not been reached for every year there is a wide gap between target and achievement due to same problem, it may be Financial management, Loan Distribution, Recovery Loan, Generation of Funds, etc. year wise average and percentage of particular has been increased after 2015-16 which is the positive indicator of financial transaction and the growth rate of financial performance is better during five year period 2013-14 to 2017-18.

It is point out that DCC Bank working in Such & good way which got award for 3 times concern to financial performance especially Shivamogga is one backward districts among 29 districts of Karnataka, DCC bank play very vital role at grass root level in general agricultural in particular which helps to Come up from financial problem particular agricultural formers that back bone of Indian economic if it works in the some directions there is no doubt if will become Nationalized Bank in future.

### **Suggestions**

1. The banks should adopt the modern methods of banking like internet banking, credit cards, ATM, etc.
2. The banks should plan to introduce new schemes for attracting new customers and satisfying the present ones.
3. The banks should plan for expansion of branches.
4. The banks should improve the customer services of the bank to a better extent.

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## **Experimental Study on Bubble Deck Slab with Spherical Hollow Balls**

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### **Abstract**

Concrete is the most important construction material. Slab is a major element of structure which consumes more concrete. The middle portion of slab does not perform any structural function. The concrete in the middle of slab can be reduced by inserting voids. Voids can be inserted by using hollow spherical balls. This new technology named as bubble deck slab.

Bubble deck slab is a reinforced concrete slab with spherical shaped bubbles. In this experimental program, reinforced concrete slabs are cast with and without spherical hollow balls of different diameter. The slabs are experimentally tested by line load applied along the length in central portion. Deflections are measured at different location, i.e. L/4, L/2 and 3L/4 with respect to loads. From this study it was concluded that bubble deck slab with 80mm diameter hollow bubble showed performance nearly equal to conventional slab with 10% saving in concrete.

**Keywords:** Bubble deck slab; Hollow spherical balls

### **1. Introduction**

Concrete which is an artificial kind of stone, and is a most common construction material. Slab is one of the largest structural member consuming concrete. A concrete slab is a common structural element which is most often used in floors and ceiling constructions, supported by beams or walls. Slabs are of two types, when bends in one direction then it is referred as one way slab, while bends in two directions known as two way slab.

Deflection of slabs will be more when span of slab or load on slab is more. To reduce the deflection of slab, increasing thickness is one of the solutions, which leads to increase self-weight of slab. To overcome this issue Jorgen Bruenig invented the first biaxial slab system in 1990's in Denmark.

Bubble deck slab is an in-situ slab which is created by inserting voids by using plastic hollow bubbles in the slab. These plastic bubbles can be made by waste plastic material, which make use of non-degradable waste plastic. The main use of these plastic hollow bubbles is to reduce dead weight of bubble deck floor slab by 1/3 to that of solid slab with same thickness [1]. Construction of Bubble deck floors can be 20% faster than traditional floor slabs. Construction cost of bubble deck slab can be reduced to maximum of 35% [2]. Voids in middle of slab eliminate 30 % to 50% of concrete which reduces self-weight [3-4]. Bubble deck slab did not influence crack pattern compared to solid slab, and punching resistance was smaller than solid deck slab [5]. In future if building is demolished, the spheres could be recycled. This technique reduces concrete usage in construction by 30% or more [6]. Surendar and Ranjitham [7] analyzed slabs numerically and experimentally

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using the ANSYS software with appropriate support conditions that provide a uniformly distributed load, with bubble diameter of 100 mm. The stress and strain results were evaluated and compared with the bubble deck slab and the conventional slab. The following conclusion was made. The bubble slab offers much better performance than conventional slab, but there has been a slight variation in numerical investigations. The numerical and experimental results show that the bubble deck can withstand 75% of the load capacity compared to the conventional slab. Immanuel Joseph Chacko *et al* [8] conducted tests on slab using 60 mm and 65 mm diameter bubbles. They concluded that while Comparing bubble deck and conventional slab, performance of bubble deck slab with 60 mm diameter was good. Harshit varshney, *et al* [9] done a review study on bubble deck slab and stated that the durability of bubble deck slab was not essentially different from ordinary solid slabs and bubble deck achieves 17% to 39% higher thermal resistance than solid slab. Muhammad shafiq mushfiq and shikha saini [10] carried out an experimental study on bubble deck slab using 90 mm and 120 mm diameter bubbles. The results of the test showed negligible load capacity between them and the weight reduction of 10.55% and 17% using the bubble deck slab.

There is also number of advantages like use of recycled materials, lower energy consumption, reduction in total construction materials, reduced CO<sub>2</sub> emission, less transportation that make bubble deck more environmental friendly than other concrete construction techniques .

The main aim of the present work is to investigate structural behavior of bubble deck slab.

## 2. Materials Used

The following are the materials used in the current experimental investigation

**2.1 Cement:** Ordinary Portland cement 53 grade (ultra tech brand) conforming to code IS: 12269-1987 having specific gravity of 3.13 was used.

**2.2 Coarse Aggregate:** The maximum size of coarse aggregate used in this project was of 20mm. Angular shaped coarse aggregate with specific gravity of 2.762 was obtained from the local crushing plants.

**2.3 Fine Aggregate:** In the present investigations, river sand available in the local area was used as fine aggregate having a specific gravity of 2.632. Fine aggregate used in this study falls under category zone- II

**2.4 Water:** Potable water has been used in this study for both mixing and curing.

**2.5 Reinforcement:** Steel bar of 8mm diameter of Fe415 grade was used.

**2.6 Hollow plastic bubbles:** Hollow plastic balls used here are made up of nonporous material and have enough strength and stiffness to bare load while casting. The hollow balls do not react chemically with steel and concrete. The ball diameters used in this project are 40mm, 60mm and 80mm.

**2.7 Mix design:** Mix design for M30 grade concrete was carried out using IS 10262:2009 code with water cement ratio 0.4. Mix proportions of M30 grade concrete are shown in Table 1

**Table 1: Mix proportions of M30 grade concrete**

Cement in (kg)	Coarse aggregate (kg)	Fine aggregate(kg)	Water (lit.)
413.33	1028.61	767.79	186



### 3. Experimental Programme

#### 3.1 Conventional slab

Rcc Slab was cast using wooden form work of inner dimensions 1.5m×0.7m×0.15m with Clear cover of 25mm. Compaction is done by using needle vibrator. 8mm diameter Fe415 grade steel bars were used at 270mm c/c in both directions as reinforcement. Fig.1 represents the conventional slab cast.



**Figure 1. Conventional Slab**

#### 3.2 Slab with bubbles

Three Rcc slabs using Plastic balls of 40 mm, 60 mm and 80 mm diameter were cast separately, and were placed in tension zone as shown in Fig.2. Number of bubbles of each diameter used in bubble deck slab is shown in Table.2. Curing was done by ponding method for 28 days.



**Figure 2. Slab with Bubbles**

**Table 2: Number of bubbles used in slabs**

Sl.no.	Samples	Bubble diameter	No. of spheres
1	Slab1	-	-
2	Slab2	40mm	112
3	Slab3	60mm	78
4	Slab4	80mm	55

### **3.3 Test setup**

Rcc slabs were tested using 100T loading frame. Test setup is as shown in Fig.3. Supporting system of slabs were simply supported along two longer edges and loaded in central portion as line load, length wise as shown in Fig 3. Dial gauges and LVDT were used to measure deflections at  $L/4$ ,  $L/2$ ,  $3L/4$  and its arrangements are as shown in Fig 4. The deflections of slabs at respective places were measured at their mid span beneath the bottom face of the tested slab.



**Figure 3. Test setup**



**Figure 4. Arrangement of Deflectometers And LVDT**

### **4. Results and Discussion**

It was observed that conventional slab had an ultimate load carrying capacity of 330 KN whereas slabs with 40 mm, 60 mm and 80 mm bubbles have 325 KN, 295 KN and 280 KN respectively. It was noticed that not much difference in load carrying capacities of conventional and bubble deck slabs.

Slab without bubbles suffered less deflection than the slab with bubbles. Load carrying capacity of slabs decreases as the size of bubbles increases, but it was noticed that maximum percentage reduction in load carrying capacity limited 16% only. From strength point of view bubble deck slab carries loads more or less nearly equal to conventional slab.

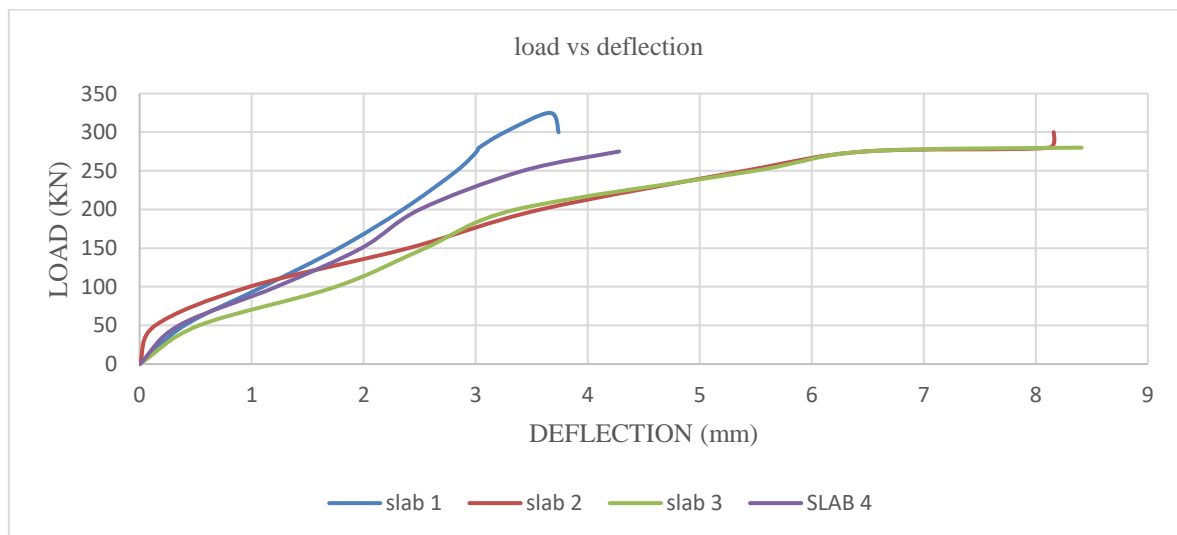


It was observed that deflections in bubble deck slab with 80 mm diameter balls found to be less when compared with other bubble deck slabs and nearly equal to conventional slab. From the limited experimental study, it was observed that slab with 80mm diameter bubbles gives better results and are nearer to conventional slab.

Load and deflection of all slabs with and without bubbles at L/4 are shown in Table 3. Load vs deflection graph at L/4 is plotted as shown in Fig5.

LOAD (KN)	DEFLECTION			
	SLAB 1 (mm)	SLAB 2 (mm)	SLAB 3 (mm)	Slab 4 (mm)
0	0	0	0	0
50	0.4	0.14	0.53	0.35
100	1.1	0.98	1.75	1.22
150	1.78	2.4	2.55	1.98
200	2.35	3.58	3.36	2.5
250	2.83	5.4	5.49	3.42
275	3.01	6.47	6.47	4.28
280	3.03	8.12	8.41	
300	3.26	8.16		
325	3.66			
330	3.74			

**Table 3: Load vs deflection of slabs at L/4 position**



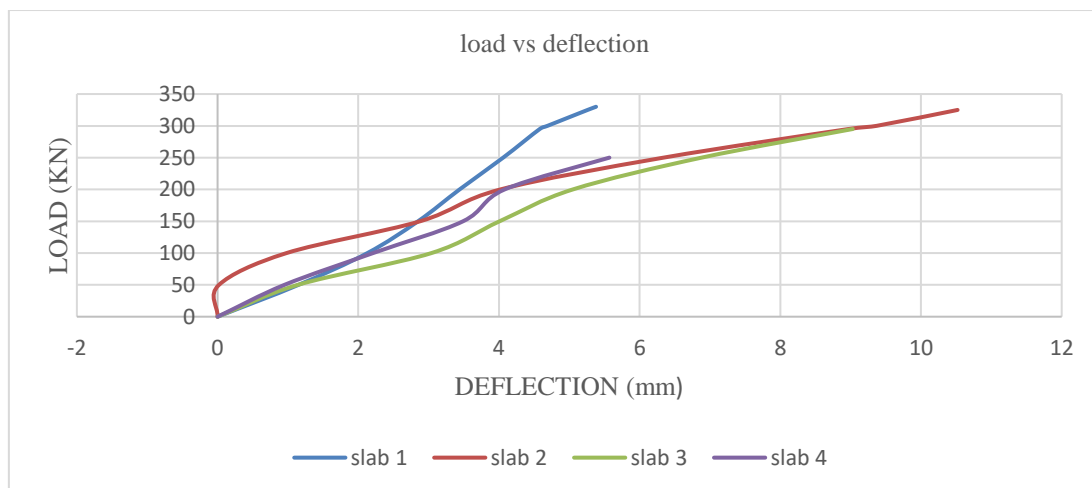
**Figure 5: Deflections of slabs (L/4 position)**

Load vs deflection graph is plotted taking load on y-axis and deflections along x-axis. Deflection graph shows that slab without bubbles suffers less deflection among all category slabs. Slab 1 (conventional) and slab 4 (80mm diameter bubbles) shows similar pattern with less deflection whereas others have very large deflections.

Table 4 shows Load and deflection values at a distance of l/2. Load vs deflection graph is represented in Fig 6.

**Table 4: Deflections at L/2 for slabs**

LOAD (KN)	DEFLECTIONS			
	SLAB1 (mm)	SLAB 2 (mm)	SLAB3 (mm)	SLAB4 (mm)
0	0	0	0	0
50	1.15	0.02	1.14	0.95
100	2.13	0.98	3.04	2.21
150	2.85	2.88	4.01	3.49
200	3.44	4.02	5.05	4.08
250	4.06	6.34	6.88	5.57
295	4.58	8.97	9.03	
300	4.69	9.37		
325	5.26	10.52		
330	5.38			



**Figure 6: Deflections of slabs (L/2 position)**

Load deflection pattern occurred at L/2 span was similar to pattern of L/4 span. Here also deflection of slab with 80mm diameter bubbles was less and nearer to conventional slab.

Fig 7 shows the cracks developed at mid span in bubble deck slab. Weight of bubble deck slabs are reduced when compared to conventional slab. Percentage reduction in weight between conventional and bubble deck slabs are shown in Table 5. Maximum percentage reduction in weight is 10.66% in case of bubble deck slab with 80 mm diameter bubble besides maintaining strength and deflection criteria nearly equal to conventional slab. Weight reduction is important criteria to be observed in bubble deck slab. From the literature also, it was noticed that nearly 30% of weight reduction can also be possible using bigger size of bubbles.



Figure 7: Cracks in bubble deck slab

Table 5: Percentage weight reduction

Specimen name	Bubble diameter used	Volume of concrete	Weight of slab	% weight reduction
Slab1	-	0.1575	393.75 kg	-
Slab2	40mm	0.1537	384.25 kg	2.4
Slab3	60mm	0.1487	371.75 kg	5.58
Slab 4	80mm	0.1427	351.75 kg	10.66

### 5. Conclusion

From the limited experimental study carried out, following conclusion are made

1. Weight reduction can be achieved up to 10% compared to solid slabs
2. Bubble deck slab is new technology to be implemented avoiding cement and its products.
3. In bubble deck slab volume of concrete consumed is reduced, so that dead weight of slab decreased compared to conventional slab.
4. Deflection of bubble deck slab with 80mm diameter bubbles is nearly equal to that of conventional slab.
5. Maximum difference in load carrying capacity of bubble deck slab and conventional slab was found to be 17%.

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## **Financial Performance Evaluation of the Hyderabad District Co-Operative Central Bank Ltd., Hyderabad (TS)– A Case Study**

**Yasmeen Banu\***

**Dr. Varun Kumar\*\***

### **Abstract**

Co-operation is the universal instrument of creation .The principle of Cooperation is as old as human society.. The Cooperative banks and credit societies perform banking services among the exactly outlined framework of principles. This paper presents to review the expansion of the Hyderabad District Co-operative Central Bank Ltd., through selective indicators. To achieve the objectives of this paper, secondary data has been used. For analysis various statistical tools were applied. Analysis is focused on Deposits, credits outstanding, Borrowings, Investment, Capital, Reserves and Profit and losses of the HDCCB to evaluate the financial performance.

**Keywords:** Hyderabad District Co-operative Central Banks (HDCCBs), Deposits, Loan outstanding, Capital, Borrowings, Investment, Reserves and profit and Loss.

### **Introduction**

A Co-operative Bank is a financial entity which belongs to its members, who are the owners and the customers of their bank. Simultaneously Cooperative banks and Credit Societies perform mainly banking services within the precisely defined framework of noble principles. Just like commercial banks, they accept all types of deposits and lend loans of different types usually to farmers and rural traders. The New Economic Policy, 1991, under the agreement established by World Trade Organization (WTO) came into force in 1995 brought Growth of District Co-operative Banks in India after New Economic Policy.

### **Definitions**

**Dr. C. R. Fay**<sup>1</sup> from the socio-economic standpoint defines co-operative society as “*an association for the purpose of joint trading, organizing among the weak & conducted always in an unselfish spirit, on such terms that all who are prepared to assume the duties of membership may share in its rewards in proportion to the degree in which they make use of their association.*”

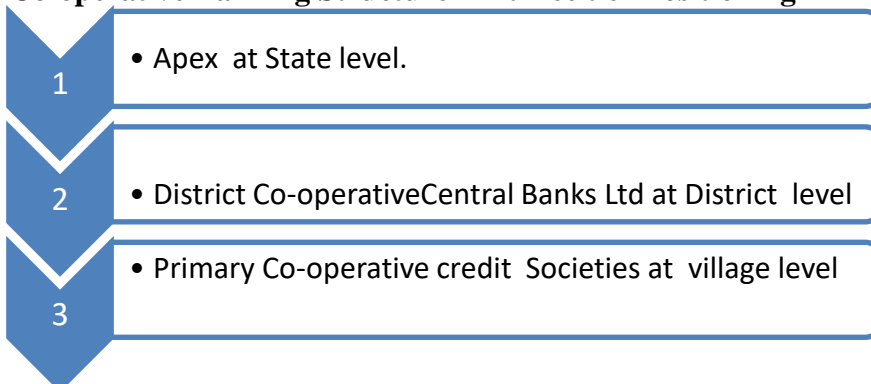
According to **Mr. Herrick**<sup>2</sup> “*Co-operation is the act of persons voluntarily united, of utilizing reciprocally their own forces, resources, or both under their mutual management to their common profit or loss.*”

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### **Co-operative Banking Structure - A three tier Positioning**



**Source: Compiled by the Researcher**

#### **Hyderabad District Co-operative Central Bank(HDCCB)**

The Hyderabad District Co-operative Central Bank was established on 20.12.1957 in Andhra Pradesh and operation began from 17.04.1958. The HDCCB at present is falls within the territorial jurisdiction of the newly formed 29<sup>th</sup> State of India the "TELANGANA STATE". At present the bank serving two districts namely Hyderabad (Urban) and Ranga Reddy District. There is no Agricultural lending's in Hyderabad District as there is no agriculture cultivation being Urban. Most of the Agricultural needs of the Ranga Reddy District are being met by the District Co-operative Central Bank (DCCB).

The Bank has been mobilizing funds by way of deposits from individuals, Institutions and Societies and borrowing funds from Telangana State Co-operative Apex Bank(TSCAB) in order to meet the credit needs of members Agriculturists, weavers, consumers, employees through respective Co-operative Societies.

#### **HDCCB sanctions Loans for the following activities**

The Bank has also extending credit to individual's and for other activities

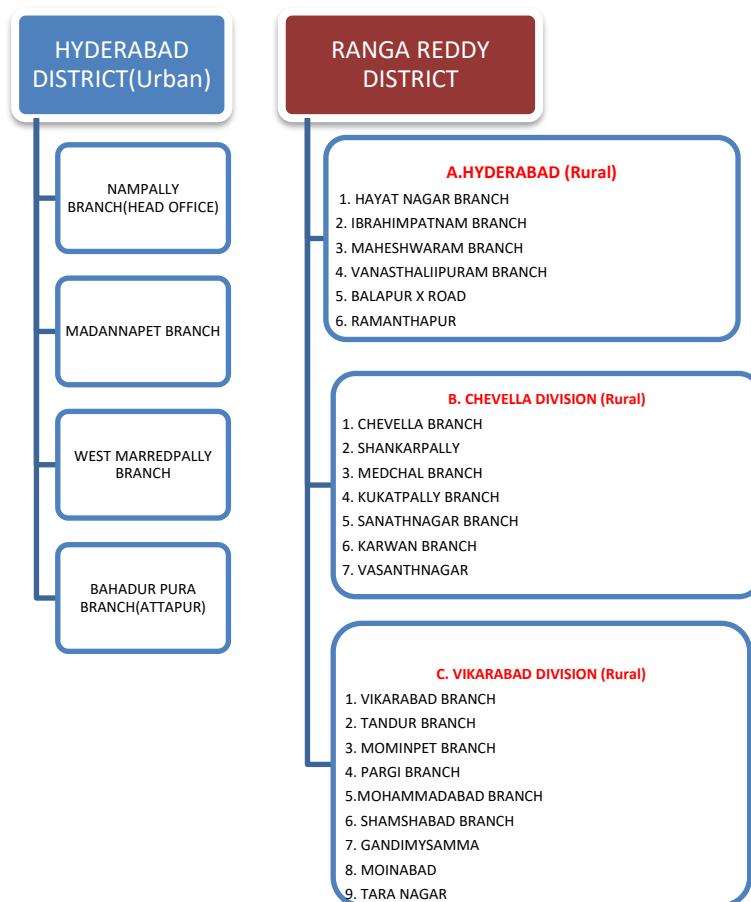
- Gold Loans
- Personal Loan,
- Non Farm Sector Loans
- Housing Loans
- CMEY
- Self Help Groups(Women)
- Weavers
- Agriculturists
- Consumers
- employees
- Education Loans.

A part from these facilities bank also extending facilities such as lockers, issue of Pay Orders & Demand Draft and other Banking Services. The network of HDCCB is through Twenty Six Branches.

#### **HDCCB's Network**

HDCCB is working through its net work spread in two districts namely Hyderabad urban and Rangareddy districts. The State of Telangana has thirty one districts; however its operations are limited to two districts only. The banks net working is shown below:





Source: The Hyderabad District Co-operative Central Bank handbook and Compiled by the Researcher

### Review of Literature

Tirupathi Kanchu (2012)<sup>3</sup> in his research paper "Performance Evaluation of DCCBs in India – A Case Study " examined the growth of DCCBs in India through selective indicators. It Analysis the deposits, credits and C/D ratios of DCCBs. This research paper also studies the growth of investment, working capital and cost of management which reflect the position in DCCBs.

Dr. Mrs. Ratna and K.Nimbalkar (2011)<sup>4</sup> analyzed on "A Study of NPA's - Reference to Urban Co-Operative Banks" Focused on urban co-operative banks facing keen competition with public sector banks and private sector banks, particularly after globalization in 1991. At the same time these banks are facing the problem of Non-Performing Assets also.

Dr.Gurcharan Singh and Sukhmani (2011)<sup>5</sup> studied on "An Analytical Study of Productivity and Profitability of District Central Cooperative Banks in Punjab" focused on evaluating performance of cooperative banks in the state of Punjab.

Kumar Sabina (2008)<sup>6</sup> analyzed on "Management of Non-Performing Advances – A Study of District Central Co-operative Banks of Punjab". An Unpublished Ph.D Thesis, Submitted to HP University, Shimla. Study based on a sample of ten DCCBs, i.e., five with high level of NPAs and five with low level of NPAs, was taken for the study.

Dutta Uttam and Basak Amit (2008)<sup>7</sup> “**Appraisal of financial performance of urban cooperative banks- a case study.**” The Management Accountant, case study, in his paper suggested that Co-operative banks should improve their recovery performance, adopt new system of computerized monitoring of loans, implement proper prudential norms and organize regular workshops to sustain in the competitive banking environment.

Harish Kumar Singla (2008)<sup>8</sup> “**Financial performance of banks in India**”, emphasized on financial management and examined the financial position of sixteen banks by considering profitability, capital adequacy, debt-equity and NPA.

**Pal and Malik (2007)**<sup>9</sup> investigated the differences in the financial characteristics of 74 banks in India based on factors, such as profitability, liquidity, risk and efficiency. It is suggested that foreign banks were better performers, as compared to other two categories of banks, in general and in terms of utilization of resources in particular.

**Singh and Singh (2006)**<sup>10</sup> studied on Funds Management in DCCBs of Punjab with special reference to analysis of financial margin. It noted that higher performance of own funds and the recovery concerns have resulted in increasing margin to the Cooperative Banks.

**Mavaluri, Boppana and Nagarjuna (2006)**<sup>11</sup> suggested that performance of banking in terms of probability, productivity, asset quality and financial management has become important to stable the economy. They found that public sector banks have been more efficient than other banks operating in India.

According to **Wim Fonteyne**<sup>12</sup>, explains the continuing success of Co-operative Banks in European Countries through evolving comparative advantages. The paper concludes that some form of independent external oversight of corporate governance is warranted and that cooperatives need mechanisms enabling them to better manage their capital.

### **Objective of the Study**

The study is based on the following objectives:

- ✓ To evaluate the growth of the HDCCB through selective indicators.
- ✓ To analyze the Deposits, credits outstanding, Borrowings, Investment, Capital and Reserves of the HDCCB.

### **Methodology of the Study**

The methodology of the present study is based on secondary data, collected from NABARD, RBI bulletins, Government of India reports and online sources like TSCAB.org, Hyderabadccb.org, NAFCOB etc. Covering a period of 2006-2016 i.e a period of ten years.

### **Statistical Tools**

For the purpose of analysis of the data, various statistical tools like Mean, Standard Deviation, Covariance, CAGR, etc., were used to arrive at scientific conclusion.

### **Analysis of the Study**

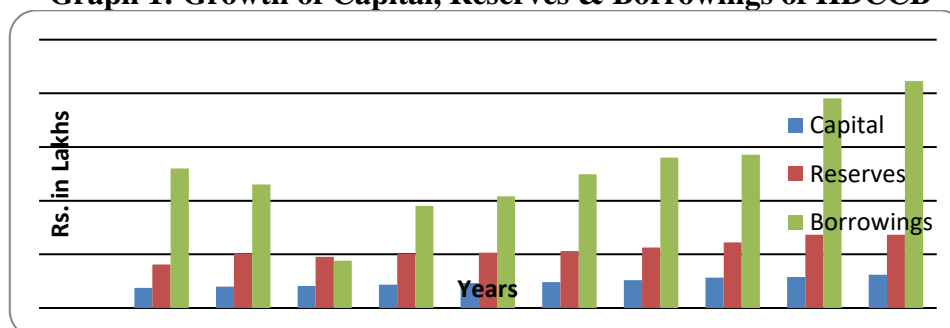
The establishment of Central Co-operative Banks (DCCBs) at the district level was to serve as a link between the ultimate credit disbursing outlets, viz., Primary Agricultural Credit Societies (PACS) at the base level, District Central Cooperative Banks (DCCB) at the intermediate level and State Cooperative Banks (SCB) at the apex level. The details of growth of The Hyderabad District Cooperative Central Bank Ltd., is depicted in table.

**TABLE 1: Growth of Capital, Reserves & Borrowings of HDCCB**  
(Rs. In Lakhs)

Year	Capital (in Lakhs)	Increase /decrease	Reserves (in Lakhs)	Increase / Decrease	Borrowings (in Lakhs)	Increase / decrease
2006-07	1863.74	0	4048.96	0	12986.96	0
2007-08	2007.93	7.74	5059.31	24.95	11500.92	-11.44
2008-09	2060.28	2.79	4781.2	-6.87	4420.63	-54.52
2009-10	2186.55	6.79	5029.07	6.13	9519.33	38.96
2010-11	2313.2	6.8	5169.13	3.46	10415.78	7.2
2011-12	2423.22	5.9	5312.18	3.53	12455.36	15.71
2012-13	2598.47	9.4	5639.65	8.09	14000.27	11.89
2013-14	2837.17	12.81	6098.54	11.33	14294.6	2.27
2014-15	2897.17	3.22	6812.09	17.62	19529.71	40.31
2015-16	3085.57	10.11	6838.94	0.67	21137.73	12.38
<b>Mean</b>	2427.33		5478.91		13026.13	
<b>S.D</b>	<b>415.07</b>		<b>886.351</b>		<b>4789.72</b>	
<b>C.V</b>	<b>17.1</b>		<b>16.18</b>		<b>36.77</b>	
<b>CAGR</b>	<b>0.058</b>		<b>0.06</b>		<b>0.057</b>	

Source: [www.hyderabadccb.org](http://www.hyderabadccb.org), [www.nafsob.org](http://www.nafsob.org)

**Graph 1: Growth of Capital, Reserves & Borrowings of HDCCB**



**Table 1:** reveals that Capital, Reserves & Borrowings of HDCCB, during the year from 2006-07 to 2015-16. During the study period it is found that every year Capital is increased. Average Capital during the year is 2427.33 and Compound Annual Growth rate is 0.057, Standard Deviation and CV are 415.07 and 17.10 respectively. Reserves fluctuate in 2008-09 is 4781.20. Average Reserves during the year is 5478.91 Compound Annual Growth rate is 0.059, Standard Deviation and CV are 886.351 and 16.18 respectively. During the study period Borrowings is fluctuate in the year 2007-08 and 2008-09 is 11500.92 and 4420.63. Average Borrowings during the study period is 13026.13. Compound Annual Growth rate is 0.0556, Standard Deviation and CV are 4789.72 and 36.72 respectively. As compare to Capital and Reserves, Borrowings are more consistences.

It is observed from the table above that Capital is being contributed by the members is showing an upward trend during the study period, and the membership is also increasing every year. This shows a positive trend. This enables for further expansion of its operations.

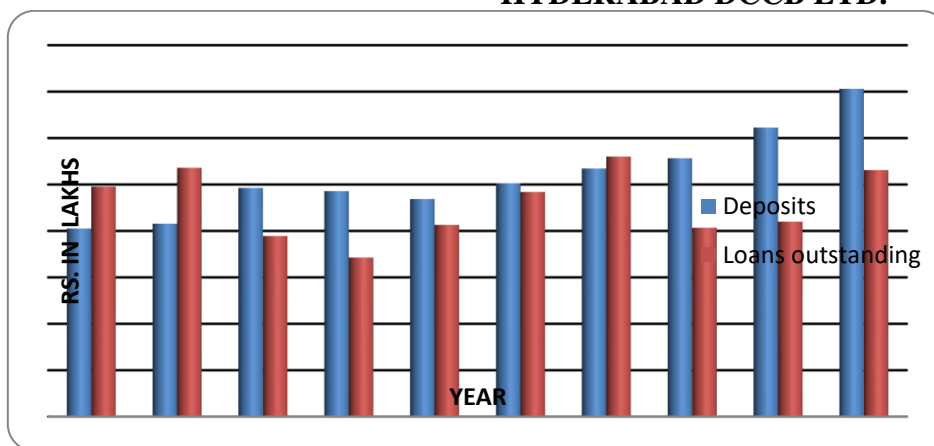
**TABLE 2: DEPOSITS AND LOAN OUTSTANDING OF THE HYDERABAD DCCB LTD.**

(Rs. in lakhs)

Year	Deposits	Increase /Decrease	Loans outstanding	Increase / decrease
2006-07	20270.31	0	24779.59	0
2007-08	20781.55	2.52	26796.7	8.14
2008-09	24638.47	18.56	19453.85	-27.40
2009-10	24289.58	-1.42	17126.65	-11.96
2010-11	23430.93	-3.54	20647.87	20.56
2011-12	25134.05	7.27	24189.76	17.15
2012-13	26713.98	6.29	28004.42	15.77
2013-14	27823.71	4.15	20339.67	-27.37
2014-15	31126.68	11.87	21003.03	3.26
2015-16	35297.02	13.40	26548.67	26.40
<b>Mean</b>	<b>25950.63</b>		<b>22889.02</b>	
<b>S.D</b>	<b>4344.19</b>		<b>3466.71</b>	
<b>C.V</b>	<b>16.74</b>		<b>15.15</b>	
CGAR	1.91		1.30	

Source : : <http://www.tscab.org> ; <http://www.hyderabadccb.org>; [www.nafsob.org](http://www.nafsob.org)

**GRAPH 2: DEPOSITS AND LOANS OUTSTANDING POSITION IN HYDERABAD DCCB LTD.**



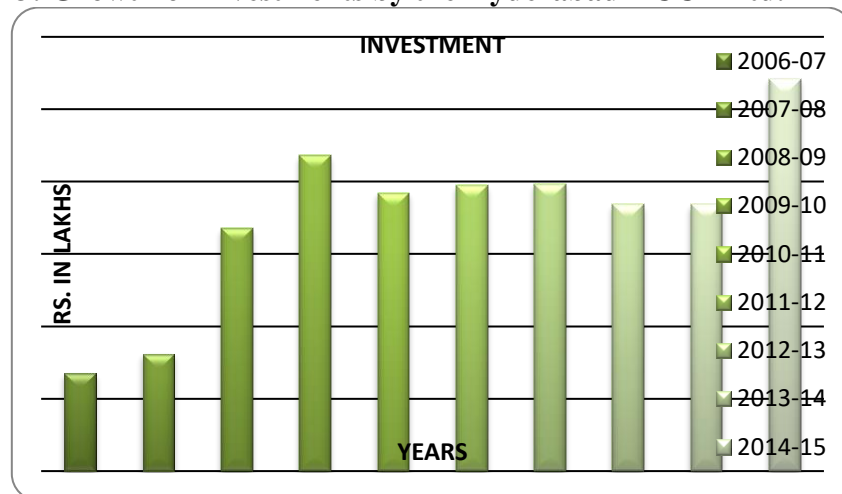
**Interpretation**

**Table 2:** The above table depicted that during the year 2006-07 the Deposits decrease 1.42% in the year 2009-10. In the year 2010-11 again it decrease up to 3.54% .During the study period deposit highest increase is 13.40% .The mobilization of deposits have been increased gradually during the study period, and the average deposits mobilized by bank is 25950.63.Standard Deviation and CV is 4344.19 and 16.74 respectively. Annual Compound Growth rate is 1.91. Whereas Loan outstanding of HDCCBs gradually decreases in the year 2008-09, 2009-10 &2013-2014 with a percentage is 27.40%, 11.96% & 37.37%. During the year 2015-16 it was increases up to 26.40%. The average of loan outstanding is 22889.02, Standard Deviation and CV is 3466.71 and 15.15%. Annual Compound Growth rate is 1.30.

**TABLE 3: Growth of Investments by the Hyderabad DCCB Ltd.**  
(Rs. in lakhs)

Year	INVESTMENT	Increase / Decrease
2006-07	6763.68	nil
2007-08	8091.76	19.64
2008-09	16762.81	107.16
2009-10	21786.62	29.97
2010-11	19211.26	-11.82
2011-12	19721.59	2.66
2012-13	19821.46	0.51
2013-14	18419	-7.08
2014-15	18419	0.00
2015-16	27098	47.12
<b>Mean</b>	17609.52	
<b>S.D</b>	6052.05	
<b>C.V</b>	34.37	
<b>CAGR</b>	0.17	

**GRAPH 3: Growth of Investments by the Hyderabad DCCB Ltd.**



**Interpretation**

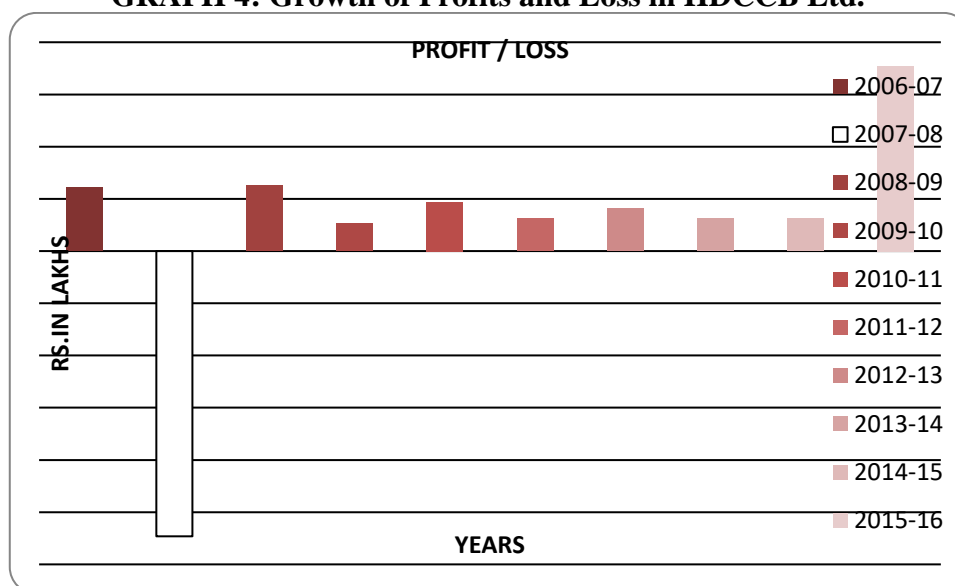
**Table 3:** Hyderabad DCCB Ltd. has been investing its funds in different avenues like Govt. Securities, Other trustee securities, purchasing Debentures of Land Development Banks, fixed deposits and other investments. The growth pattern of investment by the HDCCB Ltd., the investment in 2006-07 is Rs. 6763.68 lakhs and it has been recorded Rs. 16762.81 lakhs in the year 2008-09 with a growth rate 107.16%. The average investment of the bank is 17609.52 lakhs during the study period. The Standard Deviation is 6052.05 and the C.V is 34.37. The Average Compound Growth rate is 0.17.

**TABLE 4: Growth of Profits and Loss in HDCCB Ltd.**

(Rs. in lakhs)

Year	Profit / Loss	Increase / Decrease
2006-07	244.99	NIL
2007-08	-1092.55	-545.96
2008-09	249.94	-122.88
2009-10	106.84	-57.25
2010-11	187.87	75.84
2011-12	123.83	-34.09
2012-13	161.95	30.78
2013-14	124	-23.43
2014-15	124	0.00
2015-16	709	471.77
<b>Mean</b>	<b>93.987</b>	
<b>S.D</b>	<b>430.06</b>	
<b>C.V</b>	<b>457.57</b>	
<b>CAGR</b>	<b>0.13</b>	

**GRAPH 4: Growth of Profits and Loss in HDCCB Ltd.**



**Interpretation**

**Table 4:** reveal growth pattern of profits in H DCCB Ltd., the profit in 2006-07 is Rs. 244.99 lakhs and during the year 2007-08 Bank have very huge loss is Rs. 1092.55 lakhs in 2007-08, afterwards it has been increased and decrease year by year and recorded Rs. 706 lakhs in the year 2015-16 with a growth rate 471.77% .The average profit of the bank is 93.987 lakhs during the study period. The Standard Deviation is 430.06 lakhs and the C.V is 457.57. The Average Compound Growth rate is 0.13 which is very low.

**Findings**

- The members of the bank increased through its membership which resulted in the increase of capital. The share of State Government is minimal.
- The Bank should maintain the minimum liquidity of 15%, which it is often failing.



- Borrowing by members can be expanded by restructuring the interest rate policy & term period.
- The deposit mobilization can be increased by expanding its operations in the other districts of Telangana.
- Investment policy of the bank is safe.

#### **Suggestions**

- Since Government share in the total capital of the Bank is nominal. The main purpose of the keeping Government share in the total capital of the Bank is to build-up confidence among the public.
- The Bank should start deposit schemes such as kiddy banks, Weekly saving schemes, Daily saving schemes, Women Deposit schemes, Student deposit schemes, Marriage deposit schemes, Pension deposit schemes, Reinvestment deposit scheme etc.,
- The Bank should try to upgrade technology. It should adopt the modern methods of banking like internet banking, credit cards, ATM, etc.
- The Bank should open a separate department to take the responsibility of expanding the banking business, conducting the marketing surveys, publicity, improving the public relations etc.,

#### **Conclusion**

The financial performance of Hyderabad District Co-operative Central bank Ltd., can have improved performance by spreading it to all the new districts of the state, as a result it can maintain the prescribed percentage of reserves, deposit mobilization increases by increasing the interest rates on fixed deposits and safe investments makes the bank operations successful and increases its profitability, as of now it has a satisfactory performance during the study period, as a final say it has a great scope to improve and expand its operations during the study period.

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## **Environmental Awareness among Prospective Teachers and Prospective Managers: A Comparative Study**

**MANMOHAN GUPTA\***

### **Abstract**

Air and water pollution have reached such levels that have already resulted in serious health problems, as well as negative impact on the environment, and inevitably influencing prospects for long term economic growth (Krishnamacharayulu and Reddy, 2005). Environmental problems are not the problems of India only but the whole globe is facing this problem. It is very important to make the whole society conscious about environment. Education is a magical medium for changing human's behavior. Undoubtedly, education plays a very important role in human's life. Environmental education is the study of man to see that how he shapes his total natural and cultural surrounding for good or ill. The philosophy of environmental education asserts that man is an integral and inseparable component of the environment and eco-system. He interacts with biotic and abiotic environment. An understanding of biotic and abiotic environment i.e. eco-system is necessary in order to keep it living sustainable such as understanding could be made possible through an education system which clearly explains the structure and function of eco-system and its management. It is only environmental education which can make human beings conscious about environment and environmental problems.

***Key words:- environmental awareness, prospective teachers, prospective managers***

### **Introduction**

Human beings live on earth and earth's environment is created by all living and non living components. All the factors of the environment are flexible and keep changing continuously. In recent years, due to the development of technology, our environment is getting disturbed. It has now been accepted that the main cause of environmental degradation is depletion of natural resources. This situation is not only facing by India but the whole globe is affected by this problem. Our country India is a developing nation. But problems are also becoming larger in size. In the age of technological revolution, the needs of human being are increasing fast. The human being is destroying the nature. Because of this, human being is facing the drought, floods, earthquake etc. All these problems created drastic conditions for human beings to survive on the earth (Gohar et.al, 2005). Plastic has become a very important part of man's life. It is the material, which is used from a pen refill to parts of an aeroplane. Today we are using bottles, packaging and poly bags in daily life. But this plastic is polluting our environment. Environmental problems have reached up to a level where almost every one is conscious of them. This raising consciousness has also given rise to wide speed responsiveness to the idea for the need to do something about it (Chhokar, 2000).

Thus prospective teachers must have awareness about environment. Because the future of a country depends on how aware PT's are towards environmental problems. Similarly, managers have the responsibility of producing eco friendly products. They must know how

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and to what extent unplanned production can devastate the environment. Thus prospective managers have to be aware about environment as much as PT's are be. Hence it is necessary to know how far the prospective teachers and prospective managers are aware about environment and environmental problems.

### **Significance of the Study**

Man is a very important part of environment. He is an inseparable component of environment and eco-system (Reddy 1998). The system has become from five elements-air, water, land, flora and fauna. But today our environment is getting polluted. Human beings can not live a normal life without clean and healthy environment. We are cutting forests, destroying vegetation resulting in changed weather conditions, causing draughts, floods and extinction of rare species of plants animals and birds (Thakur, 1999). Various kinds of environmental pollution are created by human being. Human civilization is solely responsible for various kinds of environmental pollution like noise pollution, air pollution, water pollution etc. Various policy has been adopted from time to time to control it. The researcher feels that the best technique to control the pollution is creating awareness among the society. The level of awareness among society will decide the level of control on environmental pollution. In the proposed study, an attempt will be made to analyse the awareness level relating to environment among prospective teachers and prospective managers.

### **Statement of the Problem**

The problem of proposed study may be stated as:

*“Environmental Awareness among Prospective Teachers and Prospective Managers: A comparative study”*

### **Objectives**

The present study was based on the following objectives:

- (1) To study the Environmental awareness among prospective teachers and prospective managers.
- (2) To investigate the environmental awareness of male prospective teachers and male prospective managers.
- (3) To assess the environmental awareness of female prospective teachers and female prospective managers.
- (4) To compare the environmental awareness of rural background prospective teachers and rural background prospective managers.
- (5) To study the environmental awareness of urban background prospective teachers and urban background prospective managers.
- (6) To compare the environmental awareness of prospective teachers and prospective managers having graduation qualification.
- (7) To investigate the environmental awareness of prospective teachers and prospective managers having post graduation qualification.

### **Hypotheses**

The present study was based on the basis of following hypotheses:

1. There is no significant difference between the level of environmental awareness of prospective teachers and prospective managers.
2. There is no significant difference between the environmental awareness of male prospective teachers and male prospective managers.

3. There is no significant difference between the environmental awareness of female prospective teachers and female prospective managers.
4. There is no significant difference between the environmental awareness of rural background prospective teachers and rural background prospective managers.
5. There is no significant difference between the environmental awareness of urban background prospective teachers and urban background prospective managers.
6. There is no significant difference between the environmental awareness of prospective teachers and prospective managers having graduation qualification.
7. There is no significant difference between the environmental awareness of prospective teachers and prospective managers having post graduation qualification.

### **Review of Related Literature**

Gihar&Saxena (2008) in their study conducted that in all programmers that in at promoting environmental awareness greater attention must be given to rural women. As the level of education among rural woman is generally lower than that of urban woman the curriculum and the methods of transacting, it will have to be suitably adopted. The researchers suggested that non formal methods will be more appropriate for them.

Saxena&Gihar (2010) conducted a study to investigate the environmental consciousness among senior secondary students of Ghaziabad district of Uttar Pradesh state. The researcher concluded that urban students have scored higher mean values than their rural counterparts in respect to their consciousness level about environmental pollution and protection.

Kalpna Thakur (2012) conducted a study on Environmental awareness among senior secondary school students of Chandigarh. The study was conducted on the sample of 200 senior secondary students from four schools of Chandigarh and data was collected through descriptive survey method. The major findings were 1.Students of government and private schools exhibited comparable environmental awareness.2. Science students exhibited very high degree of environmental awareness than students opting for humanities.3. Male science students exhibited higher degree of environmental awareness than female science students but overall no significant difference was found between male and female students. From a more global perspective, gender differences in environmental attitude at higher education level have converged on females that are more sensitive toward environmental issues. For example, Fernandez- Manzanal et al. (2007) revealed that female students have higher scores than male students on the attitudes scale, especially in the factors of the need for conservation and environmentally favorable behavior.

### **Research Design**

#### **Methodology**

The present study was descriptive in nature; therefore, the survey method is adopted to collect the data.

#### **Population**

All the students studying in B.Ed. course and MBA course being offered by colleges situated in Saharanpur District will constitute the population for present study.

#### **Sample and Sampling Technique**

To select the sample for present study, the researcher was selecting the sample of prospective teachers & prospective managers by multi style random sampling technique. In the first phase of sample selection, 4 colleges who are offering MBA & 4 colleges who are offering B.Ed. course situated in Saharanpur district was selected. In the second phase of



sample selection 20 students of each college was selected keeping in view their sex, locality and their basic qualification. Hence 80 prospective teachers and 80 prospective managers were selected. Hence total sample was consisting of 160 prospective teachers and prospective managers.

**Tool Used**

To get the meaningful results from the study, the researcher has used Environmental Awareness Scale which is developed and standardized by Mrs. Ritu (M.Ed. student) and her guide Dr. Manoj Kumar Saxena. It has 50 items spread over 02 dimensions viz- causes of pollution & effects of pollution.

**Scoring Procedure of Environmental Awareness Scale**

The Environmental Awareness Scale having 50 items of which 30 of them positive statements and the remaining 20 were negative statements. Each statement is set against five point scale of Strongly Agree, Agree, Undecided, Disagree, Strongly Disagree and weight of 5, 4,3,2,1 are given in that order for the positive statement and the scoring is reverse for the negative statements. An individual score is sum of all the scores of the 50 items.

**Scoring For Positive Statements**

- 5 for Strongly Agree opinion (SA)
- 4 for Agree opinion (A)
- 3for Undecided opinion (U)
- 2 for Disagree opinion (D)
- 1 for Strongly Disagree opinion (SD)

**Scoring For Negative Statements**

- 1 for Strongly Agree opinion(SA)
- 2 for Agree opinion(A)
- 3 for Undecided opinion(U)
- 4 for Disagree opinion(D)
- 5for Strongly Disagree opinion(SD)

The sample prospective teachers & prospective managers were asked to tick any one response out of given five alternatives for each statement. There are total 50 items in the present awareness scale. The maximum possible scores on the whole attitude were 250 and the minimum possible scores were 50.

**Statistical Analysis**

To get the meaningful results from the study the researcher used mean, standard deviation and t-test to analysis the data.

**Mean & S.D. Scores of Prospective Teachers & Prospective Managers on Environmental Awareness Scale (EAS)**

DIMENSION	NO. OF PROSPECTIVE TEACHERS	NO. OF PROSPECTIVE MANAGERS	M <sub>1</sub>	M <sub>2</sub>	SD <sub>1</sub>	SD <sub>2</sub>	“t” value	Level of significant
Causes of Pollution	80	80	104.55	102.41	4.509	6.405	2.441	<b>0.05 level</b>
Effects of Pollution	80	80	104.52	107.18	5.763	10.471	1.983	<b>0.05 level</b>



<b>TOTAL</b>	80	80	209.09	209.59	5.967	11358	0.349	<b>N.S</b>
<b>Causes of Pollution</b>	40 MALE	40 MALE	104.78	101.85	4.812	7.382	2.099	<b>0.05 LEVEL</b>
<b>Effects of Pollution</b>	40 MALE	40 MALE	103.22	106.68	6.074	12.081	1.620	<b>N.S</b>
<b>TOTAL</b>	40 MALE	40 MALE	208.02	208.52	5.946	13.696	0.212	<b>N.S</b>
<b>Causes of Pollution</b>	40 FEMALE	40 FEMALE	104.32	102.98	4.233	5.289	1.260	<b>N.S</b>
<b>Effects of Pollution</b>	40 FEMALE	40 FEMALE	105.82	107.68	5.188	8.783	1.147	<b>N.S</b>
<b>TOTAL</b>	40 FEMALE	40 FEMALE	210.15	210.65	5.868	8.451	0.307	<b>N.S</b>
<b>Causes of Pollution</b>	40 RURAL	40 RURAL	104.25	101.68	4.533	6.431	2.070	<b>0.05 LEVEL</b>
<b>Effects of Pollution</b>	40 RURAL	40 RURAL	104.52	106.40	5.822	12.596	0.855	<b>N.S</b>
<b>TOTAL</b>	40 RURAL	40 RURAL	208.80	208.08	5.422	13.442	0.316	<b>N.S</b>
<b>Causes of Pollution</b>	40 URBAN	40 URBAN	104.85	103.15	4.521	6.375	1.376	<b>N.S</b>
<b>Effects of Pollution</b>	40 URBAN	40 URBAN	104.52	107.95	5.778	7.887	2.216	<b>0.05 LEVEL</b>
<b>TOTAL</b>	40 URBAN	40 URBAN	209.38	211.10	6.523	8.714	1.002	<b>N.S</b>
<b>Causes of Pollution</b>	40 UNDER GRADUATE	40 UNDER GRADUATE	104.82	102.68	4.332	6.306	1.777	<b>N.S</b>
<b>Effects of Pollution</b>	40 UNDER GRADUATE	40 UNDER GRADUATE	104.42	109.05	5.387	7.884	3.063	<b>0.01 LEVEL</b>
<b>TOTAL</b>	40 UNDER GRADUATE	40 UNDER GRADUATE	209.25	211.72	5.546	8.506	1.542	<b>N.S</b>
<b>Causes of Pollution</b>	40 UNDER POST GRADUATE	40 UNDER POST GRADUATE	104.28	102.15	4.718	6.573	1.661	<b>N.S</b>
<b>Effects of Pollution</b>	40 UNDER POST GRADUATE	40 UNDER POST GRADUATE	104.62	105.30	6.184	12.358	0.309	<b>N.S</b>
<b>TOTAL</b>	40 UNDER POST GRADUATE	40 UNDER POST GRADUATE	208.92	207.45	6.427	13.401	0.628	<b>N.S</b>

**Findings of Study**

The first null hypothesis that there is no significant difference between prospective teachers and prospective managers towards environment is partially accepted and partially rejected. The findings related to above hypothesis are as follows:

- There were significant difference between prospective teachers and prospective managers on causes of pollution dimensions of EAS.
- There were significant difference between prospective teachers and prospective managers on effects of pollution dimensions of EAS.
- There were no significant difference between prospective teachers and prospective managers on environmental awareness scale.

The second null hypothesis that there is no significant difference between male prospective teachers and male prospective managers towards environment is accepted and rejected.

The findings related to above hypothesis are as follows:

- There were significant difference between male prospective teachers and male prospective managers on causes of pollution dimensions of EAS.
- There were no significant difference between male prospective teachers and male prospective managers on effects of pollution dimensions of EAS.
- There were no significant difference between male prospective teachers and male prospective managers on environmental awareness scale.

The third null hypothesis that there were no significant difference between female prospective teachers and female prospective managers towards environment is accepted and rejected. The findings related to above hypothesis are as follows:

- There were no significant difference between female prospective teachers and female prospective managers on causes of pollution dimensions of EAS.
- There were no significant difference between female prospective teachers and female prospective managers on effects of pollution dimensions of EAS.
- There were no significant difference between female prospective teachers and female prospective managers on environmental awareness scale.

The fourth null hypothesis that there were no significant difference between rural prospective teachers and rural prospective managers towards environment is accepted and rejected. The findings related to above hypothesis are as follows:

- There were significant difference between rural prospective teachers and rural prospective managers on causes of pollution dimensions of EAS.
- There were no significant difference between rural prospective teachers and rural prospective managers on effects of pollution dimensions of EAS.
- There were no significant difference between rural prospective teachers and rural prospective managers on environmental awareness scale.

The fifth null hypothesis that there were no significant difference between urban prospective teachers and urban prospective managers towards environment is accepted and rejected. The findings related to above hypothesis are as follows:

- There were no significant difference between urban prospective teachers and urban prospective managers on causes of pollution dimensions of EAS.
- There were significant difference between urban prospective teachers and urban prospective managers on effects of pollution dimensions of EAS.
- There were no significant difference between urban prospective teachers and urban prospective managers on environmental awareness scale.

The sixth null hypothesis that there were no significant difference between prospective teachers and prospective managers having graduation qualification towards environment is accepted and rejected. The findings related to above hypothesis are as follows:

- There were no significant difference between prospective teachers and prospective managers having graduation qualification on causes of pollution dimensions of EAS.
- There were significant difference between prospective teachers and prospective managers having graduation qualification on effects of pollution dimensions of EAS.
- There were no significant difference between prospective teachers and prospective managers having graduation qualification on environmental awareness scale.

The seventh null hypothesis that there were no significant difference between prospective teachers and prospective managers having post graduation qualification towards environment is accepted and rejected. The findings related to above hypothesis are as follows.

- There were no significant difference between prospective teachers and prospective managers having post graduation qualification on causes of pollution dimensions of EAS.
- There were no significant difference between prospective teachers and prospective managers having post graduation qualification on effects of pollution dimensions of EAS.
- There were no significant difference between prospective teachers and prospective managers having post graduation qualification on environmental awareness scale.

### **Educational Implications**

The present study has assessed the environmental awareness of prospective teachers and prospective managers. The environmental protection becomes an urgent need of the hour in present scenario. Now, the time has come to implement the corrective measures to protect the environment.

Furthermore the study makes contribution through its findings by revealing the difference between various groups of students so far as their awareness about environment is concerned.

- 1) On the basis of the results of this study it is suggested that the institutional of learning should organize some seminars and conferences on environment related problems and their remedies. In order to improve environmental awareness of students, their participation should be made mandatory in such events.
- 2) Programme related to environmental awareness should be organized, so that students will acquaint themselves to the different aspects of environment such as environmental legislation, mass movement, and environmental management ecological balance waste management.
- 3) The college should also invite environmentalists for sharing their views with the students.
- 4) This study will encourage students to take some corrective measures such as plantation, waste management and recycling etc. to reduce environmental problems.
- 5) Environmental education should be made compulsory at all levels of education.
- 6) Environmental clubs should be constituted in the colleges/universities.
- 7) Teachers should come forward to make people aware about the environment through environmental awareness programme such as nukaad natak etc.

### **Suggestions for Further Researches**

Hindrances from time, economy and available resources made the study to this extent. There is great scope of elaboration on the present topic in the course of further research.

- 1) Due to lack of time and resources the study has been conducted only in Saharanpur district. Further researchers may take other districts too.
- 2) This study was restricted to the prospective teachers & prospective managers. The students of other streams such as Arts, Commerce, and Computer Application may also be included in the next study.
- 3) This study was based on under graduate students & post graduate students.
- 4) This study was based on the college students. A similar study may also be conducted on school students.

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#### **About The Author**



- **Manmohan gupta** received Bachelor of Education (B.Ed.) degree from C.D.L. College of education, Yamuna Nagar, Haryana, India in 2010 and master of Education (M.Ed.) degree from M.M. College of Education, Mullana, Ambala Haryana, India in 2011. He had done M.A. with sociology from ch. Charan Singh University, Meerut, U.P., India and M.A. with English from Shobhit University, Gangoh, Saharanpur, U.P., India. He has submitted his Ph.D. Thesis to MEWAR UNIVERSITY, Chittodgarh, Rajasthan. He has good teaching experience in teacher education.
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## **Growth of FDI in India – An Analytical Review**

**Ms. Maheshwari. M\***

### **Abstract**

**“FDI is a responsibility for Indians & an opportunity for the world. My definition of FDI for the people of India is ‘FIRST DEVELOP INDIA’ ” – Narendra Modi**

India is the largest democracy and is fourth largest economy in terms of purchasing power parity in the world. India with its stable expansion concert and abundant high-skilled manpower provides vast occasion for investment, both domestic and foreign Investment in India and it can be made by both non-resident as well as resident Indian entities. Any non-resident investing in an Indian company is FDI. FDI is an investment made by a concern or entity based in one country into a concern or entity based in another country. FDI has helped the Indian economy rise and the government continues to support more investments of this kind. Attracting FDI has become an integral part of the economic development strategies for India. The study intends to examine the growth of FDI since 2000 with a view to understand the prospects for inflow in future.

**Key Words: Foreign Direct Investment, Annual Growth Rate, Economy...**

### **Introduction**

According to the International Monetary Fund (IMF), Foreign Direct Investment, commonly known as FDI, “it refers to an investment made to acquire lasting or long-term interest in enterprises operating outside of the economy of the investor”. The investment is undeviating because the investor, which could be a foreign individual, business or group of entities, is seeking to control, manage, or have noteworthy influence over the foreign enterprise.

FDI is the investment made by an enterprise of one country in an enterprise resident in another country. It is considered to be the lifeblood of economic development especially for the developing and underdeveloped countries. It plays an important role in the long – term development of an economy through transfer of technology and innovative ideas, strengthening infrastructure, raising productivity and generating new employment opportunities, improving country’s trade balance, increasing labour standards and skill and the general business climate. In India, FDI is considered as a development tool, which can helps in developing the economy by generating employment to the unemployed, generating revenues in the form of tax and incomes, financial stability to the government, development of infrastructure, rearward and onward linkages to the domestic firms for the requirements of raw materials, tools, business infrastructure, and act as support for financial system. Onward and reverse linkages are developed to support the foreign firm with provider of raw and other requirements. It helps in generation of employment and also helps poverty obliteration. For this purpose in 1948, the Jawaharlal Nehru government launched a policy to gratify the foreign investor and gave them assurance that there will be no discrimination between foreign and Indian capital.

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### **Objectives**

The main objective of the study is to analyze the growth of FDI inflows in India from the year 2000-2015 through Trend analysis.

### **Research Methodology**

Research is a scientific and systematic search for relevant information on a specific subject, in this study the data has been collected on the growth of the FDI which has been acquired from secondary data collected from the years 2000-01 to 2014-15. Trend analysis has been used to establish a strong foundation for the study.

### **Analysis & Interpretation - Trend Analysis**

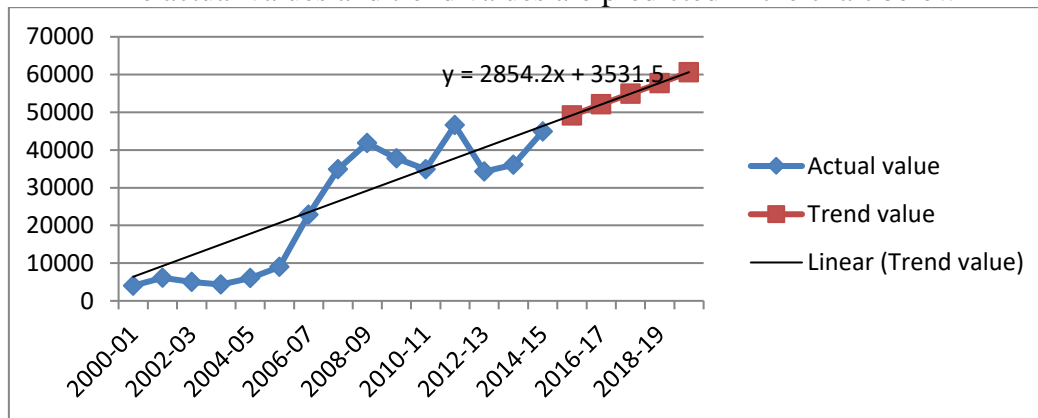
Trend analysis is a mathematical technique that uses historical results to predict future outcome. This is achieved by tracking variances in cost and schedule performance. It is a method of time series data involving the comparison of the same item to detect the general pattern of relationship between associated factors or variable and predict the future. Trend Analysis eliminates potential error by utilizing precise calculations in order to provide the utmost accuracy. It is the most dependable and efficient method for anticipating possible future behavior and desired outcome. This method involves making a comparison between what will happen and what happened.

**TABLE - TREND ANALYSIS & FDI INFLOWS**

<b>YEAR</b>	<b>ACTUAL VALUE</b>	<b>TREND VALUE</b>
<b>2000-01</b>	<b>4029</b>	
<b>2001-02</b>	<b>6,130.00</b>	
<b>2002-03</b>	<b>5035</b>	
<b>2003-04</b>	<b>4322</b>	
<b>2004-05</b>	<b>6051</b>	
<b>2005-06</b>	<b>8,961.00</b>	
<b>2006-07</b>	<b>22,826.00</b>	
<b>2007-08</b>	<b>34,843.00</b>	
<b>2008-09</b>	<b>41,873.00</b>	
<b>2009-10</b>	<b>37,745.00</b>	
<b>2010-11</b>	<b>34,847.00</b>	
<b>2011-12</b>	<b>46,556.00</b>	
<b>2012-13</b>	<b>34,298.00</b>	
<b>2013-14</b>	<b>36,046.00</b>	
<b>2014-15</b>	<b>44,877.00</b>	
<b>2015-16</b>		<b>49146.93</b>
<b>2016-17</b>		<b>52105.2</b>
<b>2017-18</b>		<b>54943.16</b>
<b>2018-19</b>		<b>57746.63</b>
<b>2019-20</b>		<b>60597.43</b>

The trend values has been calculated from 2000-01 to 2019-20 and a mere estimation has been found for the year 2016 to 2020. The FDI in the year 2000 is Rs. 4029 crore and it has been increased to Rs. 44877 crores in the year 2015. In case of future prediction, the estimated FDI amounts to Rs. 49146 crores in the year 2016, Rs. 52105.2 crores in the year 2017, and Rs. 54943.16 crores in 2018, Rs. 57746.63 crores in the year 2019 and Rs. 60597.43 crores in the year 2020.

The actual values and trend values are predicted in the chart below



### Conclusion

FDI has helped the Indian economy grow and the government continues to encourage more investments of this sort. Attracting FDI has become an integral part of the economic development strategies for India. FDI Policy permits FDI up to 100 percent from foreign/NRI investor without prior approval in most of the sectors including the services sector under automatic route. FDI in sectors/activities under automatic route does not require any prior approval either by the Government or the RBI.

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## **Contribution of Information Technology Industries in Indian Economy**

**Dr. Rupal Patel\***

**Radhika Sunilkumar Joshi\*\***

### **Abstract**

Indian economy has become IT hub in the world economy. India has one of the largest English speaking populations in the world and for labor-intensive industries like call centers, India is ideal destination for outsourcing. IT industry in India has two major components: IT services and business process outsourcing (BPO) The sector has increased its contribution to India's GDP from 1.2% in 1998 to 7.7% in 2017. According to NASSCOM, the sector aggregated revenues of US\$160 billion in 2017 with export revenue standing at US\$99 billion and domestic revenue at US\$48 billion, growing by over 13%. ([www.statista.com/statistics](http://www.statista.com/statistics)) India economy has become a highly prospective world market providing offering numerous opportunities. There is remarkable growth and development in Indian IT industry since 1980s. The contribution of IT industries in GDP, employments and foreign exchange earnings in remarkably increasing. The role of IT Industries in all the sector – primary, Secondary and tertiary in considerably increasing. Indian economy is shifting from governance to e---governance and traditional economy to digital economy. This paper highlights different aspects of the role of information technology in the evolution of India's economy.

**Keywords:** Information Technology; IT Sector, Indian Economy; Digital Economy

### **Introduction**

Information technology (IT) has become one of the most demanding industries in the world economy and key driver of global economic growth. The IT sector has emerged as a major global source of both growth and employment. Today, cutting-edge technologies such as computers, software and artificial intelligence, fiber optics, networks, and standards have an immense impact on information technologies. It can be defined as the use of hardware, services and infrastructure to create, store, exchange and leverage information in its various forms to realize any number of business purpose. IT sector has a remarkable potential for accelerating economic growth of the nation. It has the potential to improve the productivity of almost all sectors of economic development. Information technology has made our governance efficient. The role of IT industry is playing crucial role in economic development of the country.

There are five principal components of IT industry - (i) Online business (ecommerce) (ii) IT services, (iii) ITES (IT Enabled Services) e.g. BPO (iv) Software Products (v) Hardware. All these components are progressing well and are responsible for ongoing growth curve of India's economy with a steady rise in revenues as witnessed in the past few years. IT / ITES industry in India has seen an unparalleled growth since the last decade.

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Various initiatives of Government of India and the State Governments like, liberalization of external trade, elimination of duties on imports of information technology products, setting up of Export Oriented Units (EOU), Software Technology Parks (STP), relaxation of controls on both inward and outward investments and foreign exchange, and Special Economic Zones (SEZ), have helped IT industry to gain dominant position in world's IT scenario. So we can say that the IT industry has matured over the years and has proved to be a major contributor to the global economic growth. It has helped India to emerge as a global IT hub.

**Top 10 Information Technology Companies in India**

There are a number of Information Technology (IT) companies in India. Over the last few decades, top IT sector companies in India have become the global leaders in information technology sector. The Indian IT sector employs more than 40 lakh people and is a \$150+ billion industry. These top Indian IT companies provide solutions to various industries across the globe like manufacturing, retail, government agencies, banking etc. Some of the best Indian IT companies are part of the top software company's world over. Clients of these IT companies come from US, UK, Europe, and APAC and locally in India. Some of the top IT companies in India are TCS, Infosys, Tech Mahindra, Wipro followed by HCL, L&T, Mind tree etc. Here is the list of the top 10 IT companies in India 2018 based on revenues.

**Table 1: Leading Indian IT Firms**

Sr. No.	IT Company
	TCS
	Infosys
	Tech Mahindra
	Wipro
	: HCL Technologies
	L&T Infotech
	Mindtree
	Mphasis
	Oracle Financial Services
	Rolta India

**Table 2 : List of leading IT-BPO firms**

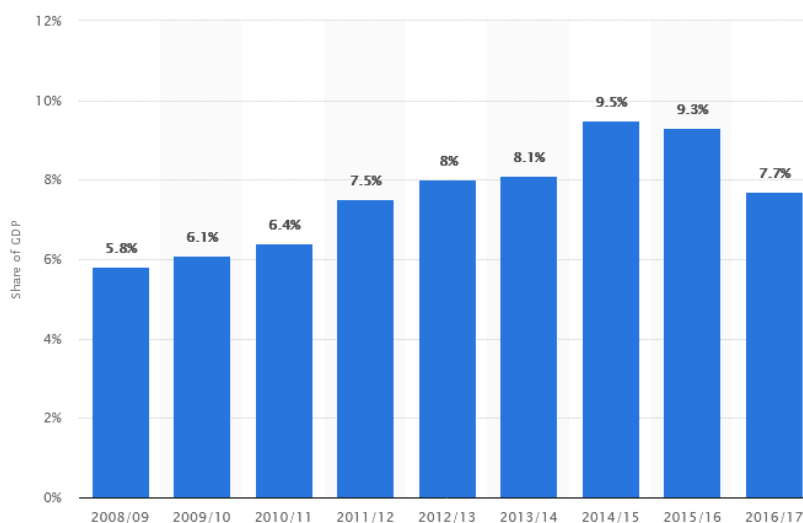
Leading IT-BPO Exporters	Leading BPO Firms	Leading IT-BPO
Tata Consultancy Services Ltd	Genpact India Pvt. Ltd.	Tata Consultancy Services Ltd
Infosys Ltd	Tata Consultancy Services BPO	Infosys Ltd
Wipro Ltd	Aegis Ltd	Cognizant Technology
HCL Technologies Ltd	Wipro BPO	Wipro Ltd.
Mahindra IT & Business	First source Solutions Ltd.	HCL Technologies Ltd
MphasiS Ltd	Aditya Birla Minacs	Mahindra IT & Business
iGate	WNS Global Services (P) Ltd	Genpact Ltd.
Larsen & Toubro Infotech Ltd	Infosys BPO	Serco Global Services
Syntel Ltd	Serco Global Services Ltd	Capgemini India Pvt. Ltd.
CSC, India	EXL Services	Mphasis Ltd.

Polaris Software Lab Ltd	Hinduja Global Solutions Ltd	Aegis Ltd.
MindTree Ltd	HCL Technologies Ltd.-Business	iGate
Zensar Technologies Ltd	Hero Management Service Ltd	Firstsource Solutions Ltd
Infotech Enterprises Ltd	Mphasis Ltd	WNS Global Services (P)
Hexaware Technologies Ltd	Syntel Ltd	CSC, India
KPIT Cummins Infosystems Ltd		Syntel Ltd
Honeywell Technology Solutions Lab Pvt Ltd		exl Services.com (India) Pvt. Ltd.
NIIT Technologies Ltd		Hinduja Global Solutions
3i Infotech Ltd		L&T Infotech
Infinite Computer Solutions (India) Ltd		Convergys India Services Pvt Ltd.

**Contribution to India’s Economy in Terms of GDP**

Indian information technology industry has grown manifold during the period 2009 to 2017 as shown in the graph. The industry has contributed significantly to the economy in terms of GDP, foreign exchange earnings and employments.

**Figure 1: Share of IT companies in GDP in India**



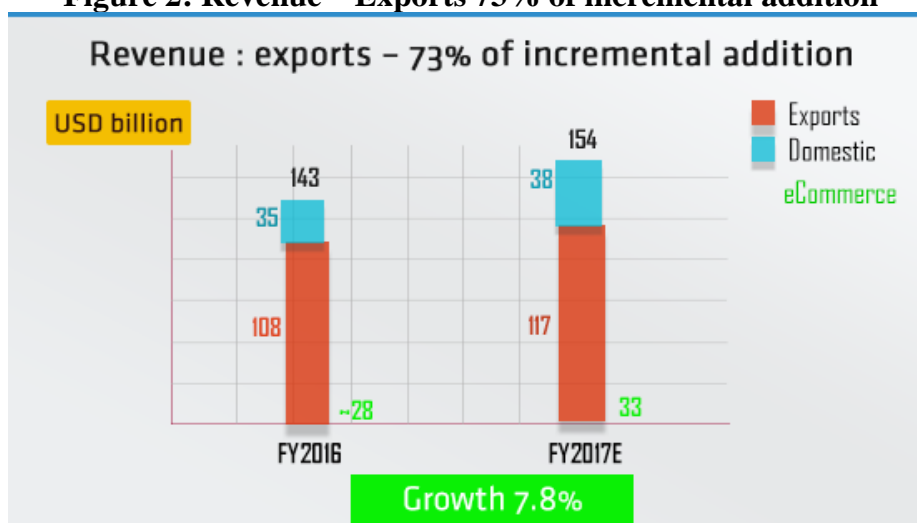
Source: <https://www.statista.com/statistics/320776/contribution-of-indian-it-industry-to-india-s-gdp>

Majority of the Fortune 500 and Global 2000 corporations are sourcing IT-ITES from India. There are around 600 centers set up by Indian IT companies in 78 countries catering to the IT related requirements of people in over 200 cities. They are performing very well and showing remarkable double digit growth in terms of national GDP (NASSCOM analysis reports). India is becoming one of the most preferred destinations for business process outsourcing (BPO) as far as IT enabled services are concerned. These services are boosting Indian economy and this is evident in their contributions to national gross domestic product (GDP). According National Association of Software & Services Companies. India’s near \$167 billion IT services industry is expected to grow 7-9 % in 2019 and Growth for 2017-18 is projected at 7.8 %.

### Generation of Employment Opportunities

The rapid growth of IT industry in India has created a large number of jobs thus raising the socio-economic level of a large number of families. The big and small software companies, BPOs, and other related business centers employ a large number of skilled and even unskilled people. The total employment in IT-ITES industry has been rising over the years and reached around 3.688 million in 2015-16. Around 5% of the employees working in IT-BPO industry come from the economically backward sections of the society. Employment to one person per family brings a large difference to their economic status.

**Figure 2: Revenue – Exports 73% of incremental addition**



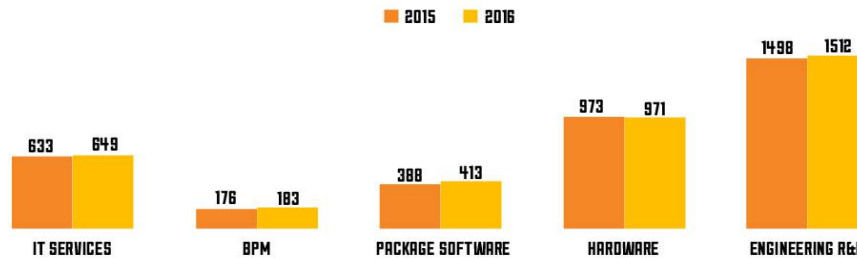
Source: <https://www.nasscom.in/knowledge-center/publications/it-bpm-industry-india-2017-strategic-review>

India's IT-BPM industry is projected to grow ~8% in FY2017 to USD 154 billion. In light of the very disruptive emerging technologies, the industry is re-imagining itself to become the Digital Solutions Partner for the world. This report analyses the IT-BPM market size by segments (IT services, BPM, ER&D, Software Products and e Commerce).

With an aspiration to touch USD 350 Billion in revenue by 2025 from the present USD 143 Billion, India's Information Technology and Business Process Management (IT & BPM) sector has continued to record double digit growth despite static growth in global tech spending. An important growth driver, it contributed 9.3% to India's GDP in FY 2015-16. The industry is known for its cost competitiveness and high quality services across the world and has been instrumental in transforming the perception of India in the global economy. This reflects in India's high market share in the global services sourcing industry which stands at 56% (highest in the world).



**Figure 3: Worldwide IT-BPM Service Growth (USD Billion)**

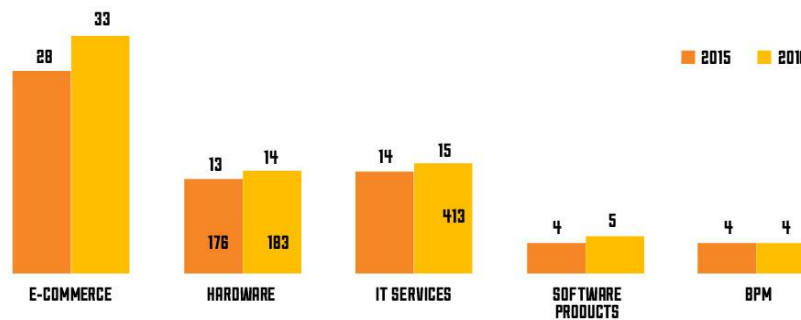


**WORLDWIDE IT-BPM SERVICE GROWTH [USD BILLION]**

4% GROWTH OVER 2015

Source: <http://www.makeinindia.com/article/-/v/sector-survey-it-bpm>

**Figure 4: IT-BPM Domestic Market Growth (USD Billion)**

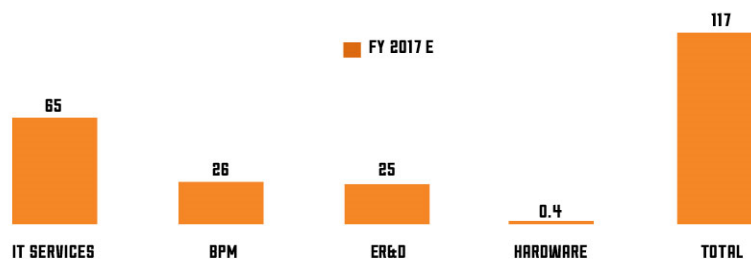


**IT-BPM DOMESTIC MARKET GROWTH [USD BILLION]**

8.5% GROWTH OVER FY 2016 [EXCL. E-COMMERCE]  
E-COMMERCE GROWTH OVER FY 2016- 19%

Source: <http://www.makeinindia.com/article/-/v/sector-survey-it-bpm>

**Figure 5: IT-BPM Export Growth (USD Billion)**



**IT-BPM EXPORT GROWTH [USD BILLION]**

7.8% GROWTH OVER FY 2016

Source: <http://www.makeinindia.com/article/-/v/sector-survey-it-bpm>

The industry's revenue is projected to grow by 8% from USD 143 Billion in FY 2016 to USD 154 Billion in FY 2017. The sector contributes 38% of the total services exports from the country. India is also world's biggest BPM destination. The e-commerce industry itself is growing at a CAGR of near 20%. Often referred to as the 'Global Talent Powerhouse', the sector is the largest employer within the private sector, employing 3.7 million people directly. India has more than 15,000 outsourcing firms out of which 1000 are large firms, employing a minimum of 5,000 employees each. As the world's third largest tech-start-up hub, India boasts of over 4,700 start-ups. Additionally, India has over 600 offshore development centres of over 78 countries. Global industry giants from France, Germany, USA and Japan presently operate in the country.

A number of factors have been driving the growth of the sector. With India having captured a sizeable portion of the global technology sourcing business, here is a look at the major catalysts for this accomplishment:

**The thrust towards digitisation:** India has successfully established itself as a digital economy with 375+ million Internet subscribers. India's domestic IT-BPM market is growing at an impressive CAGR of 14%. Internet is now closer than ever to the masses. Projects like 'Smart Cities' (which will have IT driven systems to deliver urban utilities) coupled with schemes like National Digital Literacy Mission and e-kranti will continue the wave of digitization- a significant boost to the sector in India. The 'Digital India' campaign has put India on the path of becoming a digital economy and outlook for future seems promising. IT megaprojects such as nationwide broadband highways, universal mobile access and public internet access program are in the pipeline under the Digital India initiative. The National Optical Fibre Network aims to connect all 2,50,000 Gram Panchayats in the country with high speed broadband. IT solutions in the domains of education, healthcare, urban planning and financial inclusion are focus areas of the program and this is creating several opportunities for the IT sector. The Digital India initiative will create around half million direct or indirect jobs.

**Tech startups driving growth:** Technology based startups are also key growth drivers of IT & BPM products in India with more than 4,700 startups currently operating in the country. India's startup revolution will benefit verticals such as Internet of Things (IoT), Machine Learning, Artificial Intelligence (AI) and Health Care technology. In BPM segment, a strong annual growth will be fuelled by newly emerging fields such as cloud, mobility and advanced analytics in 2017. By 2020, Social, Mobile, Analytics, and Cloud (SMAC) market, which is helping attract new customer is projected to reach USD 225 billion by 2020. India's digital workforce comprises over 1,50,000 employees with SMAC skills. ~50,000 employees are skilled in analytics, 30,000 people in enterprise mobility and >50,000 in cloud and social media & collaboration.

**The e-Commerce wave:** The domestic industry has substantially benefitted from the e-commerce and mobile-app industry and the addition of e-commerce in specific is the newly emerging sector sub-segment.

**India – a hub for digital skills & the innovation wave:** The strength of India's IT Sector lies in the skill-set of its people. With the right ecosystem for start-ups and the initiative to re-skill people, India has been able to retain global leadership in digital skills. USD 1.6 billion is spent annually on training workforce in the sector. Further, Indian IT firms have been innovating around products and services. Innovations are also being made in

“tech-dependent” areas such as edu-tech and health-tech. This is being led by start-ups in specific.

**Government support:** These significant pillars of growth for India's IT-BPM sector are complemented by Government support, which is consistently working towards sustaining the growth and performance of the sector. The Government's IT/ITeS Sector Skill Council (SSC) is facilitating the expansion of the skill workforce with the help of National Association of Software and Services Companies (NASSCOM). The Government has also been promoting regulatory support to protect intellectual property and strengthen cyber security laws among other things.

### **Conclusion**

In spite high success of Indian information technology industry, there are still many constraints in the expansion of information technology sector. Majority of Indian information technology firms, are small in size, hence cannot explore full potential of global opportunities in this sector. Thus, the industry needs a facilitating environment so that a large number of small firms can grow into large and medium size firms. Most of the present information technology firms are concentrated in few regions. Thus, there is need for location diversification for future development. Indian information technology industry is also dependent on USA market for exports, which is another drawback of this industry. Both the government and the industry will have to take effective steps for promoting research and development (R&D) and quality standards. Government should provide adequate and efficient infrastructure to facilitate future growth of this industry. The Indian IT-BPM industry's continued success is providing a big boost to business and is expected to provide revenues up to USD 300 billion by 2020. But the road is full of challenges like competition, customer understanding, protectionism, economic volatility etc. The concerned stakeholders have to address all these challenges in order to survive. There is need of IT enabled digital transformation in order to compete in the globally connected world.

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## **“A IMPLEMENTATION OF MPPT PV CONNECTED MULTILEVEL INVERTER WITH THD REDUCTION”**

**Bhawana Deshmukh\***

**Ritesh Diwan\*\***

### ***Abstract***

*Multilevel power converter With PV has wide range of applications because increasing the number of voltage levels , the output voltage is nearer to sinusoidal wave with reduced harmonic content, and greatly improving the performance of the drive. In this paper 17 voltage levels generated by using a multi-level inverter PV of a three-level flying capacitor inverter and cascaded H-bridge modules with floating capacitors has been proposed. The stability of the capacitor balancing algorithm has been verified both during transients and steady-state operation. By using the pole voltage combination all the capacitors voltages can be balanced. Another advantage of this topology is its ability to generate all the voltages from a single dc-link power supply which enables back-to back operation of converter. The presented inverter able to operate at all the power factor ranges. The performance of the system can be observed in simulation results. Even though H-bridge is failed inverter can operate at full load for reduced levels. The simulation results are shown in MATLAB/SIMULINK.*

***Key words: Multi level inverters, photovoltaic cells, harmonic analysis, Total Harmonic Distortion (THD).***

### **1.1 Overview**

Power electronic converters, especially DC/AC inverters have been extending their range of use in industrial application because they provide better system efficiency, reduced energy consumption and improved quality of power. The output voltage of inverter could be fixed or variable at a fixed or variable frequency and output waveform are therefore made up of discrete values, producing fast transition rather than smooth ones [1-2]. The ability to produce near sinusoidal waveform around the fundamental frequency is controlled by the modulation technique and using output filters. Common modulation technique includes pulse width modulation or the carrier-based technique, space-vector technique and the selective harmonic technique.

Multilevel voltage source inverter offer several advantages compared to their conventional counterparts. Cascaded H-bridge inverter provides Stepped AC voltage wave form with lesser harmonics at higher levels by combining different ranges of voltage DC sources and the filter components are reduced by increasing Step levels. By increasing the level of the inverter we can get several advantages: get a good voltage wave form, Very low THD, reduced volume and cost. The need of several sources on the DC side of the converter makes multilevel technology attractive for photovoltaic applications. This paper provides an overview of a multilevel inverter topology and investigates their suitability for single-

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phase photovoltaic systems. A simulation model is based on MATLAB/SIMULINK is developed. An experimental 40W prototype inverter was built and tested. The results is experimentally validate for the proposed SPWM based three H-bridge 17 level cascaded multilevel inverter. The 17- level multilevel inverter for solar PV applications.

The discrete shape of two level AC output waveforms imposes basic restrictions of inverters in high power and high voltage on the applications because of low efficiency, high harmonic content, additional power losses, switching losses and high frequency noise. All these drawbacks and unwanted operating characteristics of two level inverters only affect the load but also the associated controller. As alternatives to improve the AC output waveforms of the multistage or multilevel inverter typologies are used [1].MLI (Multilevel Inverters) are defined as devise have ability to produce a stepped waveform with minimum amount of ripple contain. The output voltage of the multilevel inverter has many levels; hence the quality of the output voltage is improved as the number of voltage levels increases, so the quality of output filters can be decreased. Multilevel structure of inverter produces high power and high voltage output without requiring higher ratings of individual devices, so the power rating of the converter can exceed the limit imposed by the individual switching devices. Hence, multilevel inverters are the widely used in high power motors [3-4].

### **1.2 Photovoltaic cell**

The conventional energy sources are unable to meet the increasing demand for energy worldwide. Thus, alternative energy sources like sunlight, the wind and biomass come into picture. Photovoltaic energy is a basis of interesting power; it is renewable, inexhaustible and non-polluting, and it is used as power sources in various applications, however because of its high cost and low efficiency, energy contribution is less than other energy sources. It is therefore essential to have effective and flexible system, to enable you to perform easy management of certain data investigate how to get its performance as maximum as possible [5-6].

The use of these simple models provides sufficient accuracy to analyze the behavior of the solar cell and have established to be effective in most cases. The solar cells convert solar energy into electrical power. This phenomenon occurs in materials which have the possessions of capture photon and emit electrons. The main fabric used in the photovoltaic industry is silicon. In favor of

the better understanding of the PV module the mathematical model is continuously updated. In the output characteristics are of Photovoltaic module depends on [7-8]

- The solar Isolation.
- The cell Temperature and
- The Output Voltage of Photovoltaic Module.

It is necessary to model the Photovoltaic module for the design and simulation of Maximum power point tracking for Photovoltaic system applications because it has non-linear characteristics. The mathematical modeling of the solar array here is done mainly for obtaining the performance characteristics. The performance individuality of Photovoltaic (PV) module mostly depend on the operating conditions, they also depend on solar array design excellence. The effects of these three variations are careful in the modeling; so that any change in the temperature and solar irradiation levels be supposed to not adversely affect the Photovoltaic (PV) module output. Photo voltaic analysis model proposed in this paper is circuitry based model to be used with simulink. Now module is modeled and P-V



characteristics & I-V characteristics are plotted for different irradiation schemes (1000W/m<sup>2</sup>, 600W/m<sup>2</sup>, and 200W/m<sup>2</sup>) and for different temperatures (250 C, 500C, 750C and 1000C).

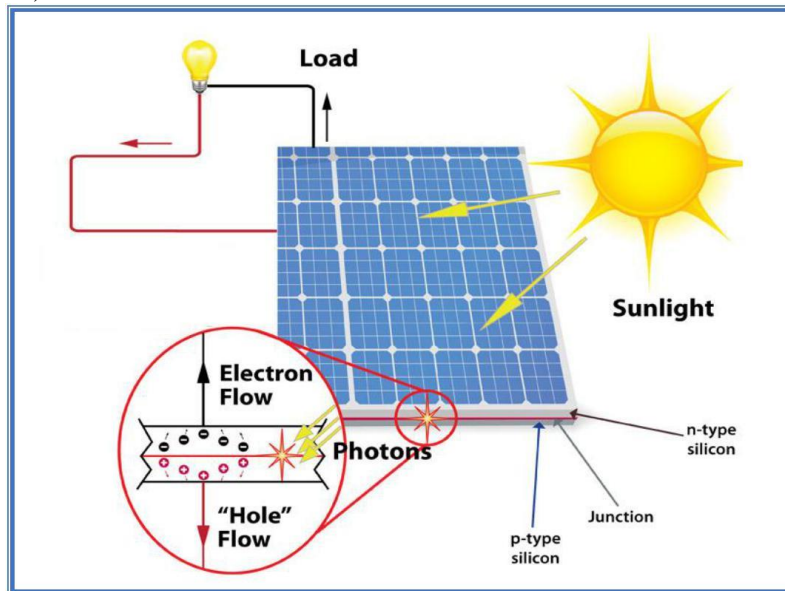


Fig: 1.1 Photovoltaic cell system

## 2.1 Literature Review

The literature survey presents the Harmonic Elimination Technique based on Genetic Algorithm and Partial Swarm intelligence (PSO) etc.

**Zhang Wenyi, et.al, [1]** Done studied in this paper, Selective Harmonic Elimination Technique based on Genetic Algorithm (GA), which can be arbitrary for the choice of initial value, make up for the deficiency of the Newton iterative algorithm, there is no need predict the tendency of switch angles in the entire modulation range in advance. Load can be better inhibition for selective harmonic elimination method based on GA, the size of the load will affect the output waveform of the inverter, and cause the increased harmonic content. Increasing the number of switching angle can reduce the harmonic content of the output current and total harmonic distortion. In this paper study of three-phase asynchronous motor, once again confirms the significance of genetic algorithm in the practical application [9].

**T.Jeevabhathi, et.al, [2]** Investigated in this paper, elimination of harmonics in a Cascaded Multilevel Inverter technique by considering the non-equality of separated dc sources by using PSO is presented. The solving a nonlinear transcendental equation set describing the harmonic elimination problem with non-equal dc sources reaches the limitation of contemporary computer algebra software using the resultant method. In this paper using PSO optimization technique has been proposed to solve the Selective Harmonic Elimination problem with non-equal dc sources in H-bridge cascaded multilevel inverters. Approach reaches the limitation of contemporary algebra software tools; method is able to find the optimum switching angles in a simple manner.

**K. El-Naggar, [3]** Proposed a method for harmonic elimination technique based on artificial intelligent using Neural Networks which uses the Newton-Raphson method. The proposed method having advantage that it will reduce the now of devices as compare to

previous traditional configuration and also can be extended to any level. The iterative methods are sensible to the initial value and divergence problems are probably to arise, using GA the optimal switching angles may not be produced for the minimum harmonic elimination techniques.

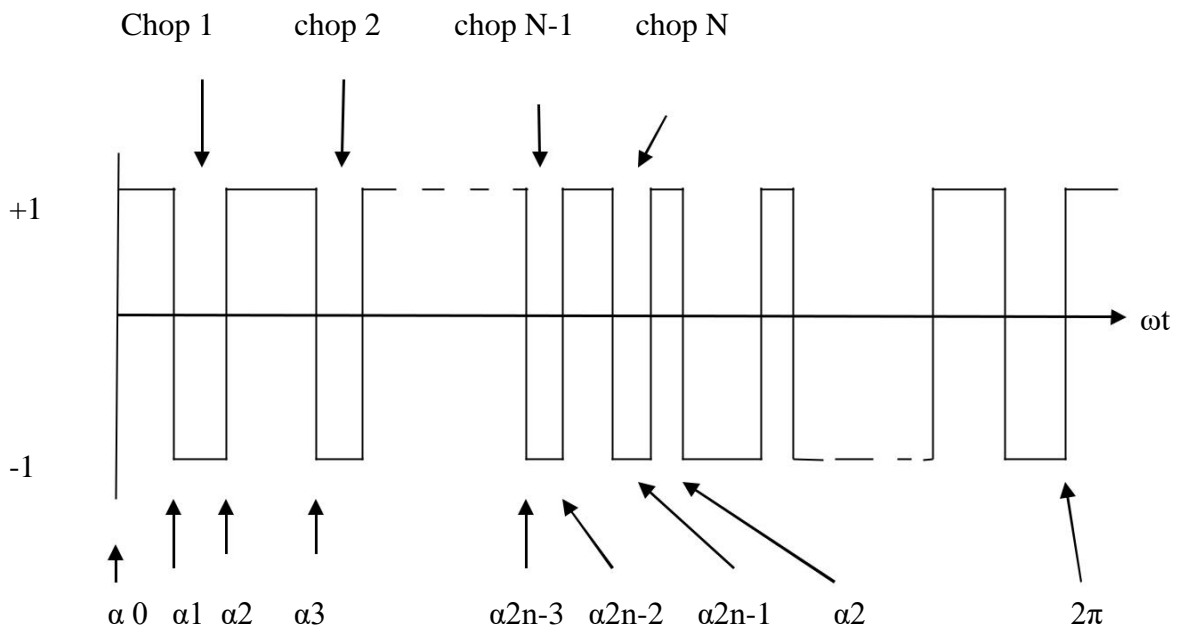
**Kishor Bommassani [4]** Proposed techniques for harmonic elimination using GA optimal firing angles which determined for various multilevel cascaded inverter typologies. This GA optimal firing angles approximate sinusoidal output voltage and current waveform which make an effect on the minimum amount of Total Harmonic Distortion (THD) after that the percentage of THD from the output of multilevel inverter typologies is compared with the output of multilevel cascaded inverters in which advance Genetic Algorithm optimization technique used. The result of the system is that nearly 70-80% THD in the output has been reduced by using Genetic Algorithm.

**J. Hereford, [5]** Proposed the method for harmonic elimination using the PSO the algorithm is applied on the with the unsupervised learning in groups of robots. The algorithm having an effective performance for groups of robots of various sizes. Using different communication range demonstrated that there is no benefit to communicating farther than a certain distance, and that the algorithm maintains high performance over a large variation of range.

**Hulusi Karaca, [6]** Proposed, and solution of Selective Harmonic Elimination Technique (SHE) equations have been optimized by Genetic Algorithm (GA). The proposed method having a structure with the reduced number of switches. Which make effective reduction in the hardware cost of proposed multilevel inverter and it is compact. Also, switching techniques applied to conventional multilevel inverter can be used with this topology. The SHE equation solved by GA with using the mat lab toolbox. The results of system have proved the effectiveness of the proposed multilevel structure and GA based SHE method.

### **3.1 Principle of Harmonic Elimination Technique**

The Single phase inverter supporting the two state output waveform is a generalized method for elimination of any number of harmonics. Basically here square wave is chopped a number of times for making a fixed relationship between the number of chops for the possible number of times harmonics eliminated. Below figure shows a generalized output waveform with N chops per-half-cycle. With the assumption that the periodic waveform has half-wave symmetry and unit amplitude [10].



**Fig 3.1 Periodic Waveform**

Therefore,

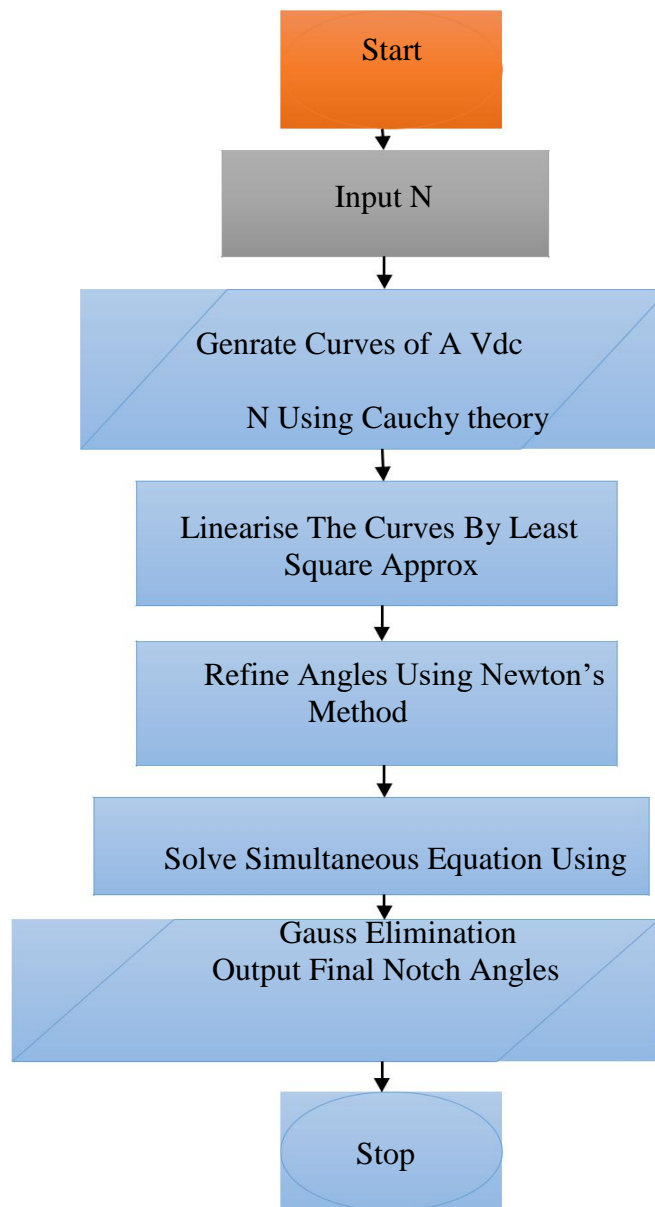
$$f(\omega t) = -f(\omega t + \pi) \quad (3.1)$$

Where  $f(\omega t)$  is the state periodic function for N chops per half cycle?

The generalized harmonic equation of power electronic inverters is of the form given by the expression

$$v_o = \sum_{h=1}^{\infty} \frac{1}{h} \cos(h\omega t) \quad (3.2)$$

### Flowchart of Mathematical Analysis



**Fig: 3.2 Harmonic mathematical flow chart**

Where,

- V Voltage output of the inverter
- V<sub>dc</sub> Magnitude of the DC input voltage
- h<sub>i</sub> Change of waveform level
- Switching angle of the inverter
- N Number of harmonic Equation
- K Switching angle number (0 to N-1)

### 3.4 Comparison among Three Multilevel Inverters

In high power system, the multilevel inverters can be appropriately replacing the exits systems that use traditional multi-pulse converters without any need for transformers. All the three multilevel inverters can be used in reactive power compensation without having the voltage unbalance problem. In back-to-back intertie application, however, it is not possible to use multilevel cascaded inverters with SDCSs because a short circuit will be introduced when two back-to-back inverters are not switching synchronously. To avoid such type problem, a transformer having one primary winding and several secondary winding can be used. In some cases, the structure of separated dc sources is well suited for different renewable energy sources such as photo voltaic cell, fuel cell, biomass etc. This structure is, therefore, suited for ac power supply in which vehicle system uses. Applications like adjustable speed drive, the multilevel inverters are needed for a utility compatible adjustable speed drive (ASD) with input from the utility constant frequency ac source and output to the variable frequency ac load. The major differences, are the control design and the size of the capacitor when using the same structure for the ASDs and for back-to-back inter ties because the ASD needs to operate at different frequencies and the dc link capacitor needs to be enough large, to avoid a large voltage swing under transient state.

Table 3.3 shows that the number of main switches and main diodes, needed by the inverters to achieve the same number of voltage levels, is the same. Clamping diodes are not needed in flying-capacitor and cascaded-inverter configuration, while balancing capacitors. The multilevel converter using cascaded inverter requires the least number of components [11-12].

**Table: 3.1 Comparison of power component requirements per phase leg among three 17-multilevel Inverters**

Inverter configuration	Diode clamp	Flying capacitor	Cascaded inverters
Main switching Devices	$2(m-1)$	$2(m-1)$	$2(m-1)$
Main diodes	$2(m-1)$	$2(m-1)$	$2(m-1)$
Clamping diodes	$(m-1)(m-2)$	0	0
DC bus capacitors	$(m-1)$	$(m-1)$	$(m-1)/2$
Balancing capacitors	0	$(m-1)(m-2)/2$	0

Another advantage of the cascaded inverter is flexibility of circuit layout. Modularized circuit layout and packaging is possible because each level of inverter has same structure and there is no need of extra clamping diodes or voltage balancing capacitor. By adding or removing the full-bridge cells the number of output voltage levels of inverter can be easily adjusted.



### 4.1 Grid Model

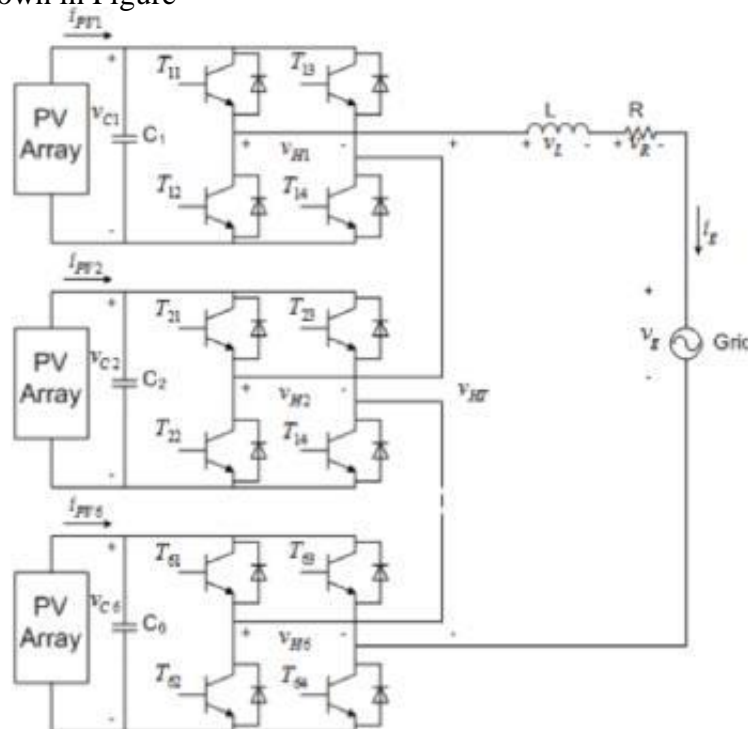
The target grid in this thesis has a line to line voltage of 10 kV. Then the peak voltage for one phase can be calculated as follows:

$$\hat{v}_g = \frac{V_{ll}}{\sqrt{3}} \sqrt{2} = \frac{10}{\sqrt{3}} \sqrt{2} = 8.165 \text{ kV}$$

VOUT Boost	Inductance L[H]	Resistance R[Ω]	Frequency f[Hz]
<b>10</b>	<b>0.01</b>	<b>0.1</b>	<b>50</b>

### 4.2 Mathematical Model for the Multilevel Inverter with PV System

From, it can be seen that the output voltage of the PV array at MPP is around 1.5 kV under the reference environment condition. The peak value of the phase voltage of the grid is 8.165 kV. Therefore, at least 6 modules should be included in the CHB multilevel inverter. As mentioned in, this would result in  $2 \times 6 + 1 = 13$  levels of the output voltage. The topology is shown in Figure



**Fig: 4.1. Topology for the CHB multilevel inverter with PV arrays**

The output voltage for each cell is determined by

$$V_{Hj} = (T_{j1} - T_{j3}) \cdot v_{Cj}, j = 1, \dots, 6$$

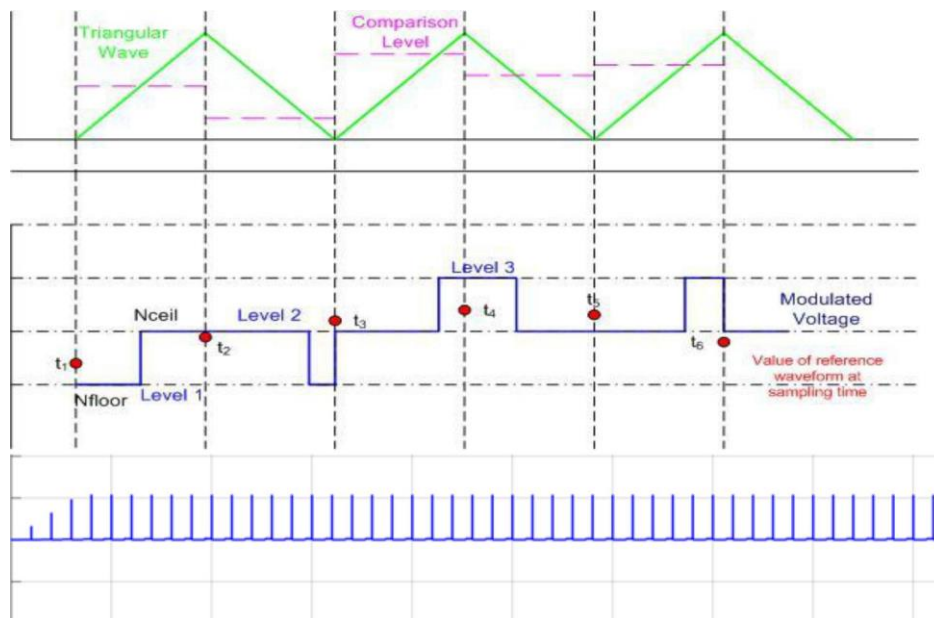
### 4.3. Control and modulation strategies

Where TXX represents the state of each switch according to Figure 4.3. TXX presents two discrete values: "1" when the switch is on and "0" when the switch is off. Therefore, the output voltage of the H-bridge is  $-v_c, 0, v_c$ , respectively. The switching action of the module will be discussed in section. The mathematical model of the system can be expressed by [13].

$$\frac{di_g}{dt} = \frac{1}{L} \left( \sum_{j=1}^6 [(T_{j1} \ T_{j3}) v_{Cj}] - R i_g - v_g \right)$$

$$\frac{dv_{Cj}}{dt} = \frac{1}{C_j} (i_{PVj} - (T_{j1} \ T_{j3}) i_g), \quad j = 1, 2, \dots, 6.$$

In this thesis, the modulation method is Pulse Width Modulation (PWM). However, it is different from normal PWM in which the state of each switch is determined by the comparison of a reference waveform with the carrier waveform. Instead, the firing signals of the switch are obtained by comparing the control signal from the proposed control law with the carrier waveform, as shown in Figure 4.2. The selection of the switching frequency of the carrier waveform is the tradeoff between switching losses in the inverter and the harmonic distortion of the current injected into the power grid. Moreover, in high power application, the switching frequency should be limited to a certain level due the switching stress imposed on the switch device. Here the switching frequency  $f_{sw} = 600\text{Hz}$  is selected.



**Fig: 4.2. Modulation strategy**

At each sampling time  $t_k$ , the desired modulation index can be obtained by comparing the value of reference waveform at this time (red dots in Figure 4.2) with the sum of DC voltages (the sum of capacitor voltages in Figure

For each sampling time  $t_k$ , the highest level that does not exceed the value of reference waveform  $v_{ref}(t_k)$  at this time is called the floor level  $N_{floor}(t_k)$ . Moreover, the lowest level which exceeds the  $v_{ref}(t_k)$  is called the ceil level  $N_{ceil}(t_k)$ . In Figure 4.2, for  $t_1$  and

$t_2$ , level 1 is the  $N_{floor}$  and level 2 is the  $N_{ceil}$ ; for  $t_3$ ,  $t_4$  and  $t_5$ , level 2 is the  $N_{floor}$  and level 3 is the  $N_{ceil}$ ; for  $t_6$ , level 1 is the  $N_{floor}$  and level 2 is the  $N_{ceil}$ . For a certain modulation index  $m(tk)$ ,  $N_{floor}$  and  $N_{ceil}$  can be determined by

$$N_{floor} = \text{int}(6 \times (m(tk) + 1)) - 6$$
$$N_{ceil} = N_{floor} + 1$$

The triangular waveform has a positive slope during one sampling interval and a negative slope during the consecutive sampling interval as shown in Figure 4.2. The following definition for the modulation strategy is given

- Interval with the ascending triangular waveform → The modulated voltage is going to shift from the floor level to the ceil level ( Insert a positive module or bypass a negative module)
- Interval with the descending triangular waveform → The modulated voltage is going to shift from the ceil level to the floor level (Insert a negative module or bypass a positive module)

The transition between the floor level and the ceil level takes place inside the interval at a certain time which is determined by comparing the Comparison Level ( $C_{level}$ ) with the value of the triangular waveform. When the triangular wave coincides with the  $C_{level}$ , one switching will occur. Actually, the value of the reference waveform at the sampling time,  $v_{ref}(tk)$ , indicates a desired average potential for the upcoming sampling interval. Therefore, the  $C_{level}$  can be determined by

$$C_{level} = 1 - [6 \times (m(tk) + 1) - N_{floor} - 6]$$

There is another point need to be mentioned in the modulation strategy. If the sampled modulation level has moved to different floor-ceiling interval as compared with the preceding sampling point. One or more modules would be switched at the sampling time instantaneously. This can also be seen from Figure 4.2. At  $t_3$ , the previous interval has shifted the modulated voltage from level 2 to level 1. However, the transition process for the upcoming interval will happen between level 2 and level 3. Therefore, at the sampling time  $t_3$ , one positive module should be inserted (Or one negative module should be bypassed) in order to make the starting level to be level 2 for the upcoming interval. Similar process is happened for the sampling time  $t_6$ .

### 5.1 Simulation

The methodology is described in previous chapters of GA and PSO and moth flame Optimization technique has been implemented in MATLAB Simulink on which simulation of multilevel inverter is done. All simulating results and work is done on MATLAB. Selective harmonic elimination pulse width modulation (SHE-PWM) switching method is used for controlling the cascade multilevel inverter and the non-linear transcendental trigonometric equations and the objective fitness function are solved and optimized by applying proposed optimization technique. The simulation results are discussed for five level single phase inverter with equal DC sources.

To analyze the behavior and performance of cascaded H- bridge multilevel inverter, a 17 level cascaded H-bridge multilevel inverter is designed in MATLAB/SIMULINK environment based on the theoretical concepts of multilevel inverters. Fig.5.1 shows the circuit diagram of five-level inverter. The circuit consists of five H-bridge inverters and each H-bridge uses IGBT (Insulated Gate Bipolar Transistor) switches. IGBTs are chosen as switching devices for simulation, since it has more features than the other power

semiconductor devices. It has the high power rating, less conduction loss and less switching loss.

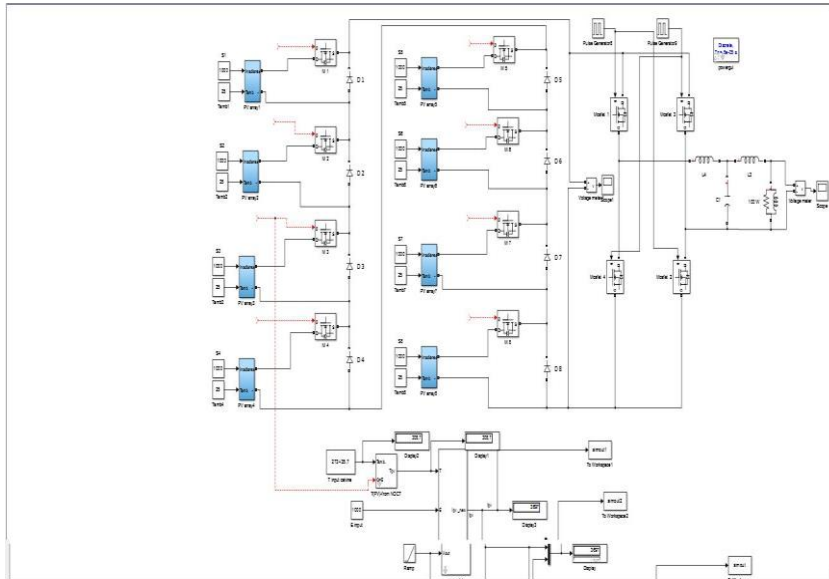


Fig: 5.2 Simulink Model

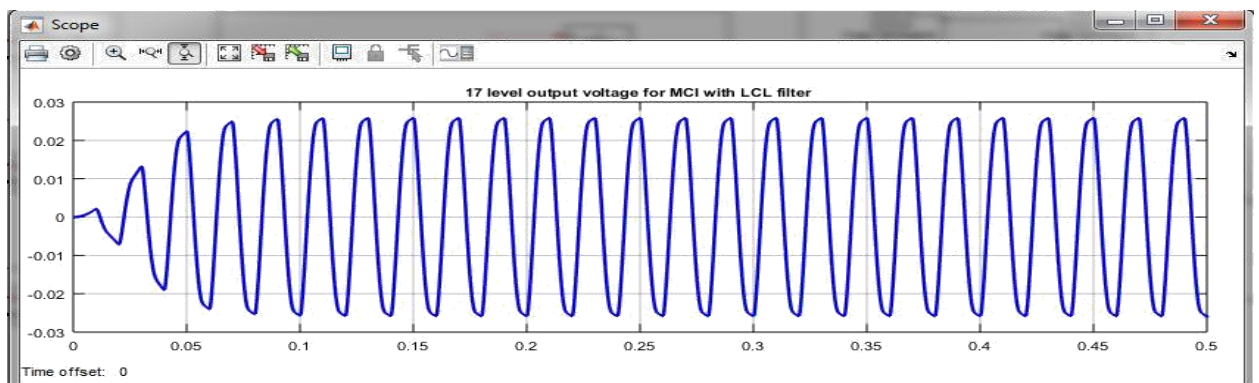
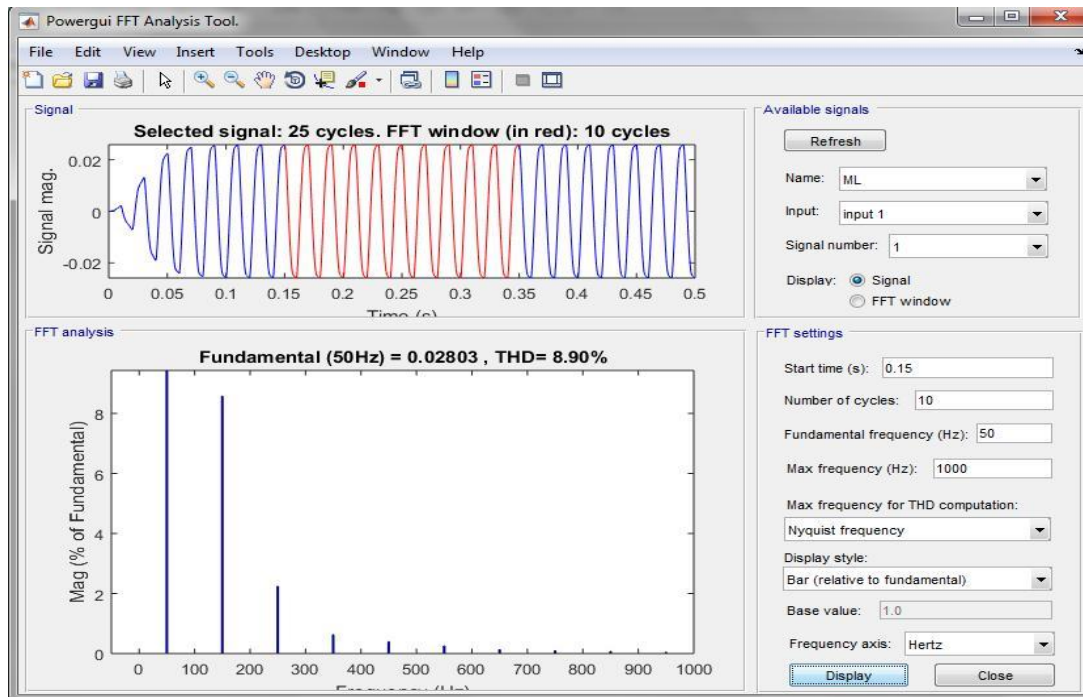


Fig: 5.4 Performance of harmonics analysis multilevel inverter output time Vs amplitude



**Fig: 5.5 Performance of harmonics analysis multilevel inverter output**

### 6.1 Conclusion

The performance of Selective Harmonic Elimination for Solar Cell based Multilevel Inverter System Using Moth Flame Optimization. The 17 multilevel inverter is powerful electronic device, which is widely used for high power utility application. The main purpose of the multi-level inverter is to provide sinusoidal wave from with low-level harmonic content to reduce distortion. From the comparison we identify that as level of the inverter is increases the Total Harmonic Distortion is decreases and the performance is improved. For analysis of this inverter SHE (Selective Harmonic Elimination) method can also be used to reduce harmonics. The simulation and experimental results are increasing the number of switching angle can reduce the harmonic content of the output current and total harmonic distortion.

### 6.2 Future scope

The work done in this project is related with the power quality improvement. Here thus work it's of can be used for different type of power generation system. The power requirement of different places needs eliminate the particular harmonics.

The calculation of the frequency angle in this case is comber sum which is eliminated which this thesis by use. This work can be extend future to improve the total harmonics distribution and done for different levels of inverter.

The work also can be extending for 31 level inverters. These cases of the other.



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## **“FinTech” the new-age digital disruptor in financial services**

**Dr. Smitha Sambrani\***

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### **Abstract**

The rapid usage of digital platforms and encouragement by the governments for digital world has created overabundant alternatives in offering different services to customers in digital via. The financial technology innovations or suitably called as “Fin Tech” innovations has managed novel combination of contributions like paying through mobile, digi wallet, Bit coin, block chain and etc. These have a great strength to flip over the current financial services industry. As the innovations in financial technology are increasing day by day with a rapid pace, the traditional financial services industry is struggling to adopt the transformations and disruptive implications. The traditional way of supplying financial services via Bricks and Mortar is becoming past as the digi world is expanding and the internet is accessing at ones finger tips.

For India 2015 year can be measured as germinating period where majority of the banks (big and small) are associated with Financial technology companies with variety of offerings through digital via. The traditional financial system has been rebooted by the demonetization in the year 2016 and pushed it towards the digital world. With the effect of demonetization, the government payment system processed over 76 million transactions per month which were only 100000 transactions per month earlier before demonetization (According to Harvard Business Review). With Digital infrastructure, through integration of stronger policy and adoption of technological innovation, India can lead towards & absorb the digital first economy. By the next decade, Nearly 60 percent of revenue from some functional products will wipe out due to the digital revolution as Fintech leads to down fall in prices and takes away lenders profit margins...( 2015 yearly review of global banking by McKinsey & Co's) Hence, financial technology is treated as a disadvantage to the traditional banking. Adopting Fintech has become compulsory to the financial service providing companies in order not to fade out in the digital storm.

### **Introduction**

For all the Indians, The basic system of payment of funds & personal finance has been shaken by the Demonetization. Traditionally, Indians visited banks which are in brick and mortar form for various banking services like opening a bank account, procurement of loans, insurance, various investment & wealth management. The rapid increase in digital innovations, government initiatives in adoption of latest & new technologies for cashless society helped in kick start in adopting the new world of digital medium for the common masses. And also it laid a way for necessity of adopting technology in providing services, which can aptly called as “Fin Tech”.

FinTech has disturbed the traditional & regular financial sector. It provided the people with better and accurate access to financial spending, credit & information related to investments to make better decisions. The Fintech institutions are majorly concentrating on customer experience with compelling design, data flows, cloud and mobility and combining it with various payment gateways, & marking a significant difference when

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compared with regular banks. Financial technology institutions primarily concentrating, how to make the digital proceedings more simplified and bring changes among the customers in doing their finance related transactions.

The common public got the appropriate opportunity in the form of digital platforms in expressing their views and opinions and shares their experience about the brands with larger world. Digital platforms are also providing pioneering channel to the institutions in the process of gathering, arranging, collating & governing the customer's data in order to create customized & handpicked applications for the best percolation as well as effectual utilization of differing with related to products and services. Hence, technical improvements & progression of digital platforms has opened alternative choices to Fintech institutions in developing new applications and systems to the consumers in order to manage their financial transactions in a better way.

### World outlook towards FINTECH

The effect of digital innovations & its influence, the technology disturbance in financial services has become the major subject at the world economic forum {WEF} meeting conducted at Davos, Switzerland in 2016. WEF stated that the growth of novelty in financial services by adopting digital platforms has turn in to a major concern for financial service organizations to continue at a safe side, else they wipe out in the coming 5 years. In the report printed by WEF in association with Deloitte regarding the financial services with Innovations, acknowledged 6 financial functions & 11 clusters of innovations which are undergoing speedy transformation in providing financial services to the consumer. They are as given under...

WEF identified eleven clusters related to innovations as the future of financial services which have capability to transform financial

services delivery across 6 main core functions namely, Deposits & Lending, Investment management, capital raising, provisioning & insurance. Though FinTech institutions are creating great strides globally in all these core functions, India is experiencing a big jump in three functions- personal finance, payments & Lending. In order to address the unmet preferences & Needs of consumers and to serve products & services with greater convenience with lower cost, the Fintech institutions are assailing on all products of traditional banks.

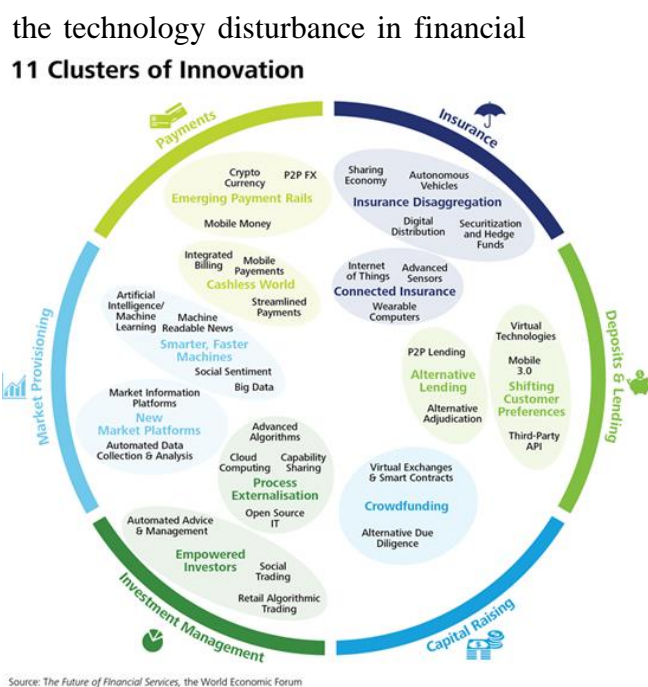


Diagram 3. Penetration rate of fintech services

	China	India	Singapore	Indonesia	Malaysia	Thailand
Payments/ Remittances	<40%	<20%	<4%	<1%	<1%	<1%
Lending	<14%	<5%	>2%	>2%	>2%	>2%
Personal Wealth Mgt	<5%	<3%	<1%	>2%	>1%	>1%
Insurance	<35%	<2%	>2%	>1%	>1%	>1%

■ Highly Disruptive 
 ■ Material Threat 
 ■ Watch list 
 ■ Emerging Threat 
 ■ Remote possibility of disruption

Source: DBS Bank

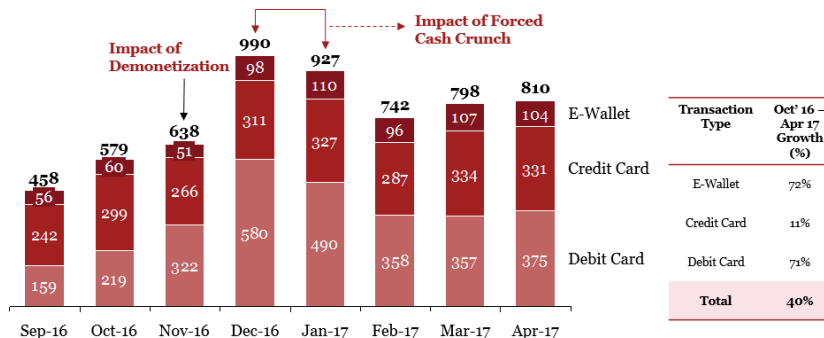
DBS bank published a report in Oct 2016. According to that, take over & dispersion of financial technology services has identified in emerging markets, especially in India & china. In china, over 500 million people use services portal Tencent for communication daily, wealth management and payments. Another identifiable Chinese company is Alipay, the world's biggest mobile payments platform. In India, common name is PAYTM, in the payments area having 122 million customers. The improvements in digital technology & novel implementations in owing of digital technologies made the financial technology grow faster with great offerings to the target customers, according to their interest, taste & choice in order to attract them and hold on. In present day, majority of the population are using advance version cell phones as their primary device to the Digi world. It made the financial technology institutions felt important in hand over suitable & personalized application to the concerned and appropriate device as a solution.

### Fintech Landscape in India

Indian government made compulsory that aadhar should be linked with all the financial systems and it helped the population to take benefit from the current financial systems. Fintech industry is gaining through the government initiative of making every person having unique ID. It is helping the Fintech organizations to launch appropriate solution in serving to each segmented people and merchant services which can provide business to people

People are forced to use digital medium to do their financial transactions by depositing the money in their bank account due to Demonetization. Lack of awareness with regard to finance will lead to low adoption. Security reasons and infrastructure gaps are acting like hurdle in adoption of fully fledged cashless society. Anyway Fintech organizations & Banks are playing a major role in the process of adopting digital medium and moving towards the achievement of cashless society.

E Wallet, Credit Card and Debit Card Transaction Value in India (INR billion)





PWC published a report in July 2017. According to that, the initiatives & efforts made by the government in adopting debit & credit card and mobile wallet transactions were given fruitful results and growth was clearly visible. There was increase in the transactions over 40% month by month from October-2016 to April -2017.

CB insights, in their article published that a market map of 78 Indian based well known private Fintech companies. It divided the companies in to 3 major & 9 sub-groups depending on company's prime product line of business. 6 outstanding corporate and govt initiatives were also included as they have been integral to build support the Fintech emerging ecosystem



Pointing towards incapability of current financial system in leading Fintech revolt across India, RBI in their publication on perspective of Indian banking sector, Dec 2017, acknowledged the major developments in information technology adoption. They also informed in the report about the driving channels towards Fintech revolt. The mentioned forces are such as (1) consumer importance for comfort, speed, cost effective and user friendliness interactions (2) technology advancements regard internet, Big data, mobile telephony, and computer power and (3) changing financial regulations and supervisory requirements.

Programs by the govt of India like digital India & other digital medium consciousness programs are helping in building the confidence among customers. With increasing alertness and supplementary encouragement from the government end, the Fintech institutions with their services will only sustain and develop in the competition. Banks should have a good association with the Fintech organizations in order to offer demanded curate products to the consumers via digital platform.

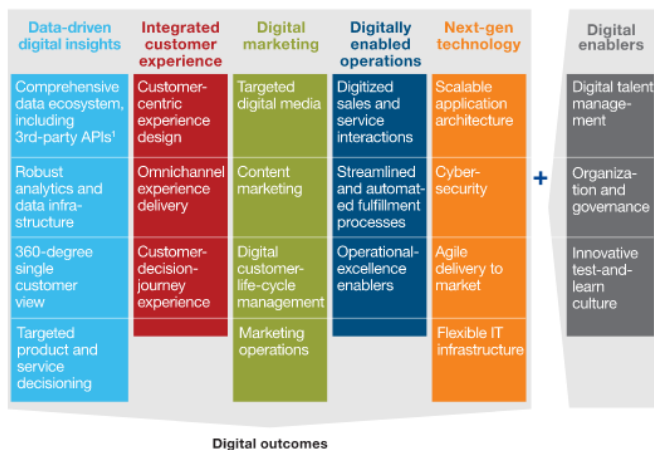
### Survival of the fittest

For Every Nations growing economy, banks are backbone and they ensure that nation is independent & self-conditional. Bank plays a prominent role in the activity of building



nation, nonetheless with the arrival of financial technology which is moulding and quaking the basics roots of banking industry. It is very important that they have to react speedily with the altering times. McKinsey in the article “cutting through the noise around financial Technology” clearly indicated that banks should realize and take up the novel era technology and novel improvements in order to keep on floating in the financial planet.

Banks should be focused on building an extensive set of distinct digital capabilities.



<sup>1</sup>Application programming interfaces.

McKinsey&Company | Source: McKinsey analysis

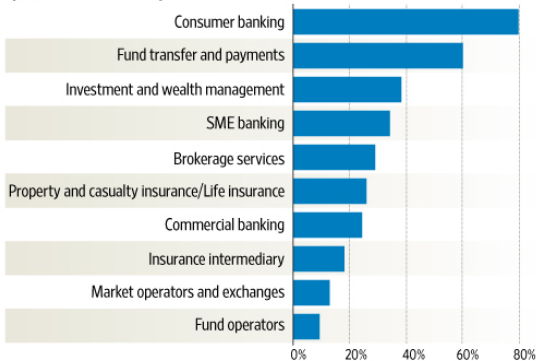
Banks are turning in to primary theme for huge pressure arising out of Fintech institutions today. Hopefulness regard financial technology is far above the ground. Accessing of services through mobile platform is considered as a play turner and every organization is considering mobile primary as their view point even before establishing their products or services into market.

PWC global survey indicated, in the next coming 5 years, customer banking, payments and transferring funds would be largely interrupt by financial technology industry. The threats are majorly high on banking industry. This survey even indicated that the financial technology creates a remarkable impact on the force on margins, losing market share to financial services sector.

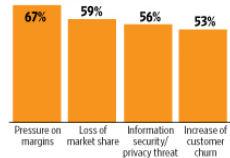
### FINTECH: A FORCE TO RECKON WITH?

A global survey by PwC indicates that response to fintech is mixed in financial services sector

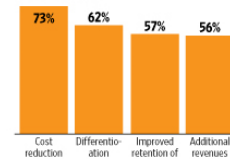
Top 10 parts of the financial sector that are likely to be the most disrupted by fintech over the next 5 years



Top threats to existing businesses due to rise of fintech



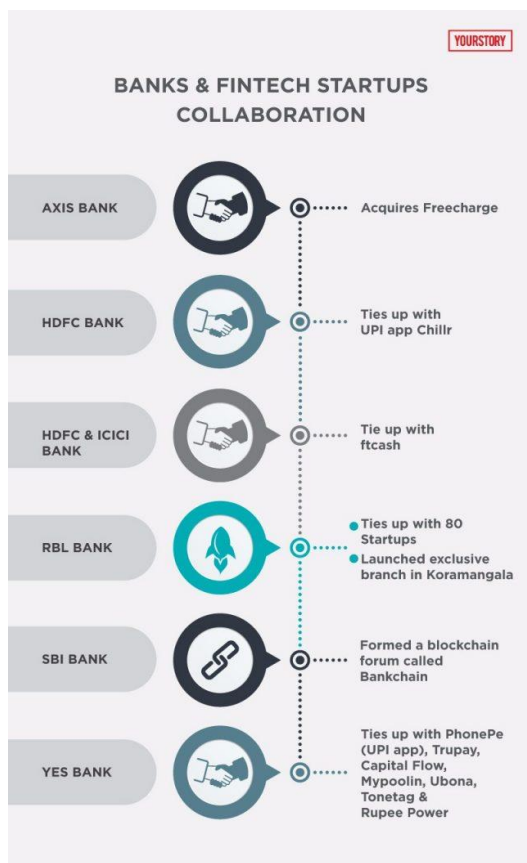
Top opportunities related to the rise of fintech



Primary data derived from results of a global survey that included feedback from 544 respondents from the world's top financial institutions. They were principally chief executive officers, heads of innovation, chief information officers and top-tier managers involved in technological transformation, in 46 countries. Surveyed institutions included banks (30%), asset and wealth management companies (21%), fintech companies (20%), insurance companies (14%), fund transfer and payments institutions (4%), and others (14%).

Source: PwC Global FinTech Survey 2016

There exist numerous alternatives through which the currently existing banks can react to the “financial technology (Fintech) Attack”. They can reside safe through completely redesigning their business models and by providing digital services. It should be identified that the Fintech institutions are not only the competitors but also strong partners through which by collaborating as partners, banks can strap up technology. This association



between banks with financial technology (Fintech) is happening already, but the pace of collaborations and continuing new products & services are in bit slower mode.

The another major thing is to identify the exact Fintech platforms depending on customer tastes & preferences, his usage philosophy and patterns of the digital platform to be great effective, parameter of customer experience should be gathered on real time, Hence banks can easily understood and comprehend the metrics which enable them to identify the appropriate future opportunities rather than focusing on events which are already done in the past.

### Conclusion

Reduction of tax rates on digital payments, biometric applications which requires least infrastructure, Broad perspectives of Reserve Bank of India in inviting new entries into financial system and etc. has boosted the India's journey into the digital world. Easy to learn & trust on Fintech applications helped to increase the usage of digital transactions. And along with that the Government initiatives in encouraging digital

medium drives towards the cashless society in India.

As majority of people in India using internet are Millennials, they naturally started to use internet and technology since their childhood. These people are very demanding and interested to do experiments and want to have an innovative Products & Services which can reduce their time and efforts for making payments. Millennials always seeks innovative products and services which can satisfy their demands in few clicks.

Among all, the very most important adoption for banks is to identify the suitable best Fintech platform in order to distribute a diverse and appropriate Products & Services that could request the consumers as a compulsory strategic necessity in the contemporary Tech period for institution glory. Otherwise, they will become the past and wiped out.

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## **Effect of Seagrasses, *Syringodium Isoetifolium* and *Cymodocea Serrulata* Based Diets on Reproduction of Sailfin Molly, *Poecilia Latipinna***

**J.Felicitta\***

**D.Nagarajan \*\***

### **Abstract**

The brood stock nutrition is an important aspect which determines the quality and quantity of offspring's produced. In the present study seagrasses, *Syringodium isoetifolium* and *Cymodocea serrulata* were used in fish feed and the reproductive performances were monitored. The investigation on the impact of seagrasses on gonad weight, development and fertility in Sailfin molly, *P. latipinna* showed the maximum sized gonad in the fish fed with 20% *S. isoetifolium* (E4) and 15% *S. isoetifolium* (E3) diets. The 20% *S. isoetifolium* incorporated diet showed early commencement of breeding. In the case of *C. serrulata* also, the gestation period was shorter than the control. Inter brood interval (IBI) taken by the experimental fishes have also reduced significantly in-between the subsequent spawning in all the treated fishes than the control. In case of the fishes fed with the E4 and E8, much reduction in IBI days was observed than the control. Females fed on 20% *S. isoetifolium* and 20% *C. serrulata* diets had greater fertility success and a higher proportion of embryos.

**Keywords:** *Syringodium isoetifolium*, *Cymodocea serrulata*, interbrood interval, fertility, gonad weight.

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### **Introduction**

Proper nutrition is one of the most important factors which influence the ability of cultured organisms to attain the genetic potential for growth, reproduction and longevity. All the necessary nutrients and energy must be available to the fish to perform the biological and physiological functions. The diets should meet out the requirement for essential nutrients and energy. Diet should be palatable and the ingredients must be relatively digestible, so that the nutrients can be fully utilized (Webster, 2009). Feeds and feeding are crucial elements in aquaculture.

Brood-stock nutrition is an important factor which governs the egg production and larval survival (Izquierdo *et al.*, 2001). The improvement in egg quality and also enhancement of seed production has been shown to be consistent with an improvement in brood-stock nutrition and feeding. Gonadal development and fecundity are affected by certain essential nutrients (Izquierdo *et al.*, 2001). Dietary protein and lipid play major roles in growth and reproductive performance (Furuita *et al.*, 2002).

Female fish need adequate protein, fat, vitamins and minerals for egg development and spawning/breeding. Yolk is composed of phospholipo proteins, an amalgam of minerals (phosphorous), protein and lipid. Protein is required for formation of follicles in the

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embryo. The absence of any of these nutrients can reduce larval survival (James and Sampath, 2002).

The nutrient requirement of brood-stock and growing juvenile animals are different due to differences in biological processes. However, a full and comprehensive understanding on reproductive mechanisms like gonadal maturation, fertilization success and larval quality is far from complete as these coordinated processes are very complex. The studies on brood-stock nutrition provide applicable knowledge by determining if reproductive performance of a particular fish species can be improved by maternal dietary intake. But, the understanding on the fish brood-stock nutrition is still poor due to difficulties in conducting studies involving proper feeding and reproduction of brood-stock. A review by Izquierdo *et al.* (2001) outlined lipid, protein, fatty acid profile, vitamin E, C and carotenoids as major nutrients influencing various reproduction processes such as fecundity, fertilization, hatching and larval development.

The present investigation was carried out to analyze the impact of different levels of Seagrasses, *S. isoetifolium* and *C. serrulata* on gonad weight, development and fertility in Sailfin molly, *P. latipinna*.

#### **Materials and Methods**

Feed formulation was done by square method (Hardy, 1980) and 45% basal protein diet was prepared by using ingredients like fish meal, groundnut oil cake, tapioca flour, rice bran, wheat flour, sun flower oil (lipid source) and vitamins (Table 1.1). Dried and powdered ingredients were blended to make a homogenous mixture. Subsequently, the feed ingredients were mixed with an aliquot of boiled water and then cooked in steam for 20 minutes. Seagrasses were dried in shade, powdered and stored in plastic containers separately. Totally nine diets were prepared including control diet which was devoid of Seagrasses. Experimental diets were prepared by adding 5, 10, 15 and 20 Seagrass powder into the diet. Diets containing 5, 10, 15 and 20% *S. isoetifolium* were designated as E1, E2, E3 and E4 and the diet containing 5, 10, 15 and 20% *C. serrulata* were designated as E5, E6, E7 and E8. All the diets were mixed with 1% chromic acid as a marker for digestibility determination. The pellets (2 mm size) were prepared using a hand operated pelletizer and dried in sunlight. The dried diets were stored in a desiccator until use.

One male and three females (mean weight 2.512 g and mean length 39.29 mm) (sex ratio 1:3) were introduced into each experimental tank. Males were left in these tanks for 3 days and kept separated. The breeders were fed twice with their respective diets. The water drained twice in a week and replenished with fresh water to remove accumulated faeces from the bottom. Triplicates were maintained for each group. Unconsumed feed was removed by pipette after 1 hour of feeding and dried in hot air oven at 80°. Clean and unchlorinated well water was used and its quality was monitored biweekly.

During the experimental period, biweekly samples of water were analysed for dissolved O<sub>2</sub> by Winkler's iodometric method, for salinity Harvey's titration method, pH was recorded using pH meter following the procedure given by Stickland and Parson (1972). Ammonia was estimated following the phenol hypochlorite method (Solar Zono, 1969) using de-ionized water. EDTA method was adopted to estimate the hardness of water as described by Trivedy and Goel (1986).

Young ones were fed *ad libitum* twice a day and left for one hour. After which unconsumed feed was removed from experimental tanks. Fish were weighed and length



was measured at the every sampling day (every 25 days). Only 4 samplings on 75, 100, 125 and 150 were done. After the gonad development, three females from each treatment were sacrificed on every sampling. Their ovaries were removed and weighed and the gonado-somatic index (GSI) was computed according to Dahlgren (1979).

$$\text{Gonado-Somatic index (GSI)} = \frac{\text{Wet weight of gonad (mg)}}{\text{Wet weight of fish}} \times 100$$

The number of intra follicular embryos produced by female fish is known as fertility (Dahlgren, 1979).

$$\text{Relative fertility} = \frac{\text{Total fry production at experimental period (days)}}{\text{Mean wet weight of female (g)}}$$

The ovaries (brood pouch) were dissected eggs / embryos were separately counted and staged according to Meffe (1985) under a dissection microscope.

Eggs / embryos were sorted out into one of six categories primarily for detection of superfetation. (1) immature ova : ova in the process of yolking but sub mature in size; (2) mature ova : fertilized egg – full sized ova, unfertilized or recently fertilized; (3) primitive streak : primitive streak present, but eyes not yet distinguishable; (4) early eyed : eyes present, but not full sized; little dorsal pigmentation; (5) middle eyed : eyes full sized; moderate to extensive dorsal pigmentation and (6) late eyed : little yolk remaining; near parturition.

### Results

The maximum sized gonad was observed in the fish fed with 20% *S. isoetifolium* (E4) and 15% *S. isoetifolium* (E3) diets. The weight gain percentage increased day by day and reached the maximum at the time of the starting of the first spawning. In the case of fish fed with 20% *S. isoetifolium* (E4), the gonadal weight was maximum (1686±27.4 mg) on 150<sup>th</sup> day and was followed by E3 (1062±20.5) on 150<sup>th</sup> day (Table 1.2). More or less, the same trend was also observed in cases of the fish fed with *C. serrulata*. The 20% *C. serrulata* diet (E8) had maximum value (76.7±13.3 mg) when *C. serrulata* diet alone was considered. The experimental diet values were significantly different ( $p < 0.05$ ) from the control.

The GSI was maximum in E4 diet (52.95±5.4 %) and was followed by E3 (42.64±1.6 %) and E8 (34.68±3.2 %) diets on the 150<sup>th</sup> day (Table 1.3). The E3, E4 and E8 diets were significantly different ( $p < 0.05$ ) from other groups.

The 20% *S. isoetifolium* incorporated diet showed early commencement of breeding (109±7.9 days) than the control (121±9.1 days) in the spawning. Whereas in others, the number of days observed were 109±7.9, 112±9.6 and 119±8.9 in E3, E2 and E1 diets of *S. isoetifolium* respectively. In the case of *C. serrulata* incorporated diets also, the gestation period was shorter than the control and it was 121.09±10.4, 118.80±8.6, 112.25±6.4 and 111.80±6.2 in E5, E6, E7 and E8 respectively. The same trend was noticed for II, III and IV spawning also.

In correlation with the spawning period, inter brood interval (IBI) taken by the experimental fishes have also reduced significantly in-between the subsequent spawning in all the treated fishes than the control. The IBI was variable between different treatments and it was between 24-35 days (Table 1.5). In case of the fishes fed with the E4 and E8, much reduction in IBI days was observed than the control. The minimum IBI (24±4.44) was recorded between III and IV spawning in E4 diet. Comparatively, E8 diet of *C.*

*serrulata* also showed lower value during this period, though lower than that of E4 of *S. isoetifolium*.

In this study, females fed on 20% *S. isoetifolium* and 20% *C. serrulata* diets had greater fertility success and a higher proportion of embryos. On 150<sup>th</sup> day, 165 embryos were observed in 20% *S. isoetifolium* diet (E4). It was followed by E3 (150), E2 (147) and E1 (135) diets. In *C. serrulata* diet, maximum embryos (155) were recorded in 20% diet (E8) and it was followed by E7 (143), E6 (141) and E5 (119) diets (Table 1.4). These results suggested that *S. isoetifolium* and *C. serrulata* diets helped female *P. latipinna* to produce more ova which were more likely to have developed into embryos. On 75<sup>th</sup> day, first three embryo developmental stages were recorded. Third stage embryos first appeared in E3 and E4. On 100<sup>th</sup> day onwards all the embryo developmental stages started to appear. Both *S. isoetifolium* and *C. serrulata* incorporated diets, irrespective of their concentration, influenced the fertility rate of the experimental fish *P. latipinna* (Table 1.6). As the concentration of the diet increased from 5 to 20% in both the diets, the number of individuals released by the female *P. latipinna* also increased accordingly when compared to the control. The breeding cycle generated four spawning. The number of young ones produced at each spawning in each concentration of the diet drastically increased spawning by spawning and reached the maximum at the last spawning. The fish fed with *S. isoetifolium* incorporated diet yielded the maximum of 260 individuals in E4 fed diet. Whereas, the number gradually reduced to 215, 182 and 147 in E3, E2 and E1 diets respectively. The total young ones released by the control fish was 114 only (Table. 1.6).

Almost the same trend was noted in *C. serrulata* incorporated diets also. Among the *C. serrulata* incorporated diet, the E8 diet showed maximum performance than others and control. The total number of young ones generated by this group of diet was 185, 168, 156, 133 and 114 respectively in E8, E7, E6, E5 and control (Table 1.6). When compared to the control, the E4 diet yielded 128% increase of young ones than the control and E8 showed 62% increase of young ones than the control.

Even though the diet induced large scale production of young ones corresponding to their concentrations in the diet than the control, the mean weight and mean length of the young ones did not show statistical difference ( $p > 0.05$ ) (Table 1.7) The relative fertility (Table 1.8) of the fish was maximum (80.47%) in E4 and was followed by E3 (80.31%) and E8 (73.44%).

**Table 1.1 Feed formulation and proximate composition of experimental diets**

INGREDIEN TS (g/100g)	C	% of <i>S. isoetifolium</i> in the diet				% of <i>C. serrulata</i> in the diet			
		E1 (5)	E2 (10)	E3 (15)	E4 (20)	E5 (5)	E6 (10)	E7 (15)	E8 (20)
Fish meal	33.0	33.0	33.0	33.0	33.0	30.0	30.0	30.0	30.0
GNOC	34.2	30.0	30.0	30.0	30.0	36.5	36.5	36.5	36.5
<i>S. isoetifolium</i>	-	5.0	10.0	15.0	20.0	-	-	-	-
<i>C. serrulata</i>	-	-	-	-	-	5.0	10.0	15.0	20.0
Rice bran	10.0	10.0	5.0	5.0	5.0	10.0	5.0	5.0	5.0
Wheat flour	10.0	10.0	10.0	5.0	5.0	10.0	10.0	5.0	5.0
Tapioca flour	9.8	9.0	9.0	9.0	4.0	10.5	10.5	10.5	10.5
Multi vitamin	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Veg.oil	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Cr <sub>2</sub> O <sub>3</sub>	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
<b>Proximate composition (%)</b>									
Protein	45.03 ±3.29	45.94 ±2.98	47.92±2.4 3	48.81±2.1 3	49.64±2.1 5	45.08±1.4 8	45.54±2.1 9	46.39±1.7 6	47.21±3.4 5

<b>Lipid</b>	7.81±1.65	6.41±0.98	5.72±1.27	5.69±0.78	6.48±0.74	7.68±0.47	7.88±0.47	7.90±0.66	7.91±0.32
<b>Ash</b>	7.74±1.34	8.53±1.39	9.00±2.18	10.34±1.28	10.82±2.17	7.97±1.36	8.14±2.49	8.97±2.13	9.19±1.98
<b>Carbohydrates</b>	39.42±2.39	39.12±1.45	37.36±2.14	35.16±1.78	33.06±2.13	39.27±2.27	38.44±4.57	36.74±1.32	35.69±2.12

(GNOC-Ground Nut Oil Cake, C- Control)

**Table 1.2: Impact of different levels of *S. isoetifolium* and *C. serrulata* on gonad weight (mg) wet weight in *P. latipinna*.**

Each value is the mean (X ± SD) of three observations

Days	C	Levels of <i>S. isoetifolium</i> (%)				Levels of <i>C. serrulata</i> (%)			
		E1	E2	E3	E4	E5	E6	E7	E8
75	141±10.4	182±9.3*	272±10.3*	353±7.3*	618±11.8*	168±6.8	204±8.5*	254±6.3*	289±7.6*
100	226±10.5	264±10.3	344±12.4*	482±9.8*	935±17.5*	227±9.4	273±9.4*	346±9.5*	397±4.9*
125	308±14.8	373±11.2	508±15.3*	711±11.4*	1348±21.3*	325±10.5	374±9.7	466±13.6*	581±12.5*
150	466±16.4	523±15.3*	692±15.9*	1042±20.5*	1686±27.4*	489±8.9	517±11.4*	633±13.7*	767±13.3*

The superscript dot (•) represents the significantly different (p<0.05) value

**Table 1.3: Impact of different levels of *S. isoetifolium* and *C. serrulata* on gonadosomatic index (%) in *P. latipinna***

Each value is the mean (X ± SD) of three observations

Days	C	Levels of <i>S. isoetifolium</i> (%)				Levels of <i>C. serrulata</i> (%)			
		E1	E2	E3	E4	E5	E6	E7	E8
75	12.34±1.6	15.18±3.8	20.87±4.2	24.96±1.8*	32.12±4.3*	13.78±3.8	16.69±3.6	21.03±2.6	24.43±4.6*
100	15.97±1.5	18.23±2.4	23.83±4.7	28.76±1.7*	38.76±4.2*	16.23±3.2	18.49±5.3	23.77±3.6	26.98±3.2*
125	18.02±1.8	20.93±1.5	26.65±3.56	33.78±1.4*	48.68±5.8*	18.56±4.6	20.89±3.9	25.62±5.4	31.69±2.4*
150	22.07±1.5	24.58±1.3	30.54±2.6	42.64±1.6*	52.95±5.4*	23.81±4.5	23.87±3.7	28.48±5.7	34.68±3.2*

The superscript dot (•) represents the significantly different (p<0.05) value

**Table 1.4: Effect of Seagrasses diets on embryo developmental stages of *P. latipinna***

Diets	I	II	III	IV	V	VI	Total
<b>On day 75</b>							
C	11						11
E1	14						14
E2	15	9					24
E3	18	12	6				36
E4	19	14	7				40
E5	10						10
E6	13						13
E7	14	8					22
E8	17	9	6				32
<b>On day 100</b>							
C	23	14	17				54
E1	23	12	11	8			54

E2	24	15	14	12	9		74
E3	24	11	9	8	12	12	76
E4	29	12	10	10	13	11	85
E5	21	8	13				42
E6	23		12	11	10		56
E7	25	12	11	7	12	11	78
E8	25	11	8	14	11	10	79
<b>On day 125</b>							
C	26	21	15	14	10	9	95
E1	28		23	26	19	10	107
E2	29	16	14	22	17	15	113
E3	39	23		26	14	11	113
E4	43	24	27	13	12	19	138
E5	26		16	17	11	19	89
E6	28	12	14	19	17	21	111
E7	32	28	12	15	8	8	113
E8	35	23	21	22	14	12	127
<b>On day 150</b>							
C	33	23	26	12	24	22	116
E1	45	25	15	19	23	23	135
E2	39	22	18	19	21	28	147
E3	37	25	22	21	21	24	150
E4	33	31	25	23	21	22	165
E5	35	14	12	19	15	24	119
E6	32	22	21	24	27	25	141
E7	36	17	21	23	22	24	143
E8	33	21	25	23	21	22	155

**Table 1.5: Breeding days and inter brood interval (IBI) of fish fed with different levels of *S. isoetifolium* and *C. serrulata***

	C	Levels of <i>S. isoetifolium</i> (%)				Levels of <i>C. serrulata</i> (%)			
		E1	E2	E3	E4	E5	E6	E7	E8
<b>I</b>	121±9.1 <sup>*</sup>	119±8.9	112±9.6	109±7.9	102±7.9	121±10.4	118±8.6	112±6.4	111±6.2
<b>IBI</b>	35±2.43 <sup>*</sup>	32±2.65 <sup>*</sup>	31±3.89 <sup>*</sup>	27±3.27	25±3.54	34±3.57 <sup>*</sup>	33±3.16 <sup>*</sup>	30±2.98	29±3.01
<b>II</b>	156±6.5 <sup>*</sup>	151±7.5 <sup>*</sup>	144±8.7	137±7.6	127±8.1	155±7.9	151±8.7	143±10.4	141±9.3
<b>IBI</b>	34±2.12 <sup>*</sup>	31±2.16	30±2.78	27±2.64	25±2.98	34±3.06 <sup>*</sup>	32±3.98 <sup>*</sup>	29±2.15	29±2.54
<b>III</b>	191±7.7 <sup>*</sup>	182±8.4 <sup>*</sup>	174±8.9 <sup>*</sup>	164±9.3	152±7.4	189±8.8 <sup>*</sup>	189±8.5 <sup>*</sup>	172±9.9 <sup>*</sup>	170±9.2
<b>IBI</b>	34±2.11 <sup>*</sup>	30±2.59 <sup>*</sup>	30±3.04	26±3.22	24±4.44	33±3.22 <sup>*</sup>	32±2.65 <sup>*</sup>	29±4.66	27±4.32
<b>IV</b>	225±9.7 <sup>*</sup>	213±9.1 <sup>*</sup>	204±9.5 <sup>*</sup>	190±7.8	176±8.5	222±9.7 <sup>*</sup>	222±10.3 <sup>*</sup>	201±10.5 <sup>*</sup>	197±9.6 <sup>*</sup>

The superscript dot (\*) represents the significantly different (p<0.05) value. (I, II, III, IV-Breeding)

**Table 1.6: Fertility of fish fed with different levels of *S. isoetifolium* and *C. serrulata***

Breeding	C	Levels of <i>S. isoetifolium</i> (%)				Levels of <i>C. serrulata</i> (%)			
		E1	E2	E3	E4	E5	E6	E7	E8
I	21±1.2	32±2.4*	42±3.7*	48±3.8*	58±3.5*	30±1.4	35±3.6*	37±1.7*	37±2.5*
II	27±1.4	35±1.6	44±3.5*	52±3.6*	62±3.6*	31±2.5	36±4.8	39±2.5*	40±3.6*
III	31±1.2	39±2.7	46±3.9*	56±4.6*	69±4.8*	35±2.8	41±4.3*	43±5.7*	47±3.9*
IV	35±2.5	41±2.9	50±5.5*	59±5.7*	71±4.6*	37±4.2	44±4.3	49±4.8*	61±6.6*
Total	114	147	182	215	260	133	156	168	185

The superscript dot (\*) represents the significantly different (p<0.05) value

**Table 1.7: Mean length (mm) and mean weight (mg) of young ones released**

	Mean length (mm)				Mean Weight (mg)			
	I	II	III	IV	I	II	III	IV
C	8.31±1.6	9.11±0.3	9.17±1.1	9.04±1.2	9.12±0.8	10.1±1.2	10.2±0.8	10.1±1.2
E1	8.30±0.9	9.28±1.2	9.29±1.2	9.24±1.2	9.19±1.2	10.2±0.8	10.3±1.1	10.2±0.8
E2	8.48±1.2	9.31±1.0	9.31±0.6	9.21±0.5	9.27±1.1	10.3±1.1	10.4±1.2	10.3±1.1
E3	8.42±0.8	9.43±1.1	9.38±1.2	9.43±1.1	9.31±0.8	10.3±1.1	10.4±1.2	10.5±0.6
E4	8.64±1.2	9.48±1.2	9.49±1.2	9.24±1.2	9.35±0.6	10.4±1.2	10.5±0.6	10.2±0.8
E5	8.29±1.1	9.14±1.2	9.16±0.9	9.07±1.1	9.13±1.1	10.1±1.1	10.3±1.1	10.1±1.8
E6	8.42±0.8	9.22±0.8	9.25±0.6	9.16±0.9	9.15±0.6	10.1±0.9	10.3±1.1	9.9±1.2
E7	8.46±0.9	9.34±1.2	9.38±1.2	9.21±0.6	9.18±1.2	10.2±0.8	10.4±1.2	10.1±1.6
E8	8.46±0.9	9.36±0.9	9.41±1.1	9.13±1.1	9.27±1.1	10.3±1.1	10.4±1.2	10.3±1.1

**Table 1.8: Effect of different levels of *S. isoetifolium* and *C. serrulata* on total fry production and relative fertility of *P. latipinna***

	C	Levels of <i>S. isoetifolium</i> (%)				Levels of <i>C. serrulata</i> (%)			
		E1	E2	E3	E4	E5	E6	E7	E8
Mean weight of female fish (brooder) (g)	2.512±0.06	2.391±0.08	2.576±0.08	2.677±0.06	3.231±0.09*	2.433±0.06	2.465±0.09	2.476±0.02	2.519±0.08
Total fry production	114±10.1	147±10.6*	182±11.3*	215±11.4*	260±12.3*	133±10.5*	156±9.7*	168±13.2*	185±13.6*
Relative fertility (%)	45.38	61.48	70.5	80.31	80.47	54.66	63.28	67.85	73.44

The superscript dot (\*) represents the significantly different (p<0.05) value

### Discussion

The proximate composition (Table 1.1) of feed showed that the highest protein content (48.81±2.13%) was recorded in E4 (20% *S. isoetifolium*) diet. It was followed by E3. The female gonad weight (Table 1.2) also followed the same trend. The highest gonad weight (1686±27.4 mg) was recorded in E4 and followed by E3 (1042±20.5 mg) on the 150<sup>th</sup> day. The trend remained the same from 75<sup>th</sup> to 150<sup>th</sup> day. E4 had the highest Gonado-Somatic Index (GSI) with 52.95±5.4% and it was followed by E3 and E8 with 42.64±1.6% and

34.68±3.2% respectively. The proximate analysis of feed showed that the protein content was higher in E4, E3 and E8 in descending order. This result reflected in the GSI and gonad weight of female *P. latipinna*. Similarly, higher gonad weight and GSI were reported on *Betta splendens* fed with 45% protein diet (James and Sampath, 2002)

The present study showed that from 100<sup>th</sup> day onwards 4<sup>th</sup> to 6<sup>th</sup> embryonic developmental (early, middle and late) stages have started appearing (Table 1.4). The number increased on 150<sup>th</sup> day. On the 100<sup>th</sup> day of rearing period, E3, E4, E7 and E8 diets showed 12, 11, 11 and 10 numbers of 6<sup>th</sup> stage embryos respectively. The present observation coincided with Nagarajan *et al.* (2011) who have reported the fast development of advanced embryo stages (4<sup>th</sup> – 5<sup>th</sup>) in Red Swordtail, *Xiphophorus helleri* fed with 500 mg vitamin E incorporated diet.

The early breeding started in E4 diet fed fishes on 102 days (Table 1.5). Totally four spawning were observed and I, II, III and IV breeding started on 102±7.9, 127±8.1, 152±7.4 and 172±8.5 respectively in the E4 fed fishes. E4 also showed maximum fry production (260) (Table 1.6). The shortest Inter Brood Interval (IBI) of 24±4.44 also reported in E4. James and Sampath (2003) reported that *Xiphophorus helleri*, produced the highest number of fries, had short IBI and bred four times in the breeding cycle. In the present study, minimum interbrood interval (IBI) (24 days) was noticed in E4 diet (20% *S. isoetifolium*) between the 3<sup>rd</sup> and 4<sup>th</sup> breeding (Table 1.7). It is followed by the same diet between 2<sup>nd</sup> and 3<sup>rd</sup> breeding (25 days)..

James *et al.* (2006) reported that gonad weight, GSI and fertility of *Xiphophorus helleri* increased with increasing levels (0, 1, 3, 5 and 8%) of *Spirulina*. In the present study also the above said parameters increased with increasing levels of *S. isoetifolium* and *C. serrulata*. The E4 diet showed higher relative fertility. There was a correlation between weight of female fish and fry production (Table 1.8). The larger fish produced more number of fry. Girndt *et al.* (2012) correlated brood size with female standard size. Larger the fish, larger the brood size. Maximum brooder weight (3.231±0.09) was recorded in E4. There was no significant (p>0.05) difference between the mean length and weight of the fry among the groups (Table 1.7). Increase in the relative fertility as well as fry production of *X. helleri* were observed in females fed with high levels of protein (Chong *et al.*, 2004; Ling *et al.*, 2006). The fact that the protein content of *S. isoetifolium* is higher than *C. serrulata* (Pradeeba *et al.*, 2011) could have been the reason for the observation of good reproductive performance in E4 diet. The result of the present study showed that the 20% *S. isoetifolium* could have some positive effect on the reproduction of *P. latipinna*

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## **Mathematical Interest and Achievement of VIII Standard Students**

**S. Muthulakshmi\***

**Dr. H. Deepa \*\***

### ***Abstract***

*The present study aims at exploring the mathematical interest and achievement of VIII standard students. The sample of the study consists of 300 students from VIII standard students from 8 schools in Thoothukudi area. The survey method is used. Mathematics Achievement test prepared and validated by the investigator and Mathematics Interest Inventory by L. N. Dubey were used to collect data. The data were analysed by using Mean, Standard deviation, t-test, ANOVA test, Post ANOVA, Pearson's product moment Correlation. The study shows that there is a significant relationship between mathematics achievement of VIII standard students and their interest towards mathematics.*

**Keywords:** Mathematics-Mathematical interest-achievement-interest inventory-relation

### **Introduction**

Mathematics has been defined as the science of numbers and space or abstract science of space and quantity. Mathematics plays a great role in our lives. Mathematics has also played an important role in the progress of total civilization. It has raised man from the primitive stage-when man found it difficult to enumerate and count-to such an advanced stage of development. All the inventions, new discoveries and developments owe their origin to mathematics. Had there been no advancement or progress of knowledge in mathematics man would have remained at same primitive level as he was twenty centuries ago. It is felt that every aspect of knowledge and life is incomplete without the knowledge of mathematics. Mathematics is the mirror of civilization. The progress of any country in this age depends largely upon its advancement in the field of mathematics and science. There is growing need in all countries and societies for many scientists, technicians, engineers, economists and special experts, in the various fields of human affairs and adjustment. They all feel the great need of mathematical knowledge to do their work efficiently and effectively. It is further realized that without the sound knowledge of mathematics every developed or developing society will remain undeveloped or under developed.

To arouse and maintain the student's interest in mathematics is a major problem for the teacher. The loss of interest is one of the principle causes of student failure. Students work most effectively in tasks in which they are genuinely interested. Students as a rule, readily become interested in things which are new or exciting.

### **Significance of the Study**

Everybody needs some knowledge of mathematics to solve their day to day problems. Mathematics is a very useful subject for most vocations and higher specialized courses of learning. It is also believed that mathematics is an exceptionally difficult and it requires special ability and intelligence. Ultimately these things lead us to believe that teaching of

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mathematics requires exceptional skill and the teacher should properly motivate his children by arousing interest in this subject. Achievement test is an effective tool in the teaching learning process of mathematics. They plan an important role in mathematics education. Therefore it is appropriate to investigate the mathematical interest and academic achievement of students.

### **Objectives of the Study**

1. To find out the level of Mathematics achievement of VIII standard students.
2. To find out the level of Mathematical interest of VIII standard students.
3. To find out whether there is any significant difference in Mathematics achievement of VIII standard students with respect to gender.
4. To find out whether there is any significant difference in the mathematical interest of VIII standard students with respect to the medium of instruction.
5. To find out whether there is any significant relationship between mathematics achievement of VIII standard students and their interest towards mathematics.

### **Hypothesis**

1. Mathematics achievement of VIII standard students is moderate.
2. Mathematical interest of VIII standard students is moderate.
3. There is no significant difference in the mathematics achievement of VIII standard students with respect to gender.
4. There is no significant difference in the mathematical interest of VIII standard students with respect to the medium of instruction.
5. There is no significant relationship between mathematics achievement of VIII standard students and their interest towards mathematics.

### **Methodology**

#### **Method adopted for the present study**

The investigator adopted "survey method" to find out the mathematical interest and achievement.

#### **Population of the study**

The VIII standard students from high schools students of various schools in Thoothukudi area form the population for the study.

#### **Sample**

The investigator selected three hundred VIII standard students from 8 schools in Thoothukudi area. The sample was taken from 4 government schools and 4 government aided schools. Since the researcher has to observe all, the random sampling technique was adopted.

#### **Tools used**

Two tools used for the study are Mathematics Achievement Tool and Mathematical Interest Inventory. (1) Mathematics Achievement Tool: Tool is prepared by the investigator to find out the achievement of the students with the help of her guide. Mathematics achievement tool consisted of 35 items. (2) Mathematical Interest Inventory by L.N.DUBEY. This consists of 40 items. This Mathematical interest inventory is designed to measure the interest of boys and girls in mathematics. This tool has been standardized for the pupils of class VIII

#### **Statistical techniques used**

The following statistical techniques were used for the analysis of the data – Mean, Standard deviation, t-test (Test of significance), ANOVA test, Post ANOVA (Scheffe Test), Pearson's product moment Correlation

**Data Analysis**

**Hypothesis: 1**

Level of mathematics achievement of VIII standard students is moderate.

**Table No: 1 Level of mathematics achievement of VIII standard students**

TOTAL	LOW		MODERATE		HIGH	
	NO	%	NO	%	NO	%
300	31	10.33	207	69	62	20.67

From the table it is inferred that 10.33%, 69% and 20.67% of students have come under the category of low, moderate and high level of mathematics achievement respectively.

**Hypothesis: 2**

Level of mathematical interest of VIII standard students is moderate.

**Table No: 2 Level of mathematical interest of VIII standard students**

TOTAL	LOW		BELOW AVERAGE		AVERAGE		ABOVE AVERAGE		HIGH	
	NO	%	NO	%	NO	%	NO	%	NO	%
300	16	5.33	52	17.33	74	24.67	98	32.67	60	20

From the table it is inferred that 5.33 %, 17.33%, 24.67%, 32.67% and 20% of students have come under the category of low, below average, average, above average and high level of mathematical interest respectively.

**Hypothesis: 3**

There is no significant difference in the mathematics achievement of VIII standard students with respect to gender.

**Table no: 3 Difference in the mathematics achievement of VIII standard students with respect to gender**

Variable	Category	No	Mean	S.D	CR Value	Table Value	Remarks at 0.05% Level
Gender	Male	152	14.178	7.262	3.027	1.96	S
	Female	148	17.912	8.333			

From the table the calculated 't' value is greater than the table value. Hence the null hypothesis is rejected.

**Hypothesis: 4**

There is no significant difference in the mathematical interest of VIII standard students with respect to the medium of instruction.

**Table no: 4 Difference in the mathematical interest of VIII standard students with respect to the medium of instruction**

Variable	Category	No	Mean	S.D	CR Value	Table Value	Remarks at 0.05% Level
Medium of Instruction	Tamil	220	27.414	6.617	5.124	1.96	S
	English	80	23.100	6.385			

From the table the calculated 't' value is greater than the table value. Hence the null hypothesis is **rejected**.

**Hypothesis: 5**

There is no significant relationship between mathematics achievement of VIII standard students and their interest towards mathematics.

**Table no: 5 Correlation in mathematics achievement and mathematical interest**

NO	"r" Value		REMARKS
	CALCULATED VALUE	TABLE VALUE	
300	0.435	0.113	S

The above table shows that the calculated “r” value is greater than the table value. Hence the null hypothesis is **rejected**.

**Findings**

1. Level of mathematics achievement of VIII standard students is moderate (69 %)
2. Level of mathematical interest of VIII standard students is above average.
3. Mathematics achievement is high among the female VIII standard students.
4. VIII standard Tamil medium students have a high level of mathematical interest than the English medium students.
5. There is a significant relationship between mathematics achievement of VIII standard students and their interest towards mathematics.

**Recommendations**

Gender has significant impact on the mathematics achievement of VIII standard students. Mathematics achievement is high among the female VIII standard students. Girls give more importance to repeated practice. Boys should be given additional exercises and repeated practice so that they will be familiar with the subject matter which in turn will help them to solve the problems.

The medium of instruction has significant impact on the mathematics achievement of VIII standard students. Tamil medium students have high achievement in mathematics than English medium students. This may be due to the command of language and understanding which leads to better analytical ability there by increasing the achievement. Also medium of instruction has significant impact on the mathematical interest of VIII standard students. Tamil medium students have a high level of mathematical interest than the English medium students. This may be due to the better understanding of the problem situation through the mother tongue there by enhancing the mathematical interest.

The present study revealed that there is a positive correlation between the mathematical interest and mathematics achievement with respect to gender, locality, type of school, medium of instruction, parental education and parental monthly income. Thus, teachers should take steps to increase the mathematical interest by following new techniques in teaching and use activities to explain abstract concepts.

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## **Analysing Soundness of Selected Public and Private Sector Banks in India: A CAMEL Approach**

**Ashish Gupta\***

**Dr. V. S. Sundaram\*\***

### **Abstract**

The development of the economy of any country is largely dependent on the soundness of its banking sector. Since the banking sector constitutes a major component of the financial services sector. The soundness of the banking sector is essential for a healthy and vibrant economy. In this way, it is necessary to analyze the soundness of the banking sector from time to time. The present study has been focused on the financial performance of selected top five public sectors banks (PSBs) and top five private sectors banks (Pvt. SBs) using CAMEL approach. This study is primarily based on secondary data covering the time period of ten years from 2005-06 to 2014-15. The study found that HDFC Bank has been occupied the top place followed by BOB and CB and the least position is secured by IB.

**Keywords:** *Capital Adequacy, Assets quality, Management Efficiency, Earning quality, and Liquidity Management*

**JEL Code:** *G2, G12, G21*

### **1. Introduction**

Liberalization, privatization and globalization opened new doors in the banking sector, like all banks try to act better than others by adopting international guidelines and sparked a new spirit competition and efficiency in the banking system. After LPG (Liberalization, privatization and globalization) competition between the public and private sector banks has been increased in India. **According to estimates by the Reserve Bank of India**, the market share of public sector banks has declined from 80 percent in 2000 to just over 60 percent in 2015. Due to strong competition, the increase in NPA level levied stress on Indian banking sector particularly public sector banks and further their stress in maintaining profitability and sustainable growth hampered in the latest decades. Therefore, it is necessary to analyse the performance of the banking sector from time to time.

### **2. CAMEL Model Approach**

CAMEL model is a standout amongst the best and well-known techniques which is utilized to decide the performance of the bank, developed in the mid-1970's by federal regulators in the USA. This system was adopted by India since 1995 by the recommendation of Mr. Padmanabhan, Governor of RBI. CAMEL model is not a comprehensive indicator of all the supervisory information gathered during a full scope exam, they serve as an appropriate summary measure for analysis. It has proven to be an effective internal supervisory tool for evaluating the soundness of a financial firm, on the basis of identifying those institution requiring special institutions. The various type of financial ratio is used to measure the overall financial soundness of a bank under the CAMEL Model. CAMEL is an acronym for five components of bank safety and Soundness consists of the following

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- A. Capital Adequacy Test
- B. Assets Quality Test
- C. Management Efficiency Test
- D. Earning Quality Test
- E. Liquidity Management Test

Each of the five performance indicators is evaluated on a scale of 1 to 5, which varies from a fundamentally sound bank to fundamentally weak bank.

### **3. Literature Review**

**S. K. Khatik, Amit Kr. Nag (2010)** in their paper, researcher emphasized the overall performance and soundness of five nationalized banks (Bank of Baroda, Union bank of India, Dena Bank, State bank of India and UCO bank) with help of CAMEL model approach and considered the data for the study of five years starting from 2007-08 to 2012-13. The researcher found that the performance of Bank of Baroda was better than other selected banks and occupied first rank. The second rank was secured by union bank of India and Dena bank, SBI secured the third rank and the fifth rank was secured by UCO bank.

**P. S. Vohra (2011)** this paper related to the comparative study of public and private sector banks. The total of six banks was selected including three from public sector banks (BOB, Canara, Dena) and three from private sector banks (ICICI, HDFC, AXIS) . This study was mainly planned to evaluate the financial performance of the selected public sector and private sector bank during last three financial years. This study endeavored to cover the broad research work on capital structure, working capital and profitability through various accounting ratio and statistical test on Indian banking sector into two individual categories of public and private sector banks.

**Aswini Kumar Mishra and Harsha (2012)** this paper deal with the financial soundness in the Indian banking sector using the internationally accepted CAMEL rating parameters. For this purpose, the researcher selected twelve banks such as Axis Bank, Bank of Baroda, Bank of India, Canara Bank, HDFC Bank, ICICI Bank, IDBI Bank, Kotak Mahindra Bank, Oriental Bank of Commerce, Punjab National Bank, State Bank of India, and Union Bank of India. The period of the study was taken one year (2011). The researcher ranked the bank on the basis of his analysis. It was found that the private sector banks had occupied the place on the top of the list with their performance in terms of soundness. The public sector banks like Union Bank and State bank of India had occupied the last position and showed a low economic soundness in comparison.

**Sahila Chaudhary (2012)** this research paper covered the analysis the selected three public sector banks (State bank of India, Punjab national bank, Bank of Baroda) and three private sector bank (ICICI, HDFC, AXIS bank) for a period of 12 years from 2000 to 2011 on the basis CAMEL model. It was found that overall financial conditions as well as the ability of the management to meet the need for additional capital are better in Bank of Baroda and ICICI Bank in their groups as the capital adequacy ratio of this bank was better than selected other banks. The management effectiveness is better in SBI and ICICI in their groups as the credit-deposit ratio is better than other banks.

**Brinda Devi V (2013)** in her research paper, attempted to analyze the Profitability of private sector Banks (Axis Bank, ICICI Bank, Karur vysya Bank, South Indian Bank) in India. This study was based on secondary data covering the period from 2002-2003 to 2011-2012. Financial ratio and some statistical tools (mean, SD CV and Anova) were used

for analyzing the profitability of the banks. It was found that there was the difference among the mean value of interest spread, net profit margin, return on long term fund and return on net worth and there was no difference among the mean value of return on assets of private banks. She (author) suggested that the entire bank should take effective steps to improve the operating efficiency of the business.

**Parvesh Kumar Aspal and Naresh Malhotra (2013)** in their research paper evaluated the performance of public sector banks in India using CAMEL model for a five year period from 2007 to 2011. The CAMEL ranking approach was used to measure the qualified performance of the public sector banks in India. It was found that during the year 2007-2011, Baroda and Andhra bank were top two performing banks because of high capital adequacy and asset quality. The United Bank of India was the poorest performer during the study period because of management inefficiency, low capital adequacy and earning quality. The study suggested that banks had to improve their management efficiency, asset and earning quality

**Sushendra Kumar Mishra and Parvesh Kumar Aspal (2013)** in their research paper analyzed the financial performance of state bank group for the study period of three years from 2009 to 2011. For analyzing the data, twenty financial ratio and statistical tools was used. It was found that SBT performance was better than other subsidiaries of SBI and it held the top rank. SBI held last position in their group. Therefore, they suggested that SBI needed to enhance its position with respect to assets quality and capital adequacy. All banks occupied different ranks on the basis of CAMEL ratio but there was no statistically significant difference between the CAMEL ratios. It implied that the overall performance of State bank of India group was same.

**Ruchi Gupta (2014)** in her research paper, attempted to evaluate the performance of 26 public sector banks in India using the CAMEL model for a five years period from 2009-13. The researcher ranked various banks according to their analysis and interpretation. The researcher observed that there was a statistically significant difference between CAMEL ratios of all the public sector banks in India and found that banks with least ranking needed to increase their performance to come up to the preferred standards.

#### **4. Objective of the Study**

The main objective of the study is to analyze the financial performance and position of the selected public and private sector banks in India using CAMEL Model.

#### **5. Research Methodology**

The present study has been focused on the financial performance of selected top five public sectors banks i.e. State Bank of India (SBI), Punjab National Bank (PNB), Bank of Baroda (BOB), Bank of India (BOI), and Canara Bank (CB) and top five private sector banks i.e. ICICI Bank, HDFC Bank, Axis Bank (AB), Kotak Mahindra Bank (KMB) and Indusind Bank (IB). It has been selected on the basis of their net worth as on 31 March 2014.

The study has been carried out for a period of ten years starting from 2005-06 to 2014-15. This study is based on secondary data and it has been collected from annual report of respective Banks, RBI report and Publication, and other publications related to banking sector. CAMEL Model has been used to known the performance of selected banks. It is ratio based model which assigns the rank to each individual's bank based on five key parameters such a Capital adequacy, Assets quality, Management Efficiency, Earning quality and Liquidity Management.

## 6. Analysis of Component of Camel Model

### 1. Capital Adequacy Test

Capital adequacy has emerged as one of the major indicators of the financial health of a banking entity. It is important for the bank to maintain depositor's confidence and preventing the bank from going bankrupt. It reflects the overall financial condition of banks and also the ability of management to meet the need for additional capital. RBI of India prescribes banks to maintain a minimum capital to risk weighted assets ratio of 9 percent with regard to credit risk, market risk, and operational risk. The following ratios have been used to measure the Capital Adequacy.

- A. Capital Adequacy Ratio
- B. Advances to Assets Ratio
- C. Government Securities to Total Investment
- D. Credit Deposit Ratio

**Table: 1 - Capital Adequacy Test**

Banks	Capital Adequacy Ratio			Advances to Assets Ratio			Govt. Securit. to Total Invest.			Credit Deposit Ratio			Group Rank	
	Mean	CV%	*UR	Mean	CV%	UR	Mean	CV%	UR	Mean	CV%	UR	Composite Rank	Final Rank
<b>BOB</b>	13.42	7.42	1	60.46	5.56	6	80.57	5.00	2	70.60	5.07	6	15	2
<b>SBI</b>	12.86	6.66	1	61.11	7.86	7	79.39	3.42	2	79.58	7.20	4	14	1
<b>PNB</b>	12.74	6.88	5	61.56	6.41	4	84.07	7.00	2	73.87	6.80	6	17	3
<b>BOI</b>	11.63	8.55	10	62.52	3.77	2	82.72	7.04	5	74.33	3.98	2	19	6
<b>CB</b>	12.83	12.37	8	61.10	3.04	3	85.68	2.71	1	70.57	2.80	5	17	3
<b>ICICI</b>	16.56	16.64	6	55.67	5.30	8	60.08	14.07	10	95.91	7.20	2	26	8
<b>HDFC</b>	15.36	12.84	3	75.29	1.77	1	76.33	9.76	9	73.93	10.11	7	20	7
<b>AB</b>	13.73	14.58	6	55.94	8.92	10	60.81	4.01	6	72.92	12.69	10	32	10
<b>IB</b>	13.39	13.11	8	58.10	6.55	9	77.96	6.67	6	76.50	14.16	7	30	9
<b>KMB</b>	17.12	16.11	4	58.36	4.84	5	79.65	8.47	8	94.87	6.46	1	18	5

**Source:** Computed from annual report of respective Banks

It is obvious from the above table 1 that SBI got the first position with the lowest composite rank of 14, followed by BOB, PNB and CB and the last position is secured by AB with the highest composite rank of 32. It is found that four PSBs and one Pvt.SB secured the place in top five ranks

### 2. Assets Quality Test

Most of the banks are failure due to poor assets quality so it is an essential tool to judge the degree of financial strength. Banks assets quality help to determine the elements of non-performing assets as the percentage of the total assets which indicates the types of advances the bank has made generate interest income. Generally, it is the difficult task to measuring the assets quality because it is mostly subjective from the analyst's point of view. To determine the assets quality test of banks, the following ratios have been used.

- A. Net NPA to Advance Ratio
- B. Total Investment to Total Assets Ratio
- C. Net NPA to Total Assets Ratio
- D. Percentage Change in NPA

\*Ultimate Rank has been calculated on the basis of mean and CV rank. Mean rank shows the average performance of banks and CV rank shows the consistent performance of banks. Therefore, I have calculated the ultimate rank which is combination of mean and CV rank. The ranking methodology has been followed in ultimate ranking by putting the highest rank on the least value.



**Table: 2 – Assets Quality Test**

Banks	Net NPA to Advances Ratio			Total Investment to Total Assets			Net NPA to Total Assets			Percentage changes in NPA			Group Rank	
	Mean	CV%	UR	Mean	CV%	UR	Mean	CV%	UR	Mean	CV%	UR	Composite Rank	Final Rank
BOB	0.82	45.13	1	22.02	18.69	10	0.49	67.91	3	37.95	151.2	6	20	6
SBI	1.89	45.59	10	25.76	12.70	8	1.17	22	3	19.34	100.9	1	22	7
PNB	1.39	42.37	2	26.53	4.06	2	0.88	93.22	10	91.34	112.4	8	22	7
BOI	1.45	15.73	4	23.17	11.49	8	0.91	62.33	9	42.23	204.3	9	30	10
CB	1.44	42.65	5	26.91	4.62	2	0.88	41.44	3	25.77	109.4	3	13	1
ICICI	1.27	58.88	7	30.07	9.04	2	0.71	41.81	3	24.67	201.6	4	16	3
HDFC	0.34	68.41	2	30.28	16.02	7	0.18	39.71	1	41.68	140.6	6	16	3
AB	0.48	92.87	7	32.71	13.38	5	0.26	33.71	1	21.16	90.7	1	14	2
IB	1	59.74	5	27.54	9.24	6	0.55	88.16	8	150.19	280.8	10	29	9
KMB	1.21	91.92	9	31.88	7.58	1	0.69	56.65	3	4.05	837.5	4	17	5

Source: Computed from annual report of respective Banks

It is obvious from the above table 2 that CB got the first position with the lowest composite rank of 13, followed by AB, ICICI Bank and HDFC Bank and the last position is secured by BOI with the highest composite rank of 30. It is found that four Pvt. SBs and one PSB secured the place in top five ranks

### 3. Management Efficiency Test

It is another essential component of the CAMEL model. As we know the management is finally responsible for the sound functioning of every organization. It is a key objective of bank management to minimize the cost of product and services and maximize the profit under the given circumstances with efficiently and effectively utilization of available resources. For analysing the management efficiency test, the following ratios have been used.

- A. Assets Utilisation Ratio
- B. Profit per Employee
- C. Business per Employee
- D. Cost of Fund Ratio

**Table: 3 Management Efficiency Test**

Banks	Assets Utilization Ratio			Profit Per Employee			Business Per Employee			Cost of Fund Ratio			Group Rank	
	Mean	CV%	UR	Mean	CV%	UR	Mean	CV%	UR	Mean	CV%	UR	Composite Rank	Final Rank
BOB	7.90	7.86	10	7.27	48.61	4	116.5	46.39	4	4.95	8.90	1	19	4
SBI	8.96	4.26	2	4.41	31.81	4	70.89	43.57	10	5.59	7.68	3	19	4
PNB	9.15	6.75	5	5.67	40.36	9	86.18	43.10	5	5.45	13.87	4	23	7
BOI	8.44	6.52	9	5.03	37.21	8	116.33	50.75	7	5.53	8.74	2	26	10
CB	9.14	5.55	4	5.73	39.73	4	102.10	39.69	3	6.49	14.39	9	20	6
ICICI	9.51	6.45	2	10.60	18.97	1	78	39.69	7	6.33	12.52	6	18	2
HDFC	10.57	9.12	5	7.61	32.26	3	68.64	24.93	5	5.50	17.27	6	18	2
AB	9.85	8.34	5	12.17	27.10	1	117.90	11.21	1	5.55	12.30	5	12	1
IB	10.93	14.05	5	6.12	52.02	10	85.62	13.58	2	7.37	12.06	8	25	9
KMB	11.78	4.54	1	6.93	44.86	4	51.71	28.23	9	6.53	14.33	9	23	7

Source: Computed from annual report of respective Banks

It is clear from the above table 3 that AB got the first position with the lowest composite rank of 12, followed by ICICI Bank, HDFC Bank BOB and SBI and the last position is

secured by BOI with the highest composite rank of 26. It is found that three Pvt.SBs and two PSBs secured the place in top five ranks.

#### 4. Earning Quality Test

It is one of the components of the CAMEL model which indicates the operational performance of banks. Earning quality test indicates the capability of a bank to earn consistently. It is argued that much of bank income is earned through the non-core activities like investments, treasury, operation, and corporate advisory services as on. It also measures the profitability of the bank and describes its sustainability and growth in earning in the future. For measuring the earning quality of banks following ratios have been used

- A. Net Interest Income to Total Assets
- B. Return on Equity (ROE)
- C. Return on Assets (ROA)
- D. Operating profit to Total Assets

**Table: 4 – Earning Quality Test**

Bank	Net Interest to Total Assets			Return on Equity			Return on Assets			Operating Profit to Total Assets			Group Rank	
	Mean	CV%	UR	Mean	CV%	UR	Mean	CV%	UR	Mean	CV%	UR	Composite Rank	Final Rank
<b>BOB</b>	2.47	14.73	7	16.14	29.59	3	.95	27.69	6	1.88	13.03	7	23	6
<b>SBI</b>	2.87	11.34	5	14.55	17.73	3	.86	15.97	5	2.10	10	4	17	5
<b>PNB</b>	3.20	6.07	2	17.30	31.05	3	1.08	27.87	6	2.38	9.59	2	13	3
<b>BOI</b>	2.36	11	6	15.51	39.87	8	.80	43.94	10	1.86	21.12	10	34	9
<b>CB</b>	2.30	15.36	10	16.07	31.85	6	.95	29.80	8	1.79	15.92	9	33	8
<b>ICICI</b>	2.37	17.49	9	11.74	21.74	8	1.38	22.75	4	2.47	14.97	4	25	7
<b>HDFC</b>	4.27	5.12	1	18.48	8.76	2	1.61	18.06	1	3.19	4.44	1	5	1
<b>AB</b>	2.95	10.89	4	18.86	6.21	1	1.53	17.51	2	2.82	13.32	3	10	2
<b>IB</b>	2.65	34.91	8	13.32	43.71	10	1.10	60.49	8	2.13	42.76	8	34	9
<b>KMB</b>	4.65	11.21	3	13.13	18.44	6	1.54	25.10	3	2.82	18.23	4	16	4

**Source:** Computed from annual report of respective Banks

It is clear from the above table 4 that HDFC Bank got the first position with the lowest composite rank of 5, followed by AB, PNB and KMB and the last position is secured by BOI and IB with the highest composite rank of 34. It is found that three Pvt. SBs and two PSBs secured the place in top five ranks.

#### 5. Liquidity Management Test

Liquidity represents the ability to fund assets and meet obligations as they become due. Liquidity is essential in a credit union to compensate for expected and unexpected balance sheet fluctuations and provide the fund for growth (U.F.I.R.S). Liquidity management measures the ability of the bank to meet the demand from depositor in a particular year. For measuring the liquidity Management of bank following ratios have been used

- A. Liquid Assets to total Assets
- B. Liquid Assets to Total Deposit
- C. Liquid Assets to Total Demand
- D. Government Securities to Total Assets

**Table: 5 – Liquidity Management Test**

Banks	Liquid Assets to Total Assets			Liquid Assets to Total Deposit			Liquid Assets to Demand Deposits			Govt. Securities to Total Assets			Group Rank	
	Mean	CV%	UR	Mean	CV%	UR	Mean	CV%	UR	Mean	CV%	UR	Composite Rank	Rank
<b>BOB</b>	14.49	23.22	2	16.90	22.51	3	212.22	20.12	1	17.63	14.67	10	16	2
<b>SBI</b>	8.81	13.52	3	11.49	14.12	4	92.21	26.47	7	20.49	15.04	9	23	6
<b>PNB</b>	9	34.61	7	10.80	35	9	117.47	22.08	3	22.31	8.39	2	21	5
<b>BOI</b>	10.82	10.81	1	12.86	10.12	1	217.67	30.65	2	19.05	7.53	4	8	1
<b>CB</b>	8.75	11.08	3	10.12	11.53	6	166.11	34.94	7	23.05	4.45	1	17	3
<b>ICICI</b>	8.29	18.58	7	14.26	17.50	2	118.97	23.91	3	17.90	8.61	7	19	4
<b>HDFC</b>	9.11	26.50	6	12.09	26.16	7	55.95	20.31	6	22.94	13.38	4	23	6
<b>AB</b>	8.16	23.68	9	10.57	21.78	8	53.51	18.84	5	19.82	10.35	6	28	9
<b>IB</b>	8.99	17.27	3	11.76	17.10	4	89.90	34.77	9	21.54	13.97	7	23	6
<b>KMB</b>	5.02	39.91	10	8.10	32.01	10	47.31	39.03	10	25.42	12.10	2	32	10

**Source:** Computed from annual report of respective Banks

It is clear from the above table 5 that BOI got the first position with the lowest composite rank of 8, followed by BOB, CB, and ICICI Bank and last position is secured by KMB with the highest composite rank of 32. It is found that four PSBs and one Pvt.SB secured the place in top five ranks.

## 7. Findings

### Rank Based on CAMEL Model

**Table: 6 – Final Rank**

Banks	C	A	M	E	L	Combined Rank	Final Rank
<b>BOB</b>	2	6	4	6	2	20	2
<b>SBI</b>	1	7	4	5	6	23	4
<b>PNB</b>	3	7	7	3	5	25	7
<b>BOI</b>	6	10	10	9	1	36	9
<b>CB</b>	3	1	6	8	3	21	3
<b>ICICI</b>	8	3	2	7	4	24	5
<b>HDFC</b>	7	3	2	1	6	19	1
<b>AB</b>	10	2	1	2	9	24	5
<b>IB</b>	9	9	9	9	6	42	10
<b>KMB</b>	5	5	7	4	10	31	8

**Source:** Compiled from table 1, 2, 3, 4, and 5

The table 6 indicates the final rank on the basis of CAMEL Model of selected public and private sector banks. Thus, 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>, 7<sup>th</sup>, 8<sup>th</sup>, 9<sup>th</sup> and 10<sup>th</sup> ranks are given to HDFC, BOB, CB, SBI, mutually (ICICI,AB), PNB, KMB BOI, and IB respectively .It is found that three PSBs and three Pvt. SBs secured the place in top five ranks.

## 7. Conclusions

Economic development of any country is influenced mainly by the growth of the banking sector in that country. Various reforms in the economic and banking sectors have had a positive impact on the banking industry and Indian economy. The study concluded that the performance of public sector banks has been improved when compared to the previous study. The results show that three banks in the private sector namely ICICI, HDFC, AB

and three public sector banks namely BOB, SBI, and CB secured the place in top five ranks in which HDFC got the first place. In addition, it can be concluded that there is a need for close supervision for improving the performance of BOI, IB, and KMB to come up to the desired standard.

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## **Impact of High Performance Work Practices on the Performance of IT Professionals**

**Rita Bhautmage\***

**Dr. Satish Dudure\*\***

### **Abstract**

*High performance work practices (HPWPs), are helpful in the organisation and professional development. It helps to improve the workplace, work structure and work efficiency. IT is designed to elicit employee commitment and involvement such that employees become a source of sustainable competitive advantage discusses the preconditions necessary for creating successful employee involvement. The paper focuses on the impact of HPWP on the performance of IT professionals.*

**Keywords:** *High performance work practices, IT professionals, HRD practices*

### **Introduction**

High Performance Work Practices aims to plan, organize, direct and control the operative functions of procurement, development, compensation and maintenance of human resource of an organization's goals or objectives. Thus HPWP is nothing but a Human Resource Development Practices in recent era. The Human Resource Development Practices which is also known as High Performance Work Practices can be implementing in the IT industries to enhance the performance and satisfaction of Human Resource.

### **Applications of High Performance Work Practices**

- Having a win-win relationship for employees and employers
- Increasing employee productivity in the long term
- Developing effective employee performance measures
- Implementing incentives for employees that work
- Creating a positive organisational culture
- Agreeing retention techniques for talented employees
- Targeting and selecting 'organisational fit' people
- Creating an environment of knowledge and information sharing
- Improving existing employee decision making processes
- Creating self-managed teams
- Understanding job satisfaction and motivation in employees
- Supporting employees by providing training in personal and professional development
- Aligning your organisational strategy with employee goals
- Facilitating open communication in the organisation
- Active participation and reflective listening styles
- Managing unexpected situations
- Using precedents to influence stakeholders

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- Human Resource Development (HRD) is an important and very attention receiving discipline of present time. It is a relatively young academic discipline but an old and well established field of practice. Researchers have developed new theories and conceptual frameworks that address a broad range of phenomena of interest to the HRD profession. A key area of inquiry has been to try and figure out the current boundaries of HRD but defining HRD has not been so straightforward, and the writers and researchers are continuously debating the issue, and there seems to be no consensus, despite of the fact that numerous efforts have been made to define HRD.

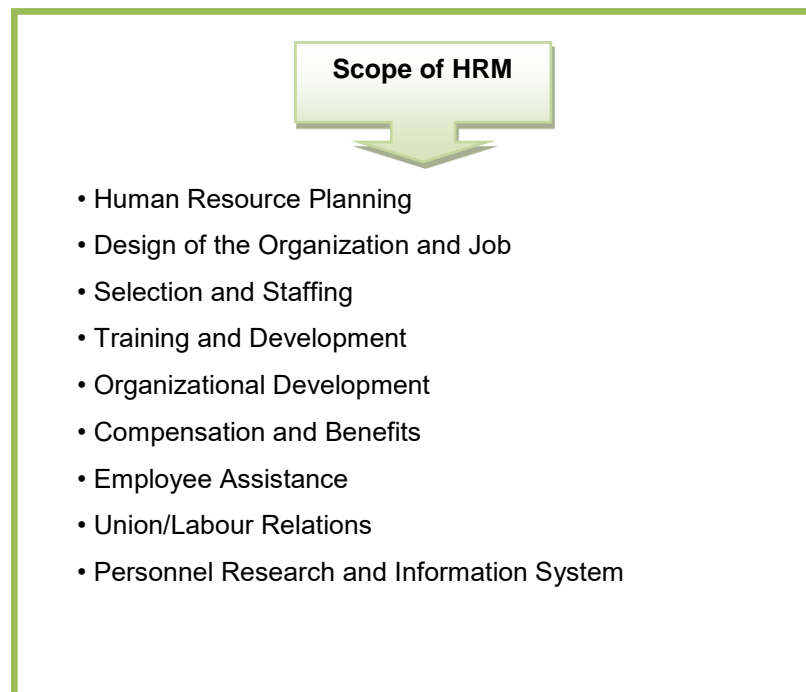
### **Human Resource Management**

Human resources management (HRM) is a management function concerned with hiring, motivating and maintaining people in an organization. It focuses on people in organizations. Human resource management is designing management systems to ensure that human talent is used effectively and efficiently to accomplish organizational goals.

### **Scope of HRM**

The scope of HRM is indeed vast. All major activities in the working life of a worker from the time of his or her entry into an organization until he or she leaves the organizations comes under the purview of HRM. The major HRM activities include HR planning, job analysis, job design, employee hiring, employee and executive remuneration, employee motivation, employee maintenance, industrial relations and prospects of HRM.

**Figure 1.1 Scope of HRM**



American Society for Training and Development (ASTD) conducted fairly an exhaustive study in this field and identified nine broad areas of activities of HRM like Human Resource Planning, Design of the Organization and Job, Selection and Staffing, Training and Development, Organizational Development, Compensation and Benefits, Employee Assistance, Union/Labour Relations, Personnel Research and Information System.

**a) Human Resource Planning**

The objective of HR Planning is to ensure that the organization has the right types of persons at the right time at the right place. It prepares human resources inventory with a view to assess present and future needs, availability and possible shortages in human resource. There upon, HR Planning forecast demand and supplies and identify sources of selection. HR Planning develops strategies both long-term and short-term, to meet the manpower requirement.

**b) Design of Organization and Job**

This is the task of laying down organization structure, authority, relationship and responsibilities. This will also mean definition of work contents for each position in the organization. This is done by "job description". Another important step is "Job specification". Job specification identifies the attributes of persons who will be most suitable for each job which is defined by job description.

**c) Selection and Staffing**

This is the process of recruitment and selection of staff. This involves matching people and their expectations with which the job specifications and career path available within the organization.

**d) Training and Development**

This involves an organized attempt to find out professional needs of the individuals to meet the knowledge and skill which is needed not only to perform the present job but also to fulfill the future needs of the organization.

**e) Organizational Development**

This is an important aspect whereby "Synergetic effect" is generated in an organization i.e. healthy interpersonal and intergroup relationship within the organization.

**f) Compensation and Benefits**

This is the area of wages and salaries administration where wages and compensations are fixed scientifically to meet fairness and equity criteria. In addition to this labour welfare measures are involved which include benefits and services.

**g) Employee Assistance**

Each employee is unique in character, personality, expectation and temperament. Every one face unique problems, which are personal sometimes official. If they worry they can't produce effective output of their work. Such worries must be removed to make him or her more productive and stress free.

**h) Union Labour Relations**

Healthy Industrial and Labour relations are very important for enhancing peace and productivity in an organization. This is one of the areas of HRM.

**i) Personnel Research and Information System**

Knowledge on behavioral science and industrial psychology throws better insight into the workers expectations, aspirations and behaviour. Advancement of technology of product and production methods have created working environment which are much different from the past.

Globalization of economy has increased competition many fold. Science of ergonomics gives better ideas of doing a work more conveniently by an employee. Thus, continuous research in HR areas is an unavoidable requirement. It must also take special care for improving exchange of information through effective communication systems on a

continuous basis especially on moral and motivation. HRM is a broad concept; personnel management (PM) and Human resource development (HRD) are a part of HRM.

The scope of Human Resources Management extends to:

- All the decisions, strategies, factors, principles, operations, practices, functions, activities and methods related to the management of people as employees in any type of organization.
- All the dimensions related to people in their employment relationships, and all the dynamics that flow from it.

### **Objectives of HRM**

The primary objective of HRM is to ensure the availability of competent and willing workforce to an organization. The specific objectives include the following:

- 1) Human capital: Assisting the organization in obtaining the right number and types of employees to fulfill its strategic and operational goals.
- 2) Developing organizational climate: helping to create a climate in which employees are encouraged to develop and utilize their skills to the fullest and to employ the skills and abilities of the workforce efficiently.
- 3) Helping to maintain performance standards and increase productivity through effective job design; providing adequate orientation, training and development; providing performance-related feedback; and ensuring effective two-way communication.
- 4) Helping to establish and maintain a harmonious employer/employee relationship.
- 5) Helping to create and maintain a safe and healthy work environment.
- 6) Developing programs to meet the economic, psychological, and social needs of the employees and helping the organization to retain the productive employees.
- 7) Ensuring that the organization is in compliance with provincial/territorial and federal laws affecting the workplace (such as human rights, employment equity, occupational health and safety, employment standards, and labour relations legislation).
- 8) To help the organization to reach its goals.
- 9) To provide organization with well trained and well-motivated employees.
- 10) To increase the employees satisfaction and self-actualization.
- 11) To develop and maintain the quality of work life.
- 12) To communicate HR policies to all employees.
- 13) To help maintain ethical polices and behavior.

### **Objectives of Study**

The objectives of the study are as follows:

- To analyze the implementation of HRD practices
- To study the present HPWP adopted by IT industries in Nagpur.
- To analyze the role of HPWP in the performance of IT industries.

### **Hypothesis**

H<sub>0</sub> HPWP adopted in the IT industries are not significantly influence on the performance of IT industries.

H<sub>1</sub> HPWP adopted in the IT industries are significantly influence on the performance of IT industries.

### **Universe of Study**

As there are vast numbers of IT industries are spread in the vicinity of Nagpur; the

researcher is studying the utilization of high performance work practices (HPWP) i.e. different HRD practices in the IT industries of Nagpur.

**i. Universe of study**

The study refers to the IT industries in general and Nagpur in particular. The universe includes the IT industries and the prospective employees, Managers and owners are also included in the sample.

Total Number of IT industries in Nagpur are 100

Managers in IT industries are : 500

**ii. Sampling Size**

The Sampling size for this study is taken as 10% of sampling universe.

**iii. Sampling Frame**

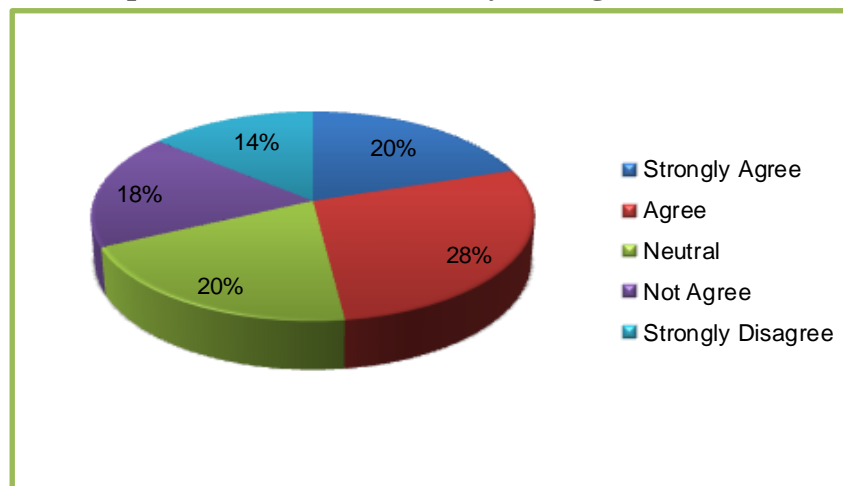
- Questionnaire to Managers (50 nos.)

**Table 1.1: Do you feel that the performance of IT professionals is improved with the implementation of HPWP in your organisation**

Total no. of participants is 50

Strongly Agree	Agree	Neutral	Not Agree	Strongly Disagree
10	14	10	9	7

**Graph 1.1: Do you feel that the performance of IT professionals is improved with the implementation of HPWP in your organisation**



From the above graph it is found that out of 50 respondents, 20% respondents are strongly agree with the statement 'the performance of IT professionals is improved with the implementation of HPWP in the organization', 28% respondents are agree with the statement, 20% respondents are neutral with the statement, 18% respondents are not agree with the statement while 14% respondents are strongly disagree with the statement.

That means the performance of IT professionals is improved with the implementation of HPWP in the organization.

**Hypothesis Testing**

H<sub>03</sub> HPWP adopted in the IT industries are not significantly influence on the performance of IT industries.

H<sub>13</sub> HPWP adopted in the IT industries are significantly influence on the performance of IT industries.

This hypothesis regarding impact of HPWP on the performance of IT industries is tested through the One Sample t-test using statistical software SPSS.

N	Mean	Std. Deviation	Std. Error Mean
50	2.7800	1.34453	.19014

Test Value = 5					
t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper
-11.675	49	.000	-2.22000	-2.6021	-1.8379

To test this hypothesis; a Likert scale is used. Response of 50 respondents are recorded and inputted in the SPSS software. The mean value generated is 2.9 and Standard Deviation is 1.34. The test value is set as 5 as Likert scale is five level scale to record the responses. From the above One Sample t-test hypothesis is significant i.e. 0.000. So the NULL hypothesis is rejected and the alternate hypothesis 'HPWP adopted in the IT industries are significantly influence on the performance of IT industries' is accepted.

**Conclusion**

20% respondents are strongly agree with the statement 'High Performance Work Practices are helpful in the improvement of overall organizational productivity', 28% respondents are agree with the statement, 20% respondents are neutral with the statement, 18% respondents are not agree with the statement while 14% respondents are strongly disagree with the statement. The performance of IT professionals is improved with the implementation of HPWP in the organization. The High Performance Work Practices are helpful in the improvement of overall organizational productivity

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## **Velocity profiles of pulsatile unsteady flow of blood through stenosed artery filled with porous medium under the influence of magnetic field and slip velocity**

**Dr. Mahender Singh\***

**Dr. Seema Bansal\*\***

**Sanjay Kumar\*\*\***

**Abstract:** The present paper considers the pulsatile flow of blood under the effect of transverse static magnetic field and slip velocity. The pulsatile flow is analyzed by considering a periodic pressure gradient (a function of time). Also, viscosity of blood is of hematocrit dependent and governed by Einstein equation. The Navier-stokes equation is made dimensionless using non-dimensional parameters and is solved by Frobenius method. The effect of Hartmann number (H), Hematocrit concentration(Hm), Womersley number( $\alpha$ ) and Darcy number(Da) on the velocity profiles have been calculated and shown by graphs.

**Keywords:** Newtonian fluid, Stenosed artery, Slip velocity, Magnetic field, Porous medium.

### **Introduction**

Many researchers Kolin(1936), McDonald(1960), Fung(1984), Mazumdar(1992), Halder and Ghosh(1994), Layek and Mukhopadhyay (2008), Sharma and Bansal(2012, 2014) considered the mathematical model of blood flow through stenosed artery subject to various physiological conditions. Steinman et al. (2000) characterized the hemodynamics of moderately and severely stenosed carotid bifurcation. They concluded that the presence of a severe stenosis serves to increase the size and extent of the recirculation zones and introduces turbulence in the post-stenotic region. J. Anand Rao *et al.* (2004) obtained the numerical solution of unsteady blood flow through an indented tube with atherosclerosis and observed that volumetric flow rate decrease with increase in maximum hematocrit, increase in maximum hematocrit increases the pressure gradient in stenotic region and also investigated that increase in hematocrit and maximum height of the stenosis decrease the shear stress in the stenotic region. Sanyalet *al.* (2007) developed a mathematical model for studying the characteristic of blood flow in a rigid inclined circular tube with periodic body acceleration under the influence of a uniform magnetic field and concludes that velocity increases with acceleration due to gravity, inclination and womersley parameter and decreases with magnetic number. Biswas *et al.* (2010) consider a two-layered blood flow through stenosed artery under the action of body acceleration and slip at wall. They noticed that there is a highly influence of wall slip and body acceleration on velocity, flow rate and effective viscosity. They found that with the increase of wall slip and body acceleration,

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there is an increase in velocity and flow rate, but effective viscosity decreases with wall slip. Prakash and Makinde (2011) studied the effect of magnetic field on the blood flow through a stenosed artery with radiative heat transfer. The blood behaves like a Newtonian fluid and viscosity is taken in the form of hematocrit dependent. Analytic solution for the blood velocity, temperature, volumetric flow rate, wall shear stress and wall heat transfer rate are found. They concluded that arterial wall heat transfer rate and skin friction increases with the increases of stenosis height and radiation absorption. Also, they observed that blood temperature is maximum along the arterial centre line and minimum at wall. Sharma et al. (2012) considered the blood flow in a stenosed artery under the influence of transverse magnetic field through porous medium and they showed that wall shear stress changes its sign twice in the region of stenosis nearby entry and exit of the stenosis. The occurrence of these variation suggests that there will be two region of circulation for the value of Hartmann number  $H > 2$ . Sharma et al. (2014) dealt with the pulsatile blood flow through an inclined catheterized stenosed artery with slip on the wall in the presence of an external magnetic field by considering the incompressible Newtonian fluid model. Analytic expression for the velocity, volumetric flow rate, wall shear stress, wall shear stress gradient and impedance have been derived and numerical results are presented graphically for different values of physical parameters. Mwanthi et al. (2017) dealt the unsteady blood flow through an inclined circular tube under MHD effects. Here, blood is taken as incompressible, viscous and Newtonian with varying pressure gradient with time. The problem was solved by approximation method. They found that with the increase of Hartmann number leads to decrease the axial velocity of the blood.

In the present paper an attempt has been made to deal with the blood flow through an artery filled with porous medium subject to a slip velocity at arterial wall and effects of various hemodynamic parameters on velocity profiles.

### **Formulation of Problem**

The present study is to dealt with the flow of blood in narrow stenosed artery that is suffer with some deposition in the flow region which is taken as porous medium. A static magnetic field is present surrounding the patient and slip velocity at the arterial wall is also taken. The viscosity of blood is dependent on Hematocrit concentration and is given by Einstein equation

$$\mu = \mu_0 [1 + \beta h] \tag{1}$$

where,

$\mu_0$  → coefficient of viscosity of plasma

$\beta$  → constant

And

$h(r)$  → hematocrit concentration

which vary along the radial direction govern by the equation

$$h(r) = H_m \left[ 1 - \left( \frac{r}{R_0} \right)^n \right] \tag{2}$$

Here,  $H_m$  → maximum hematocrit concentration at the axis of tube.

### Geometry of the Model

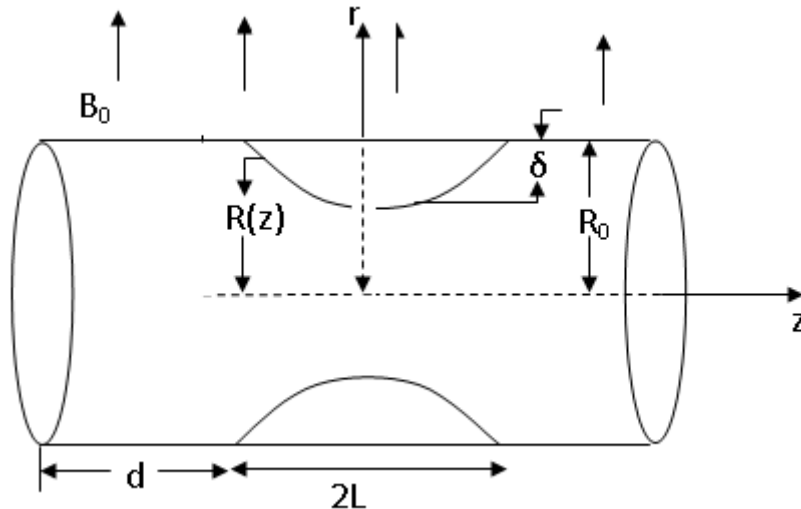


Figure 1

The blood vessel geometry is determined by the radius  $R_0$  of the inlet and outlet unconstricted segment, whereas the radius of the smooth axisymmetric stenosed segment is given by

$$R(z) = \begin{cases} R_0 - \frac{\delta}{2} \left(1 + \cos \frac{\pi z}{L}\right) & -L \leq z < L \\ R_0 & \text{otherwise} \end{cases} \quad (3)$$

where

$2L \rightarrow$  length of stenosis

$\delta \rightarrow$  maximum thickness of the stenosis

Here, we consider unsteady, incompressible, viscous, axially symmetric and one dimensional fully developed blood flow through a circular tube in the presence of static magnetic field and slip velocity  $u_s$  at arterial wall. The governing equations are derived using cylindrical coordinate system  $(r, \theta, z)$ , the axis of the tube is along with the  $z$ -axis and  $z=0$  (origin) corresponds to the peak point of the stenosis. The diameter of the tube is assumed to be greater than 1mm so Fahraeus –Lindqvist effect is not significant. The tube is filled with blood of electrical conductivity  $\sigma$ , density  $\rho$  and the permeability of porous material is constant  $K$ .

The momentum equation of blood as incompressible and Newtonian fluid through a porous medium with slip condition at arterial wall is given by

$$\rho \frac{\partial u}{\partial T} = -\frac{\partial p}{\partial z} + \frac{1}{r} \frac{\partial}{\partial r} \left( \mu r \frac{\partial u}{\partial r} \right) - \sigma B_0^2 u - \frac{\mu}{K} u \quad (4)$$

The boundary conditions are

$$\begin{aligned} \frac{du}{dr} &= 0 & r &= 0 \\ u &= u_s & r &= R(z) \end{aligned} \quad (5)$$

Where,  $-\sigma B_0^2 u$  is the magnetohydrodynamic force which arises due to the interaction of electrical conductivity of blood and the applied magnetic field.

Taking length and time scaling parameter, the governing equation reduced to

$$\frac{\rho R_0^2}{t_0 \mu_0} \frac{\partial u}{\partial t} = \frac{-R_0^2}{\mu_0} \frac{\partial p}{\partial z} + \frac{1}{y} \frac{\partial}{\partial y} \left[ (a - ky^n) y \frac{\partial u}{\partial y} \right] - \frac{R_0^2 \sigma B_0^2 u}{\mu_0} - \frac{(a - ky^n) u}{Da^2} \quad (6)$$

Where,  $y = \frac{r}{R_0}$ ,  $t = \frac{T}{t_0}$ ,  $\beta H_m = k$ ,  $a = 1 + k$ ,  $t = \frac{T}{t_0}$

The blood is acted upon by pressure gradient  $\frac{\partial p}{\partial z}$  which varies with time is given by

$$-\frac{R_0^2}{\mu_0} \frac{\partial p}{\partial z} = c e^{i\omega t} \quad (7)$$

where,

$\omega = 2\pi f$ ,  $f \rightarrow$  heart pulse frequency and  $c$  is the amplitude of the pulsatile flow.

Also, Taking  $u(y, t) = U(y) e^{i\omega t}$  (8)

And introducing the following non-dimensional parameters

$$\frac{R_0^2 \sigma B_0^2}{\mu_0} = H^2, \quad \frac{K}{R_0^2} = Da^2, \quad \alpha^2 = \frac{\rho R_0^2 \omega}{t_0 \mu_0} \quad (9)$$

Where,  $H$  the Hartmann number,  $Da$  the Darcy number and  $\alpha$  the Womersley number, the governing equation can be written as

$$\frac{1}{y} \frac{d}{dy} \left[ (a - ky^n) y \frac{dU}{dy} \right] - (\alpha^2 i + H^2 + \frac{a}{Da^2}) U + \frac{ky^n}{Da^2} U = -c \quad (10)$$

The corresponding boundary conditions (10) and (11) are transformed to

$$\begin{aligned} \frac{dU}{dy} &= 0 & y &= 0 \\ U &= u_s & y &= \frac{R(z)}{R_0} \end{aligned} \quad (11)$$

**Method of Solution**

**Calculation for Velocity Profiles**

We have used Frobenius method for the solution of differential equation (10). For implementing, it is required that  $U$  is bounded at  $y = 0$ . The only admissible solution satisfying the boundary condition (11) is

$$U = D \sum_{m=0}^{\infty} A_m y^m - \frac{c}{4a} \sum_{m=0}^{\infty} \lambda_m y^{m+2} \quad (12)$$

Here, the second term of the right hand side is the solution corresponding to non-homogenous part of the equation (10) and  $A_m$  and  $\lambda_m$  are the series constant,  $D$  is an arbitrary constant to be determined by the boundary condition (11).

Firstly, we find the solution of homogenous part of (10) with

$$U = D \sum_{m=0}^{\infty} A_m y^m \quad (13)$$



$$\frac{dU}{dy} = D \sum_{m=1}^{\infty} A_m m y^{m-1} \tag{14}$$

$$\frac{d^2U}{dy^2} = D \sum_{m=2}^{\infty} A_m m(m+1) y^{m-2} \tag{15}$$

Combining these with the homogenous part of the equation (10) we get

$$\begin{aligned} [ay - ky^{n+1}] \sum_{m=2}^{\infty} A_m m(m+1) y^{m-2} + [(a - ky^n - kny^n)] \sum_{m=1}^{\infty} A_m m y^{m-1} \\ - \left[ (\alpha^2 i + H^2 + \frac{a}{Da^2}) y + \frac{ky^{n+1}}{Da^2} \right] \sum_{m=0}^{\infty} A_m y^m = 0 \end{aligned} \tag{16}$$

Comparing the coefficient of  $y^m$ , we have

$$A_{m+1} = \frac{(\alpha^2 i + H^2 + \frac{a}{Da^2}) A_{m-1} + k(m+1)(m-n+1) A_{m-n+1} - \frac{k}{Da^2} A_{m-n-1}}{a(m+1)^2} \tag{17}$$

For the solution of non-homogenous part, let

$$U = -\frac{c}{4a} \sum_{m=0}^{\infty} \lambda_m y^{m+2} \tag{18}$$

$$\frac{dU}{dy} = -\frac{c}{4a} \sum_{m=1}^{\infty} \lambda_m (m+2) y^{m+1} \tag{19}$$

$$\frac{d^2U}{dy^2} = -\frac{c}{4a} \sum_{m=2}^{\infty} \lambda_m (m+2)(m+1) y^m \tag{20}$$

The equation (10) gives

$$\begin{aligned} [(a - ky^n) y] \sum_{m=2}^{\infty} \lambda_m (m+2)(m+1) y^m + [a - ky^n - kny^n] \sum_{m=1}^{\infty} \lambda_m (m+2) m y^{m+1} \\ - (\alpha^2 i + H^2 + \frac{a}{Da^2}) y \sum_{m=0}^{\infty} \lambda_m y^{m+2} + \frac{ky^{n+1}}{Da^2} \sum_{m=2}^{\infty} \lambda_m y^{m+2} = 4ay \end{aligned}$$

Comparing the coefficient of  $y^{m+2}$ , we have

$$\lambda_{m+1} = \frac{(\alpha^2 i + H^2 + \frac{a}{Da^2}) \lambda_{m-1} + k(m+3)(m-n+3) \lambda_{m-n+1} - \frac{k}{Da^2} \lambda_{m-n-1}}{a(m+3)^2} \tag{21}$$

with  $A_0 = \lambda_0 = 1$  and  $A_{-m} = \lambda_{-m} = 0$

The constant D involved in the solution (13) is obtained with the help of boundary condition (11) i.e.  $U = u_s$  at  $y = \frac{R(z)}{R_0}$

$$\text{We have, } u_s = D \sum_{m=0}^{\infty} A_m \left( \frac{R}{R_0} \right)^m - \frac{c}{4a} \sum_{m=0}^{\infty} \lambda_m \left( \frac{R}{R_0} \right)^{m+2}$$

and D is given by

$$D = \frac{\frac{c}{4a} \sum_{m=0}^{\infty} \lambda_m \left( \frac{R(z)}{R_0} \right)^{m+2} + u_s}{\sum_{m=0}^{\infty} A_m \left( \frac{R(z)}{R_0} \right)^m} \quad (22)$$

then,

$$U(y) = \frac{\left( \frac{c}{4a} \sum_{m=0}^{\infty} \lambda_m \left( \frac{R(z)}{R_0} \right)^{m+2} + u_s \right) \sum_{m=0}^{\infty} A_m y^m - \frac{c}{4a} \sum_{m=0}^{\infty} A_m \left( \frac{R(z)}{R_0} \right)^m \sum_{m=0}^{\infty} \lambda_m y^{m+2}}{\sum_{m=0}^{\infty} A_m \left( \frac{R(z)}{R_0} \right)^m} \quad (23)$$

and  $u(y, t) = U(y) e^{i\omega t}$

$$u(y, t) = \left[ \frac{\left( \frac{c}{4a} \sum_{m=0}^{\infty} \lambda_m \left( \frac{R(z)}{R_0} \right)^{m+2} + u_s \right) \sum_{m=0}^{\infty} A_m y^m - \frac{c}{4a} \sum_{m=0}^{\infty} A_m \left( \frac{R(z)}{R_0} \right)^m \sum_{m=0}^{\infty} \lambda_m y^{m+2}}{\sum_{m=0}^{\infty} A_m \left( \frac{R(z)}{R_0} \right)^m} \right] e^{i\omega t} \quad (24)$$

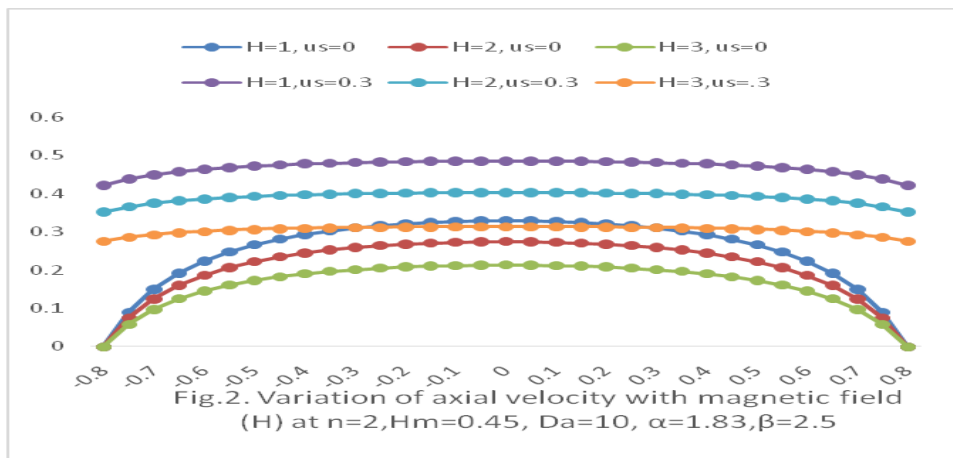
In particular, in the absence of the hematocrit, the average velocity  $u_0$  is given by

$$u_0 = \frac{c_0 e^{i\omega t}}{\left( \alpha^2 i + \frac{1}{Da^2} \right)} \left[ 1 - \frac{I_0 \left( \sqrt{\alpha^2 i + \frac{1}{Da^2}} y \right)}{I_0 \left( \sqrt{\alpha^2 i + \frac{1}{Da^2}} \right)} \right] \quad (25)$$

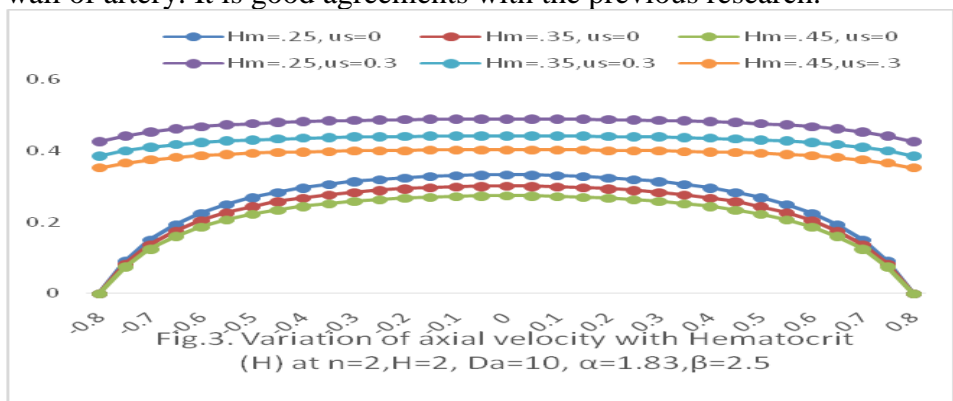
The dimensionless form of  $u(y,t)$  with respect to  $u_0$  is now obtained from equations (24) and (25) and given by

$$\frac{u}{u_0} = \frac{\left( \alpha^2 i + \frac{1}{Da^2} \right)}{c_0} \frac{\left( \frac{c}{4a} \sum_{m=0}^{\infty} \lambda_m \left( \frac{R(z)}{R_0} \right)^{m+2} + u_s \right) \sum_{m=0}^{\infty} A_m y^m - \frac{c}{4a} \sum_{m=0}^{\infty} A_m \left( \frac{R(z)}{R_0} \right)^m \sum_{m=0}^{\infty} \lambda_m y^{m+2}}{\sum_{m=0}^{\infty} A_m \left( \frac{R(z)}{R_0} \right)^m \left[ 1 - \frac{I_0 \left( \sqrt{\alpha^2 i + \frac{1}{Da^2}} y \right)}{I_0 \left( \sqrt{\alpha^2 i + \frac{1}{Da^2}} \right)} \right]}$$

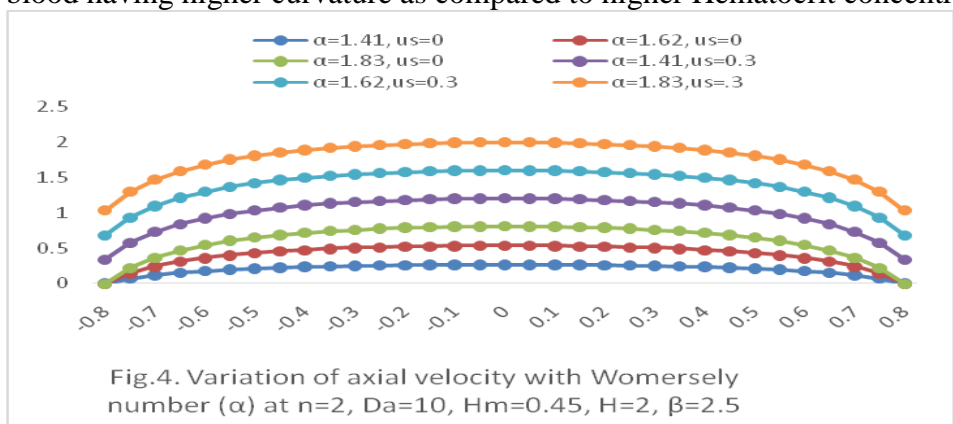
**Results and Discussion:** The expression of axial velocity is found and the obtained Data are plotted for different values of Hartmann number (H) , Darcy number (Da), Wormersley number ( $\alpha$ ) and Hematocrit concentration(Hm). The profiles of axial velocity versus radial co-ordinate for various physical parameters are shown in Figures [2-5].



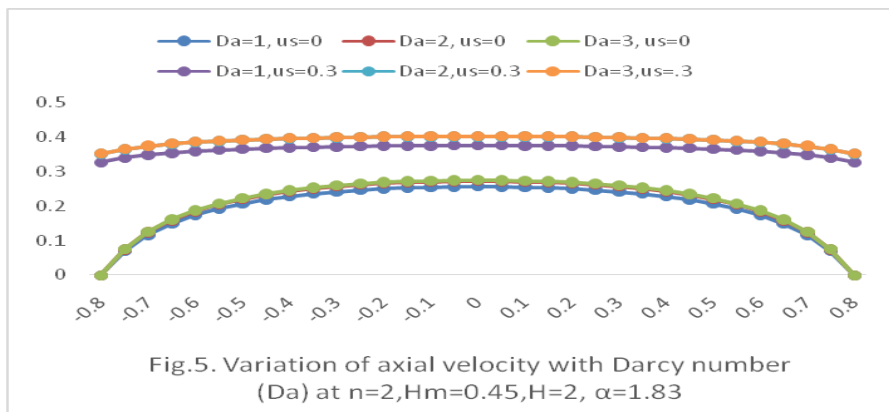
In figure 2, it is observed that increase of Hartmann number (H) fluid speed decreases in both the cases, with slip or without slip at arterial wall, keeping all other parameters constant. The Slip velocity fairly increases the flow speed as compare to the no-slip at the wall of artery. It is good agreements with the previous research.



In figure 3, it is observed that the axial flow velocity slowed down with the increase of Hematocrit concentration for both cases of with slip or without slip at the arterial wall, it is possible that the velocity profile in centerline region for less Hematocrit concentration of blood having higher curvature as compared to higher Hematocrit concentration of blood.



In figure 4, it is observed that with the increase of Womersley number, there is an increase in the flow speed for both the cases that is flow speed is increased with increasing of oscillations in the flow.



In figure 5, it is observed that with the increase of porosity of the medium in the tube, there is an increase in the flow speed for both the cases, but there is amplification in the fluid speed for the slip velocity at the arterial wall.

### Conclusions

1. The fluid velocity reduces its value with the increase of magnetic field and Hematocrit concentration.
2. The fluid velocity increases its value with the increase of Womersely number and Darcy number

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## **Employee Engagement - Recipe for success**

**Emmy Gracy Vas\***

### **Abstract**

Every organization aspires to a workforce that is truly engaged in every aspect. Companies today are made up of a multigenerational workforce. Engaging each generation of employees is truly challenging due to the huge generation gap but this generation gap can also offer myriad benefits to a workplace, if leveraged wisely. In this context, the key challenge is designing a proper employee engagement recipe that satisfies the taste of every employee and enables them to work with passion and commitment and make a significant contribution towards the success of a business and the achievement of its goals.

**Key words: Recipe, Multigenerational workforce, Employee Engagement Recipe**

### **Part I- Introduction**

Over the last two decades, employers' needs and interests have moved from creating conditions and programs that result in employees who are merely "satisfied" with pay, benefits and working conditions, to employees who are "committed" to the organization and not considering a move, to those who are genuinely "engaged" in the work and mission of the organization. For employers, engagement has become the search for the "Holy Grail" of the 21st century. Employee engagement is not just an event; it is an experience that shapes employee behaviour and performance in positive ways. Engaged, energised employees want to continue to do the best for their manager and company and will willingly go the extra mile to put in that discretionary effort. Such employees tend to create a positive multiplier effect on their peers and as a result the workplace becomes genuinely productive and highly ethical.

The primary objective of this paper is to find out the essential mix of ingredients in the Employee Engagement Recipe that help the organization to achieve success. **Part I** of this paper is Introductory in nature. **Part II** explains the meaning of Recipe and the basic ingredients in the recipe for success. **Part III** explains the role of the Company, HR, Leader and the Employees in the Employee Engagement Recipe. It also focuses on the use of the right mix of ingredients in getting best results from the Multigenerational workforce. **Part IV** gives the global and Indian Scenario of Employee Engagement and the **last part** give the concluding remarks.

### **Part II: Recipe for Success**

A **Recipe is a** set of directions with a list of instruction for making or for preparing something specially food. In the organizational context, a recipe would mean a formula for or means to a desired end.

**Employee Engagement Recipe** is a set of instructions to be followed by organizational members to involve the employee mentally, emotionally and spiritually in the work and produce positive outcomes. It also means a formula for igniting the mind, heart and hands

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of every employee in the organization to engage in work in order to achieve the desired end.

### **Basic Ingredients in the recipe for success**

Employee engagement is when both parties recognise the gains they get from the employment relationship. Employees, who are engaged, 'go the extra mile' but they also report that they feel valued by their employer and so their sense of well-being is enhanced.

According to Benjamin Franklin Fairless, there are four essential ingredients to success.

Quote from Benjamin Franklin Fairless - *What is the recipe for successful achievement? To my mind there are just four essential ingredients: **CHOOSE** a career you love, **GIVE** it the best there is in you, **SEIZE** your opportunities, and **BE** a member of a team.*

Digging Deeper into the quote and applying this to the organizational context to engage employee, success can be achieved effectively.

- 1. Choose a career you love.** Employees will put in their best, if they choose the career they love. They will work with passion and commitment if they are given the right job in the organization. Employees are likely to yield 100 percent outcome if the employers follow Person-job fit strategy. Thus both the employee and the employer can reach their goals effectively.
- 2. Give it the best there is in you.** To reach the pinnacle of success, the Employee and Employer should put themselves in the 'Giving Mode'. The Employee putting in his best efforts, energy and hard work on one hand and the employer, on the other hand giving proper ambience for work and rightly recognizing and appreciating the continuous efforts of their employees, compensate it with just and right rewards financial as well as non-financial.
- 3. Seize your opportunities.** Today's business environment is highly volatile and dynamic. It offers various challenges and opportunities. To remain ahead of competition, both Employer and employees should be proactive and seize the opportunities and challenges for the growth and well-being of each other.
- 4. Be a member of a team.** While working in a team, each employee comes to know his/her inner worth or value, as each of them contributes his or her best abilities and potentials to get things done and get complemented by the others for their uniqueness. Team work at its best, produces synergistic effect. Putting employees in proper teams and encouraging team spirit among them, will enable the organization to reach its desired end easily.

Bottom line, if one wants an entrée of success in one's life and business, one must actively mix the four ingredients in this recipe of success — **CHOOSE** work one loves, **GIVE** one's best, **SEIZE** opportunities, and **BE** a team member.

### **Part III**

#### **A. Roles each play in the Employee engagement recipe**

While the role of leadership is critical in setting the tone and culture of an organization, the emphasis on accountability for and engagement is shifting across all levels. Engagement is not just on the agenda of leaders, managers, or HR, it is the responsibility of every individual. Unless individuals assume some ownership on their own engagement, the efforts of the best managers may bear limited utility. The question and challenge, then is, how to continuously draw out that coveted discretionary effort from employees so that it becomes an ingrained workplace practice or behaviour.

➤ **Role of Companies and HR professionals**

There are several essential ingredients that HR professionals and companies will need to consider if they are committed to focusing upon employee engagement within their organisation:

**Creating exceptional leaders.** Whilst engagement cannot be dictated from above, it is the responsibility of the business leaders to set out the framework for the future of the company and communicate this on an on-going basis to their teams in a way which is motivational, inspirational and relevant to ensure they understand and buy into the vision they are looking to create.

**Two-way communication.** Sharing the management's vision and objectives for the company, it is vital that employees have a means by which they can provide feedback to their line manager. Involving staff in certain decision-making is a useful motivational tool and giving staff a voice to share their views, ideas, and suggestions can help identify where improvements can be made to processes, procedures or productivity.

**Effective line management.** Being able to motivate a team to ensure that objectives are met is an essential skill for any manager, but the method and means by which they approach this fundamental is very important. People respond in very different ways and it is the responsibility of the manager to recognise, understand and adapt his or her behaviour accordingly. It is important that a business also places importance on skills such as listening and the ability to empower individuals if it is to achieve long term success.

**Trust.** It is important that senior managers only make promises to their employees that they are able to or intend to keep. Staff will quickly come dissatisfied if they feel that their boss is not being genuine or is unlikely to keep to their word. Trust is built when promises are kept.

➤ **Role of Leader**

The most important thing a leader, manager, boss, supervisor, etc. must learn is that people are their most appreciable asset and that relationships matter. Recognizing employee contribution and building a strong bond with them, helps employees to strive even harder to engage in work that contributes to organizational success. So a leader should do the following in order to get the cooperation of the employees at workplace:

**Make recognition a priority.** As a leader, the recognition of people - the most appreciable asset must be a top priority. The responsibility is to make sure that the hard work and dedication of the employees is given the appreciation that it is due. When the employees know that their leader recognizes their efforts, this helps in building good will among them and they will keep performing at high levels.

**Make recognition personal; make it public.** Not all recognition should necessarily be public; but that never hurts. When a colleague is publicly praised for achieving a goal it is proper to praise in public. It builds confidence and reinforces morale. But a good leader also knows that a personal hand-written note of appreciation is priceless. So the leader should practise both and be sincere about the same.

**Being spontaneous.** Employees often face obstacles and challenges that the leaders are far-removed from. The daily grind can wear down even the best among the employees. Nothing will lift the spirits and culture of the organization more than a kind gesture of appreciation to employees for no other reason than to say, "I am with you, you are not forgotten, I am proud of you".

**Being realistic.** The hard-reality every leader has to learn is that some of the people – those “most appreciable assets” will be very challenging when it comes to building relationships. Some require more “strokes” and attention than others and at times there will be no “pleasing” of these people. On the other side of the coin we find individuals who are just happy to show up, work hard, go above and beyond the call of duty and would be embarrassed if singled out for recognition. This is truly challenging.

**Being inclusive.** One of the challenges leaders face is the accusation of showing favouritism. In fact, those who demonstrate a strong work ethic, a positive attitude, and a genuine team player approach actually deserve more recognition than those who don't. The leader should be inclusive as much as possible when it comes to recognition and appreciation. A little encouragement and recognition can make the difference between where they are now and the spark needed to go an extra mile or to the next level.

**Being generous.** Recognition and reinforcing a positive message within the organization is a game changer. The path of effective and meaningful employee engagement and strong relationships begins with recognition that comes from the heart. It begins with the leader.

➤ **Role of Employee: Lessons from Michelangelo, the great Artist**

Michelangelo once said: “The greater danger for most of us lies not in setting our aim too high and falling short, but in setting our aim too low, and achieving our mark.” And aim high, he did. He was a true Renaissance man who mastered many different fields. He was an accomplished sculptor, painter, poet, and engineer. His famous works, like the magnificent frescoes of the Sistine Chapel, the grand statues of David, and the Pietà, all expressed his engagement in work, deep emotionalism, realism, and intensity never before seen. He remains relevant today not only because of his glorious creations, but because his work ethic continues to provide valuable insights and inspire us today. Here are some life lessons employees can learn from the great Michelangelo, the greatest artist of all time:

**Quality is in the details.** The works of Michelangelo are known for their extraordinary attention to details. You can see it in the complex folds of the Virgin's robe in the Pietà, in the veined hands of the statue of David, and in the elaborate ceiling of the Sistine Chapel. The ability to pay attention to the smallest details is important because it allows one to reach a level of excellence not easily achieved by others. It also comes from the deep commitment and work-ethic one has towards one's work. If an employee carries this attitude towards his work, he has a chance to create something of real quality and to produce a great masterpiece of high quality as Michelangelo did.

**Step out of the box.** Michelangelo was passionate about sculpture. It was his true love. When he looked at a piece of marble, he could already see the statue inside it and all he had to do was to chisel away to set it free. His love for sculpture did not stop him from painting. He worked on the ceiling of the Sistine Chapel with little knowledge of frescoes and created two of the most astounding frescoes the world has ever seen: the scenes from Genesis on the ceiling of the Sistine Chapel, and The Last Judgment on its altar wall. If employees want to expand their knowledge, they should move out of their comfort zone, step out of the box and push themselves in order to discover that hidden talent of creating something new, something innovative, and something of value.

**Believe in teamwork.** In creating his masterpieces, Michelangelo was never quite the romantic lone wolf everyone thought him to be. He drew sketches, created miniature models, and directed a team of artisans to help bring his vision to life. Experts believed that he worked with at least 12 other painters to complete the ceiling of the Sistine Chapel. This

is a prime example of teamwork. True success can be achieved if and only if employees work in teams and get the cooperation and support of all the members in the team.

In a nutshell, we can say that paying attention to details, stepping out of the box and believing in teamwork helps employees to climb the ladder of success.

#### **A. Engagement recipe for Multigenerational workforce**

Companies today are made up of multigenerational workforce. There is usually a huge generation gap that exists between individuals in any organization. However, generation gaps can also offer myriad benefits to a workplace if leveraged wisely. A combination of the enthusiasm and up-to-date attitudes of the youth and the experience of the older employees can create a stimulating and vibrant work environment.

Individuals born between the years 1946 and 1964 are termed as 'Baby Boomers'. They have a competitive spirit etched in their DNA and are often known as the 'think-tanks' of any company they work for. Those born between the 1960s and early 1980s are referred to as Gen X and are independent-thinkers. Then there are Millennials or GenY whom researchers say are born between the 1980s and early 2000s. They are usually tech savvy and possess the ability to adapt to a particular environment. Organizations have to try to maintain an insignificant age difference between these generations for a better cohesiveness and this is essential to achieve success. The Millennials are relatively fresh, especially at the professional front. They have the ability to work incredibly hard and lay intense focus for long hours. On the other end, Boomers can offer a pool of knowledge as they spent decades in learning. Their experience enables them to quickly accomplish a given task with operative solutions.

Generation Gaps can often infuse ill-will among employees, making the atmosphere inappropriate for effective performance. It gives rise to conflicts of ideas and thoughts, which sometimes result in cold wars. This is definitely not healthy for any organization. Misunderstandings among employees of different generations stem from the dissimilarities and differences existing between them regarding their ideas of right and wrong, work ethics and basic beliefs. This ultimately leads to tensions and stress among employees. This situation negatively impacts the entire organization thus reducing their productivity significantly. In the battle between various generations, it's ultimately the company that suffers the most. Although generational differences can be stressful for both employees and companies, it is possible to handle them efficiently and transform the problem into a boon. Since each generation brings its unique set of skills, they actually complement each other and present huge learning opportunities. Therefore, developing a proper engagement recipe will help to achieve success.

- **Senior management sensitization-** An Organization needs to act cautiously while dealing with generation gaps at the workplace. Strategies and action plans need to be carefully-crafted in order to improve the work environment and induce positivity and harmony amongst employees of distinct generations. The Human resource team must train the top-level managers in such a way that they can handle the generational difference effectively without hindrances in the working environment. They should initiate cross-generational conversations. This will help the employees of different generations to mingle and understand each other in a better way. The interactions will help the younger generation to grasp and benefit from the seniors and learn from their experiences. For older generation or seniors, it will act as a good way to embrace



innovative ideas and opinions of youngsters and also figure out what appeals most to younger demographic customers.

- **Training** – Companies should ensure that they have different training methods in place, in order to meet the requirements of employees of various generations. Some might go for the conventional methods of learning. Others might prefer to inculcate a better work culture through interactive training sessions. Employees of younger generations are typically more inclined towards training through technology.
- **Innovative in approach-** The monotonous routines of employees need to be tackled by inducing newness in the company. This change is likely to attract millennials, encouraging them to perform marvellously through enhanced team work. Employees of the baby boomers and Gen Xs can give phenomenal performance if motivated for even the minutest achievements. Companies can show their appreciation to them by felicitating them in a get-together or recognizing them via emails. This will boost their performance tremendously.
- **Tailor-made policies** – The Organization should take care not to have a one-for-all policy. Different generations have different needs and desires and it is a good idea to not impose a uniform policy on all, as this can lead to resentment. For example, Companies should provide work-hour flexibility to employees to manage their work and personal life. Gen Y sees they doing work everywhere - except in a cubicle. They definitely need flexible hours and schedules because they are great believers in work-life balance and want to live life to the fullest.
- **Open channels of communication-** Providing employees with freedom to voice out their opinions and ideas will certainly boost productivity. Open communication channels work best to keep employees happy and satisfied, as they give them a feeling of security that their concerns will be addressed. Not just this, it is also crucial to provide the management with feedback on whether generational disparities are being dealt with creatively or not.
- **Work environment** – Boomers are often ambitious, loyal, work-centric, and cynical. They can be motivated by promotions, professional development, and having their expertise valued and acknowledged. Gen Xs prefer to work independently with minimal supervision. They also value opportunities to grow and make choices, as well as having relationships with mentors. Gen Ys, more than any previous generations, are graduating with a dynamic mix of academic and work experiences that have them positioned to contribute from day one. They seek challenging work right from the start.
- **Corporate culture-** Boomers place a high value on money and career advancement, often willing to work considerable overtime and are loyal to their organization. Generation X represents a significant change in work values and world view. They do not believe in working to the detriment of their home lives. Gen X show less loyalty and are more inclined toward career switching and entrepreneurship. Millennials (Gen Y) value an open culture which lets them learn quickly and shares its growth plans with them. Social media offers an unprecedented opportunity for younger generation employees to engage in discussion about preferred places to work. The report clearly suggested that findings highlight the increasing role that social media is playing in the workplace, with a constant mixing of work-related and social exchanges.



#### **Part IV**

##### **A. Employee Engagement - Global scenario:**

A recent Employee Engagement & Benefits report by Raconteur showcases that as baby boomers begin to retire, “ambitious millennials are demanding more in terms of employee engagement and benefits than any generation before them.” In fact, in the same report, a not so surprising 60% of workers would be more productive if they felt happy at work. Employee engagement at ISS is measured and has identified nine common themes that have helped improve employee engagement: Recognition, Organizational approach, Engagement Board, Engagement focus groups, Engagement awareness training, Communication, Worker involvement programmes, Working in teams and Reconfiguring company Bonus schemes

**B. Employee Engagement - Indian scenario:** About half the Indian workers in a survey have said that they feel fully committed or engaged with their current employer. Here below are India's best Companies to work for 2018

<b>Company</b>	<b>Ingredients in the Recipe for success</b>
SAP Labs India Pvt Limited	SAP encourages free expression, collaboration, individuality, and diversity. Its core strength as an employer, vests in the empowerment of its employees. SAP has developed an environment which motivates its employees to do their best and energises an individual to influence the deliveries with utmost sincerity
Intuit India	Being certified as a great place to work for, management at Intuit India believes in living up to its core value of 'being bold' by raising their ambition of being the best. Employees take pride in the organisation's values and their team
American Express India	An organisation that recognises talent, American Express India rewards employees appropriately for their hard work and dedication
Adobe Systems India Pvt Ltd	The management at Adobe Systems India Pvt Ltd ensures that the core values that drive its culture remain integral to its ecosystem at all times, so that the employees continue to feel as being part of a family
DHL Express India Pvt Ltd	Respect and results are the two most important values that describe the culture of DHL. Essentially it means that while results are important for them to succeed today, they do not achieve them by compromising on respect for their employees

**Source:**[https://economictimes.indiatimes.com/news/company/best\\_company\\_2018](https://economictimes.indiatimes.com/news/company/best_company_2018)

#### **Part V**

##### **Conclusion**

Employee engagement fosters and drives discretionary behavior, eliciting employees' highest productivity, their best ideas and their genuine commitment to the success of the organization. While it is fairly easy to say what engagement is and why it is good for organizations, it has proven more difficult for organizations - particularly organizations with heterogeneous employee populations - to determine how to increase engagement. Cracking the code to employee engagement-learning how organizations can win the hearts and minds of their employees - remains a complex yet critically important challenge facing organizations as they strive to reach the highest levels of performance in changing and competitive environments. Research has shown that employee engagement is higher when

responsibility for sustaining it is spread throughout the organization. An Organization can achieve success by developing a proper recipe, which fuels engagement and enrichment and this is a collective responsibility of management, individual executives and employees.

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## **A case study on the effectiveness of Faculty Research Programme as a Knowledge Sharing tool**

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### **Abstract**

There is a tremendous growth in the number of students enrolling in Arts and Science colleges in the higher education sector in India in the recent years. Knowledge Sharing has been acknowledged as a key resource for colleges to gain competitive advantage in today's competitive environment. Various initiative like Seminars, Conferences, Workshops and Faculty Development programmes have been organised by colleges as a Knowledge Sharing Practice. In addition to the above practices St. Anne's Degree College for Women has introduced Faculty Research Programme to capture, store and disseminate the knowledge among its entire faculty.

This paper was developed keeping in view that Faculty Research Programme is a holistic model that not only aids knowledge creation but also helps in sharing knowledge at workplace.

**Keywords:** Knowledge Sharing, Faculty Research Programme, Case Study

### **Introduction**

The concept of knowledge management developed with the management consulting community. With the advent of internet, those organisations viewed that an in-house subset of the internet can be used to make information accessible and share among its geographically dispersed units. This gradually emerged as Knowledge Management and went public at a conference at Boston (1993).

This concept widely used in industries has now gained importance in the education sector also. Higher Education institutions are centres where knowledge is created continuously and KM strategy is an important factor that enables it to be more effective. Each faculty member is a personal store of knowledge with training and experiences.

Knowledge Management (KM) is a process where organizations have formulated ways in an attempt to recognize and achieve knowledge assets within the organization that are derived from the employees of various departments or faculty and in some cases, even from other organizations that share the similar interests or specializations.

In an attempt to create, store and share specialised knowledge, IQAC of St. Anne's Degree College has started organizing Faculty Research Program (FRP) as an initial stage of Knowledge Management. It is a springboard for the faculty to carry out research in their area of expertise and share it in a common forum. The research papers presented are

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compiled and released as a compendium to capture and store knowledge. This study aims at evaluating the effectiveness of FRP as a Knowledge Sharing tool.

### **Review of Literature**

*Chang & Chuang (2011)*, in his study stated that information technology, human resources management, leadership, organisational learning, organisational culture, organisational structure and organisational strategy, can be developed through knowledge management.

*Walter Omona et al (2010)*, in his study "Using ICT to enhance knowledge management in higher education: A conceptual framework and research agenda, states that KM is an increasingly important source of competitive advantage. The author in this paper proposes organisation as a knowledge space where the required ICT's, agents, individuals and collectives who use them in the conduct of the knowledge work are embedded.

*Ferenc Farkas and Agnes Liraly (2009)*, in their study "What makes higher education knowledge – Compatible?" recommend that the aim of knowledge management is to improve the value of the organisation through application of the existing knowledge and intellectual capital inside the organisation. Considering the discussion on knowledge in universities the author has found it appropriate to view those features of universities producing and featuring service to the public which can have an impact on successful implementation of KM programs.

Knowledge sharing is at an emerging state in developing countries which are making policies and encouraging the stake holders of institutions to minimize the barriers and promote successful practices of KM.

### **Research Design**

#### **Objectives of the study**

1. To evaluate the effectiveness of Faculty Research Programme as a Knowledge sharing tool in capturing, storing and disseminating knowledge
2. To study if Faculty Research Programme aided in enhancing content delivery in classrooms.

#### **Collection of data**

Primary data was collected in the form of questionnaire from the faculty members of science, commerce & management departments of St. Anne's degree college for women. The questionnaire was developed to test the hypothesis in order to ensure its accuracy; feed was obtained from all the faculty members who had presented papers in the Faculty Research Programme. Secondary data was collected from websites and journals.

#### **Tools for analysis**

The main purpose of this study is to identify a tool for setting up Knowledge Sharing at the college. The collected data was scored and entered in SPSS. Mann-Whitney U test was used to test the hypothesis.

#### **Hypotheses**

1.  $H_0$ : There is no significant difference in the perception of faculty members of the two departments in the effectiveness of FRP as a Knowledge Sharing tool.
2.  $H_0$ : There is no significant difference between the opinions of faculty members of the two departments in the effectiveness of FRP in enhancing content delivery in classrooms.

#### **Data Analysis**

The data was tested for normality using the Shapiro-Wilk test since it is more appropriate for smaller sample sizes (<50 samples). The significance value was found to be below 0.05

which indicates that the data significantly deviates from the normal distribution, hence Mann-Whitney U test was used to analyse the data.

**Mann-Whitney test:**

- H<sub>0</sub>:** There is no significant difference in the perception of faculty members of the two departments in the effectiveness of FRP as a Knowledge Sharing tool.

**Table 1.1 Descriptive Statistics**

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Gain Detailed Knowledge	20	4.20	.768	3	5	4.00	4.00	5.00
Aids Conceptualizing Information into Knowledge	20	4.10	.718	2	5	4.00	4.00	4.75
Aids Organizational Knowledge Creation	20	4.10	.447	3	5	4.00	4.00	4.00
Aids Storage of Information Through ICT	20	4.05	.394	3	5	4.00	4.00	4.00
Aided Peer Knowledge Sharing	20	4.00	.000	4	4	4.00	4.00	4.00
Department	20	1.50	.513	1	2	1.00	1.50	2.00

**Table 1.2 Ranks**

Department	N	Mean Rank	Sum of Ranks
Gain Detailed Knowledge	Science	10	111.00
	Commerce & Management	10	99.00
	Total	20	
Aids Conceptualizing Information into Knowledge	Science	10	93.00
	Commerce & Management	10	117.00
	Total	20	
Aids Organizational Knowledge Creation	Science	10	96.00
	Commerce & Management	10	114.00
	Total	20	
Aids Storage of Information Through ICT	Science	10	91.00
	Commerce & Management	10	119.00
	Total	20	
Aided Peer Knowledge Sharing	Science	10	105.00
	Commerce & Management	10	105.00
	Total	20	



**Table 1.3 Test Statistics**

	Gain Detailed Knowledge	Aids Conceptualizing Information into Knowledge	Aids Organizational Knowledge Creation	Aids Storage of Information Through ICT	Aided Peer Knowledge Sharing
Mann-Whitney U	44.000	38.000	41.000	36.000	50.000
Wilcoxon W	99.000	93.000	96.000	91.000	105.000
Z	-.487	-1.076	-.976	-1.704	.000
Asymp. Sig. (2-tailed)	.626	.282	.329	.088	1.000
Exact Sig. [2*(1-tailed Sig.)]	.684 <sup>a</sup>	.393 <sup>a</sup>	.529 <sup>a</sup>	.315 <sup>a</sup>	1.000 <sup>a</sup>

a. Grouping Variable: Department

**Interpretation**

Mann Whitney U value was found to be statistically significant U=44 (Z= -0.487, r= -0.10) for detailed knowledge gained, U=38 (Z= -1.076, r= -0.24) for aiding conceptualizing information into knowledge, U=41 (Z= -0.976, r= -0.21) for aiding organizational knowledge creation, U=36 (Z=-1.704, r= -0.38) for aiding information storage through ICT, U=50 (Z= -0.000, r= 0) for aiding peer knowledge sharing. Since p>0.01 and r values are less than 0.5 for all the factors discussed, the difference in the opinion of faculty members between the two departments is significantly small. This indicates that Faculty Research Programme can be used as Knowledge sharing tool across the departments in higher education institutions.

2. **H<sub>0</sub>:** There is no significant difference between the opinion of faculty members on the effectiveness of FRP in enhancing content delivery in classrooms

**Table 2.1 Descriptive Statistics**

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25 <sup>th</sup>	50 <sup>th</sup> (Median)	75 <sup>th</sup>
Aids Teaching outcome in classes	20	3.80	.768	2	5	4.00	4.00	4.00
Department	20	1.50	.513	1	2	1.00	1.50	2.00

**Table 2.2 Ranks**

Department	N	Mean Rank	Sum of Ranks
Aids Teaching outcome in classes	10	11.10	111.00
Commerce & Management	10	9.90	99.00
Total	20		

**Table 2.3 Test Statistics**

	Enhances content delivery in class rooms
Mann-Whitney U	44.000
Wilcoxon W	99.000
Z	-.560
Asymp. Sig. (2-tailed)	.575
Exact Sig. [2*(1-tailed Sig.)]	.684 <sup>a</sup>

a. Grouping Variable: Department

### **Interpretation**

Mann Whitney U value was found to be statistically significant  $U=44$  ( $Z=-0.560$ ) ( $r=-0.12$ ) for effectiveness in enhancing content delivery in class rooms. Since  $p>0.01$  and  $r$  value is less than 0.5, the difference in the opinion of faculty members between the two departments is significantly small. This indicates that Faculty Research Programme enhances content delivery in class rooms.

### **Conclusion**

The findings of the study prove that Faculty Research Programme can be used as a knowledge sharing tool across the departments in higher education institutions. The study will be beneficial to the higher education institutions that are at the initial phase of implementing KM but do not have clarity on Knowledge sharing tools. It also provides scope for future research in knowledge management.

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**Questionnaire**

Age: 25-35  35-45  45-55

Experience: 0-6  7-12  13-18

S. No	Statement	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
1.	FRP helped me to acquire detailed knowledge in my area of interest					
2.	It aided organizing and conceptualizing information into knowledge					
3.	FRP helped the creation of organizational knowledge					
4.	The storage of information with the help of ICT aids knowledge capture					
5.	FRP aided knowledge sharing among peers in the organization					
6.	FRP has enhanced the content delivery in classrooms					

**7. Mention the ways in which FRP helped in improving teaching methods?**

## **Nutrition Labelling for Packaged Foods: A Study of Consumer Response**

**Dr. Monica Bedi\***

**Dr. Pooja Chopra\*\***

### **Abstract**

India is moving up in the coveted list of the world's largest emerging economies, as it inches towards unrivalled growth in the consumption of processed and packaged food. With the booming organized retail sector, there is a paradigm shift in consumers buying behaviour particularly regarding food products. The present research will attempt to investigate the awareness level among Indian consumers with respect to content and nutritional information on printed food product labels. Also, the study attempts to explore the demographic and socio-economic differences with regard to level of awareness. Random sampling method is used to carry out the study with a sample size of 150 respondents. Well-structured questionnaire were used to collect the primary data. Chi square is used to analyze the data. The results of the study will help Indian policy makers and food companies to understand the complexity of issues involved in nutrient labelling and designing marketing strategies to maximize benefits from resources spent on food labelling. The study found that Indian consumers are somewhat aware of the nutritional contents mentioned on packaged foods. Females pay more attention to nutrient labels as compared to males. It is seen that nutrient labels affect the purchasing decision of the consumers. People do read about food labels while purchasing but at the same time they are not able to relate some of the contents and are not aware of their significance. Hence they find it difficult to understand the importance of some contents. Also, educational qualification has improved the understanding of consumers regarding nutritional value.

**Key words:** Nutrition Labelling, Packed Foods, Consumer Response, India.

### **Introduction**

India has moved up 6<sup>th</sup> position in the coveted list of the world's largest emerging economies with a population of over 1.3 billion(World Bank Report, 2018).India is currently poised at 123<sup>rd</sup> position at the global platform in terms of purchasing power parity as per Consumer Expenditure Survey Data conducted by Nation Sample Survey Organization, 2012-15.India has robust middle class base of over 300 million but also 45 per cent of the India's population is below 24 years of age and the young population is set to rise further(MOSPI, 2017)

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**Table 1: Change in the Indian consumer profile**



Rampant urbanization, accelerated literacy rate and increasing per capita income, changing demand patterns and beugouning economic growth has led to an explosion of new opportunities for manufacturers (IBEF, 2017). There is great demand for an enormous variety of goods and services, India have a heterogeneous consumer base differ in terms of age, income, gender, literacy levels, and tastes & preferences World Bank, 2017). But ironically India is clouded under the double burden of under nutrition on one hand while simultaneously facing a rapid rise in overweight-, obesity- and diet-related non-communicable diseases (NCDs) (Kulkarni *et al.*,2017: Chopra *et al.*, 2013). India ranks third after the US and China in the number of obese people and 22% of children and adolescents are overweight or obese (Dey, 2016). A report by AC Nielsen (2017) highlighted the growing surge for health and wellness consciousness among Indian consumers, especially, the youth because of changing work and lifestyle habits. In recent years, the trend towards healthier eating has increased consumer demand for detailed, accurate and accessible information, typically on food package label (Abbott, 1997). Ideally, food label help customers to make healthy and informed food choices by providing the desirable information about the food on the packaging (FSSAI, 2011). Nutrient profiling on labels is recognized by the World Health Organization (WHO) as a helpful method aimed at improving the overall nutritional quality of diets(WHO Nutrition Profiling, 2010) The three primary functions of nutrition labeling are: Firstly, it provides basic product information (including common name, list of ingredients, net quantity, shelf life, grade/quality, vegetarian society logo, country of origin, name and address of manufacturer, dealer or importer and food standards agency(FSSAI, 2018). Secondly, it provides health, safety, nutrition information which includes instructions for safe storage, handling, nutrition information such as quantity of fats, protein, carbohydrate, vitamins &minerals and preservatives, colors, if used any, quantity per serving of stated size of food (Wasir & Misra 2004) and thirdly, it also acts as a vehicle for food marketing promotion and advertising (via label vignettes) promotional information and claims such as ‘low fat’, ‘cholesterol free’, ‘natural’, ‘organic’, ‘no preservatives added’ and so on( Lwin *et al.*, 2015)

### **Theoretical Framework**

Overweight and obesity are the two burning issues (especially among young kids and adolescents (Chan & Woo, 2010), which has caught the attention of nutritionists, doctors and researchers in the public health domain, across the globe. They have been working hard to collect accurate and concrete data on the nutritional quality of food products (Guh *et al.*, 2009). Around 10 per cent of population and 5-15 per cent of children and adolescent suffer from Nutritional disorders like overweight or obese in India (Sunitha, & Gururaj, 2014).

In India, Prevention of Food Adulteration Act (PFA) was legalized in 1954 and since then it has been the major regulator, which provides guidelines for printing vital nutritional information on labels of food packages in line with the various updates regarding regulations from time to time. PFA (1954) Act is a national legislation for food safety, and it's based upon the doctrine for welfare of consumers so as to save guard them from supply of contaminated, substandard and adulterated food products along with regulating the entire supply chain i.e. starting from production, manufacture, packaging, storage till sale of food products clubbed with a strict check to maintain minimum quality norms. However, Nutritional labeling was not mandatory during the last decade (Laxmaiah *et al.*, 2009) but the Indian Government was working constantly on a proposal to do so at the earliest (Gaiha *et al.*, 2014). However, In India the apex food regulator is the Food Safety and Standards Authority of India (FSSAI) which is empowered by and functions under the protocol framed by Food Safety and Standards Act, 2006 provided by Ministry of Health and Family Welfare, Government of India.. The FSS Act ,is popularly known as the Food Act which is passed by the Parliament of India .The regulations of the FSS Act became effective in 2011 with FSSAI as its chief regulatory body. The Act is continuously evolving so that it comes as par with the global standards. Now, it is binding for the manufacturers to display nutrition information. As food labels play an integral role in diffusing vital nutritional information to consumers. (Gruère & Rao, 2007). So, labels have become an indispensable part of promotion mix. In the beginning, food labeling had limited horizon that would provide just the food name, quantity, price and identity of the manufacturer (Cowburn & Stockley, 2004). But now, labeling acts as an silent salesperson helps in disseminating vital information like manufacturing, expiration, and best used before dates, as well as ingredients used (Castillo *et al.*,2015).The customer , just with a glimpse at the label can make out regarding the contents and the usefulness of the product (Singla, 2010). Ling, *et al.*, (2004) in a study on food adoption by Indians, assert that Indians have traditionally placed a lot of value on the importance of fresh and healthy food; cultural influences reinforced by a modern approach to healthy nourishment have reinforced this intent. Moreover, processed food is a new concept to the Indian population. While the time constrained urban Indians are adopting this concept with alacrity, they continue to seek the nutritional benefits of fresh food( Zameer & Mukherjee 2011 ).The food corporate, too, has been very efficacious in substituting fresh and healthy food from consumers' food regime with fast food and ready to cook meals.( Piližota, 2012). Food label affects consumer buying behavior as it effects valuations and perceptions about the product (Prathiraja & Ariyawardana 2011). Feunekesa *et al.*, (2006) are of the view that many consumers, draw out vital information form nutrition labels while selecting food products. Composition of the product significantly influences its purchase probabilities (Baltas, 2001).Thus, this study also concluded as there is hardly any research examining



the knowledge, practices and use of food labels by Indian consumers (Anand, 2011). So, this research reiterated the need to understand the consumers' knowledge and practices related to food labels for formulating strategies to make them user-friendly.

### **Food Information and Attributes that Consumer Seek**

Singla (2010) and George & Chryssochoidis (2006) were of the viewpoint that consumers refer to food labels primarily to compare brands and not to access nutritional information, at times even to know about promotional offers and free gifts. Consumers gain access to nutritional information through various sources. Television is identified as the principal source of information, followed by friends, internet and magazines (Daud, *et al.*, 2011) doctors or dieticians (Shine *et al.*, 1997). In an empirical study using actual purchase data (Drichoutis, *et al.*, 2006) revealed that there exists a clear tradeoff between the nutrition and taste attributes of food products. Adults may attach less importance to taste, whereas children place specific emphasis on it. A study by Stanley & Tschirhart, (1991) emphasize that convenience is also an important factor for specific consumer groups such as children or busy adults.

### **Specific Nutritional Information Sought from Food Labels**

Individual's opinions vary largely regarding their willingness to pay attention to food labels (Velčovská and Chiappa, 2015). In general, consumers who are more aware of nutrition and health conscious are more likely to use nutritional labels (Majid *et al.*, 2015). Popkin *et al.*, (2001) carried out a methodical review and found that consumers pay more attention towards nutrients, they want to avoid for example fat. Other nutrient information commonly sought out by consumer's energy content, serving size protein, types of fat, cholesterol, dietary fibre, minerals, carbohydrates, vitamins, additives and sodium (Neale & Langnäse, 1998).

### **Demographics and Label Use**

Campos *et al.*, (2010) in his study concluded that middle-aged or young adults were more likely to use nutrition labels as compared to older people. Studies also indicate that women are more likely to use nutrition labels. Drichoutis *et al.*, (2006) affirm that people with lower level of education and earning are less likely to use labels, moreover, smaller families; families with young children, urban residents are more likely to search for nutrition information. Healthier eating habits, specific disease diagnosis within the family, and weight control are all related to increased label use (Reimer, 2009). However, all these studies have been carried out in the western context. Baltas (2001) observed that the importance of a nutrition attribute varies over people even within the same target market. Consumers on a special diet, organic product users, and those aware of the relation between diet and disease are more likely to search for nutrition information than others (Mannell *et al.*, 2006). Mackison *et al.*, (2008) also mention a study by Levy *et al.*, (1992) which states that label nutritional labels are influenced by a host of factors including the format.

### **Objectives of the Study**

The study aims to assess awareness and usability of content and nutritional information on food labels on packaged food. Specifically, the study attempts to:

- a) Explore consumer awareness of nutrient labels and information provided on packaged food.
- b) Examine the extent to which nutrient labels influence purchase decision of packaged food products.

- c) Assess impacts of socio-economic characteristics of consumers on level of awareness and use of nutrient label in decision making.

### **Methodology**

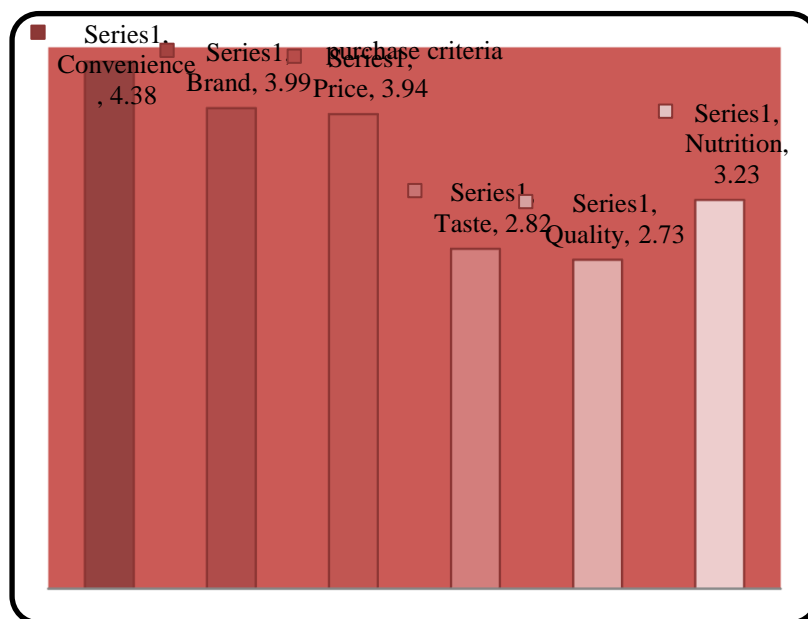
Survey method of research was used to conduct the study. A descriptive research has carried to collect data on purchase behavior and the attention consumers pay to different categories of information displayed on nutrient labels while making purchase of packaged food items. The sampling method used was random sampling. The sample size of 150 respondents was proposed initially, out of which data entry of 142 completely filled questionnaires was done. More than half (67%) of the respondents were females, the remaining 33% being males. 50% of the total employees surveyed were between less than 25 years of age. About half (48%) of the respondents were postgraduate whereas 46% were undergraduates. Around 47% was having annual income less than INR.3 Lac. Data collection was done with the help of a structured questionnaire comprising of sections focusing on demographics, awareness and purchase behavior of the consumer. Respondents were required to rate the extent they agree or disagree with each statement on a five-point scale (1 = strongly disagree; 5 = strongly agree). The score is calculated by summing the item responses. Chi-square has been used for the analysis. Analysis was performed using SPSS version 18.

### **Major Findings and Discussion**

**a) Explore consumer awareness of nutrient labels and information provided on packaged food.**

- i. The study shows that 43% of the total target population rates their diet as “Good” on the nutritional value.
- ii. 54% of the respondents have rated their health as “Good” during the survey. Whereas 25% of the respondents agree that they have “fair” health. Only 12% of the respondents believe that they have “Excellent” health.
- iii. 68% of the target population spends “About half” on shopping for food items. And 22% of the respondents spend “Most” on food shopping.
- iv. The study shows that 44% of the sample population “Sometimes” pays attention on reading the nutrition labels on packaged food items.
- v. 59% of the target population has responded positively by answering “Yes” when asked whether they read labels for the first time a food item is purchased. Whereas 27% are not sure whether they read labels or not and 14% definitely read labels while making a purchase for the first time.
- vi. 53% of the respondents agree that “Sometimes” the nutrient labels affect their purchase behavior while shopping for packaged food items. Only 28% respondents say that the food labels “Always” affect their purchasing decision whereas 13% of respondents supported the statement by answering “Rarely”. 6% of the target population’s purchase is “Never” affected by nutrient labels mentioned on packaged food items.
- vii. 58% of the target population does not have any special dietary needs within their household and the remaining 42% of the respondents are those have special dietary needs within the household.

**b) Examine the extent to which nutrient labels influence purchase decision of packaged food products.**



The study showed that respondents gave highest weightage to “Convenience” while shopping for packaged food items. Next preference is given to “Brand” followed by “Price”. The respondents look for “Nutritional value” of the food items at the 4<sup>th</sup> position. “Taste” and “Quality” are found out to be the last priorities while purchasing a packaged food item.

c) Type of food information is sought from food labels.

S. No.	Attributes	Age			Gender			Qualification			Annual Income			Occupation		
		X <sup>2</sup>	df	sig.	X <sup>2</sup>	df	sig.	X <sup>2</sup>	df	sig.	X <sup>2</sup>	df	sig.	X <sup>2</sup>	df	sig.
a.	Nutritional information	11.5	6	0.74	0.4	2	0.82	7.6	6	0.27	22.3	6	<b>0.001</b>	4.4	10	0.93
b.	Additives/ Artificial colors	5.3	6	0.5	1.3	2	0.52	13.9	6	<b>0.03</b>	5.2	6	0.52	9.0	10	0.53
c.	List of ingredients	7.6	6	0.27	0.4	2	0.98	8.3	6	0.22	9.1	6	0.17	8.8	10	0.55
d.	Date mark	20.7	6	<b>0.002</b>	0.09	2	0.96	23.0	6	<b>0.001</b>	11.2	6	0.08	4.9	10	0.90
e.	Price	6.3	6	0.39	2.4	2	0.31	12.6	6	<b>0.05</b>	6.9	6	0.33	6.7	10	0.76
f.	Brand	10.1	6	0.12	3.6	2	0.16	5.3	6	0.51	13.1	6	<b>0.04</b>	4.3	10	0.94
g.	Origin	6.8	6	0.34	3.5	2	0.17	5.3	6	0.51	14.3	6	<b>0.03</b>	8.3	10	0.60
h.	Quantity or weight	11.9	6	0.06	1.4	2	0.51	3.9	6	0.69	8.0	6	0.24	7.1	10	0.71
i.	Cooling instructions	9.2	6	0.16	3.2	2	0.21	12.8	6	<b>0.05</b>	9.5	6	0.15	8.8	10	0.55
j.	Environmental information	3.5	6	0.74	0.4	2	0.83	5.2	6	0.52	1.6	6	0.95	14.7	10	0.14
k.	No opinion	7.6	6	0.27	2.4	2	0.3	6.7	6	0.35	7.7	6	0.26	6.6	10	0.77

From the above table it can be seen that as the **Pearson's Chi-square** has very small value there exists a significant relationship between the following dependent and independent variables.

1. A significant relationship can be seen between the dependent variable “Date mark” and independent variable “Age” and “Qualification”.
2. It is also seen that there exists a relationship in the understanding of nutritional information with the classificatory variable “Annual Income”.
3. The relation has been seen between the “Qualification” and “Price” on the packaged food products.
4. The significance value of 0.04 shows a relationship between the “Brand” and the “Annual Income” within the target population.
5. The significance value of 0.05 shows that there exists a relationship between the “Qualification” and “Cooling instructions” mentioned on the packaged food items

**(d) Type of information is looked for on nutrition labels**

S. No.	Attributes	Age			Gender			Qualification			Annual Income			Occupation		
		X <sup>2</sup>	df	sig.	X <sup>2</sup>	df	sig.	X <sup>2</sup>	df	sig.	X <sup>2</sup>	df	sig.	X <sup>2</sup>	df	sig.
a.	<b>Fat</b>	5.0	6	0.55	0.9	2	0.65	2.6	6	0.86	18.6	6	<b>0.01</b>	6.6	10	0.76
b.	<b>All nutrients</b>	11.1	6	0.09	0.2	2	0.91	5.8	6	0.44	7.2	6	0.27	11.6	10	0.31
c.	<b>Vitamins</b>	5.5	6	0.48	0.5	2	0.79	4.0	6	0.68	2.9	6	0.82	7.0	10	0.73
d.	<b>Iron</b>	15.6	6	<b>0.02</b>	2.26	2	0.32	20.3	6	<b>0.002</b>	8.1	6	0.23	5.9	10	0.83
e.	<b>Calories</b>	6.5	6	0.37	0.1	2	0.96	6.0	6	0.43	12.0	6	0.06	2.5	10	0.99
f.	<b>Protein</b>	5.4	6	0.50	0.2	2	0.90	2.1	6	0.91	27.3	6	<b>0.00</b>	11.1	10	0.35
g.	<b>Cholesterol</b>	12.4	6	<b>0.05</b>	0.8	2	0.66	14.0	6	0.03	12.1	6	<b>0.059</b>	4.8	10	0.91
h.	<b>Fiber</b>	4.46	6	0.61	5.9	2	<b>0.05</b>	2.3	6	0.89	12.3	6	<b>0.056</b>	7.6	10	0.66
i.	<b>Carbohydrates</b>	11.3	6	0.08	1.9	2	0.39	4.9	6	0.56	6.6	6	0.36	7.2	10	0.71

The small value of **Pearson's Chi-square** shows that there exists a relationship between the following:

1. Respondents within various "Age groups" look for information such as "Iron" and "Cholesterol" contents on the nutrient labels on the packaged food products.
2. The results shows that "Males and Females" look more for the "Fiber" contents mentioned on the packaged food items.
3. It is also seen that respondents with different qualification levels look for "Iron" and "Cholesterol" information on nutrient labels.
4. In "Annual Income" category respondents look for information on "Fat", "Protein", "Fiber" content on packaged food products.

**Conclusion**

The study tells that Indian consumers are somewhat aware of the nutritional contents mentioned on packaged foods. Females pay more attention to nutrient labels as compared to males as the study explores that females seek nutritional information on packaged foods. This research examines the extent to which nutrient labels influence purchase decision of packaged food products. In most of the cases it is seen that nutrient labels `somewhat affect the purchasing decision of the consumers. People do read about food labels while purchasing but at the same time they are not able to relate some of the contents and are not aware of their significance. Hence they find it difficult to understand the importance of some contents. This may be a major reason that consumers loose interest in paying attention to the nutrient labels. Also educational qualification has improved the understanding of consumers regarding nutritional value and it was seen that respondents coming under the category of higher qualification level are the ones who read and can understand the nutritional contents on packaged food.

**Future Scope of Study**

With increasing being paid to food labels, there are numerous areas which can be explored. A study of the compliance by corporates, how much of the information on food labels is actually comprehensible and usable, the impact of nutritional labels on purchases made by

children are, food labels as a tool in branding are some of the areas which mandate further study.

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## **Mobile Agent framework and Security Implications**

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### **Abstract**

In the present mobile agent technology which has multiple faces along with lots of latest technologies like cloud computing and advance communication network framework. It is very much supportive to the where the mobile agent have potential deployment. It has been promoted emerging technologies which plays significant role in designing, implementing and maintaining distributed system even cloud based distributed system. The mobile agent not only works autonomously but it works in migrated form on various computers. It is obvious that this technology gives a rapid direction to communication network technology in the limited time framework but security is one the concern associated with. At this point network environment is a system which can take benefit of weakness of the mobile agents which come to the host machine to get it work done. This article discusses and gives an assortment of the prospective utilization of mobile agents in the context of framework, platform, relocation and security implications.

**Keywords:** Mobile, Network, Communication, Agent, security implications, analysis.

### **1. Introduction**

Nowadays with the advancements of the technology of network and communication mobile agent comes in the role. Basically the mobile agent is an autonomous piece of program which may travels in various networks or one can say computer to computer. It has its own programming about travelling and placing itself at various instant. The condition of the operation of program is set aside, by being conveying to the target. The course of final action is taking up again at the target ongoing it's processing with the stored state. The programming reside in the mobile agent is one of the robust programming which get activated at the targeted node or network. The factor which may affect the action of the mobile agent is latency, bandwidth, and weakness to network disconnection. Despite this mobile agent is useful for creating smart environment in distributed cloud network. The role of mobile agent give various advantaged like asynchronous execution, dynamic deployment, direct manipulation, development of application and all above reduce communication cost.

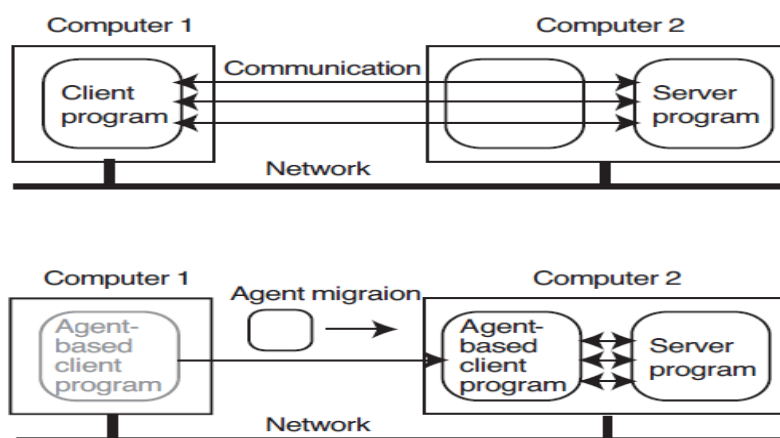
### **2. Working Framework**

As depicted in the figure that mobile agent workings as a mediatory unit among the client program and server program. Without mobile agent there is regressively need of communication channel in the network to pass the information whereas with the help of mobile agent the migration of agent in association of agent based client program is sufficient to communicate the information as well as action and the desire point.

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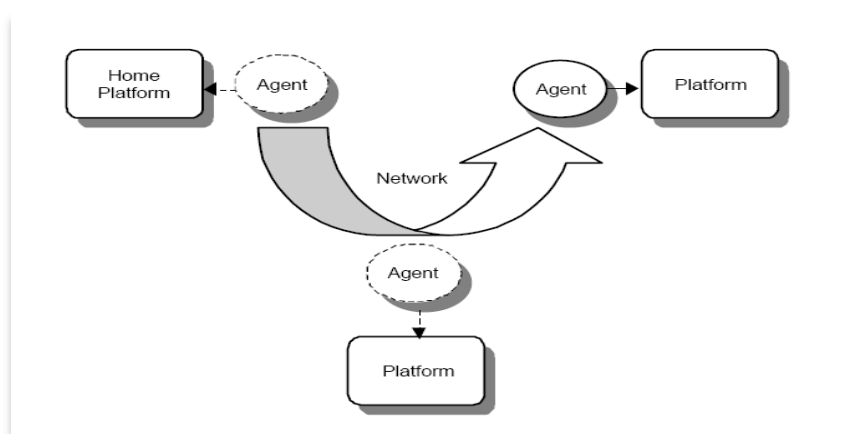


**Figure-1: Working process of mobile agent in network**

The mobile agents can save themselves in the course of persistent storage, and replicate to self, and transfer themselves for further computers beneath their self control consequently are able to sustain various types of processing in distributed cloud network.

It is not always true that all the program of distributed cloud network needed mobile agents. The key concern associated with mobile agent is to use software intelligence technology to manage the activity and action on remote node at a particular time or on particular course of action. The efficiency of mobile agent depends on the network, term of scaling, speed of processors and bandwidth of network.

The mobile agent investigation is produced by at least two dissimilar loom, as distributed cloud artificial intelligence and dispersed systems. Entire plays a significant function in mobile agent study and therefore brings an exclusive perceptive and equivalent influence in the field. There are two key segment of Mobile Agent structure: mobile agents and platform of mobile agent



**Figure-2: Mobile Agent platform**

The mobile agent platforms may be broadly classified in two major categories the first one is runtime system and another one is mobile agents. The software for mobile agents are one of the crucial parts of them or it itself mobile agents. The supports for functioning of mobile agents is agent platform, agent system and agent server, it all associated with the execution and transfer of events.

As per the activity point of view every mobile agent follows network system runtime limit on the existing terminal. The similar framework stays alive on the entire node at which agents are accessible. As soon as an agent wishes the existing real time structure to travel itself, the runtime system is able to travel to the end node, moving its condition and code through it.

### 3. Agent Relocation

In the mobile agent activity agent migration or relocation is comparable to remote procedure calling; sometimes it is also known as remote method invocation. The remote procedure calling facilitate a client course to call a course of action for server programs which is in succession of detach procedures, usually in dissimilar node from the user end. It is a lean-to of neighboring technique incantation that permits an entity to call upon the technique of the entity on a remote node / workstation.

Agent relocation procedure is able to pass opinion to process or technique of a program on the server and accept a acknowledge value. The manner of sending passing opinion and outcome among two nodes via Agent relocation communicate for agent relocation among two node/ workstations.

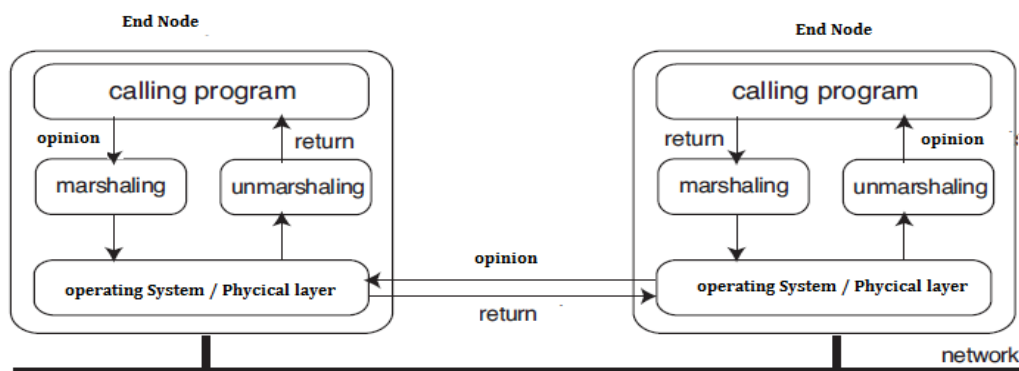


Figure -3: Agent Relocation among two computers

The term marshaling is concern from the procedure of data items collection and brings them together for appropriate message which is transfer by the one end system to another end system. Similarly the un-marshaling is the procedure of disassembling data items on appearance to bring into being an alike group of data towards receiving end. Both of the procedures are taken in action during the execution in the real time.

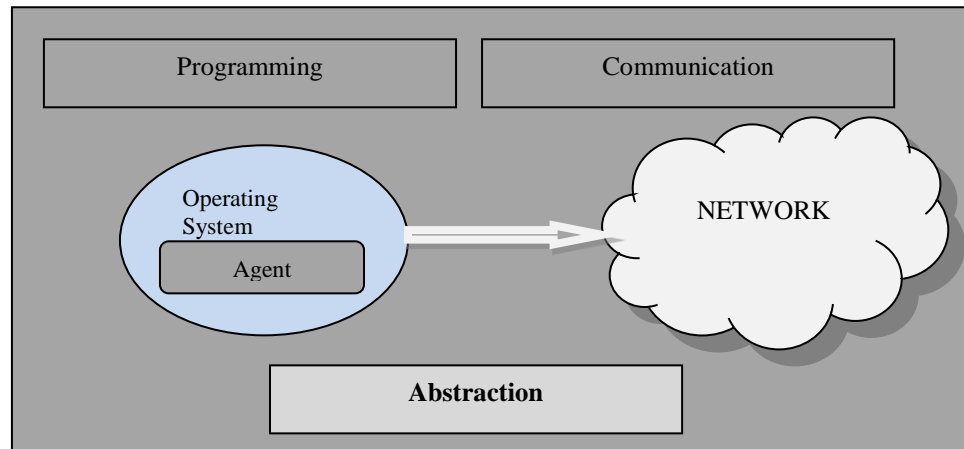
### 4. Four level Security Implications

There are various level of security implemented in the mobile agent. In general the framework of security explores the process of securing data items during the action or activity. On the other hand be short of a general aim and the assortments of the loom have led to the fruition of security frameworks which are not capable to gratify totally the anxiety of security. So to implement the level of security there is implementation of four level securities.

The levels of securities are as follows:

- Security on the physical layer / operating system level
- Security on the network / communication level
- Security on the machine / abstraction level
- Security on the programming language level

□



The communication among the objects through mobile agent happened taken care about the data transfer with the confidentiality. The secrecy or secure environment works with programming language in association of encryption and decryptions techniques. The data items are wrapped in packets with special encrypted form.

The abstraction also plays important role to secure the data items at machine level so there is robust system works in association of machine abstractions. Similarly the network level security keeps information secure. The physical level including operating system level also ensures the transfers of bits patterns in association of mobile agent.

In general the protected exchange of data items, messages, or packets does not give assurance that at the receiving end message is the intended. This situation brings up the issue of endorsement. The four level endorsement mechanisms gives the satisfied result about the authentication of information at receiving end when system working with mobile agent.

### **Conclusions**

This article provides the fundamental of mobile agent and its functionality with its framework of the working. Enrichment of the mobile agent framework its platform to implementation is also discussed. The agent relocation is the activity by which the remote procedure calling facilitate a client course to call a course of action for server programs which is in succession of separate processes, usually in dissimilar node /computers from the client. Finally the four level security is discussed which tries to ensure the all aspect security of the data items in the distributed cloud network in special reference of mobile agent functioning. The research article gives a overall scenario of functioning of mobile agent, framework of working, platform, relocation of mobile agent and level of security.

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## **Promotional Activities in Cultural Infrastructure Requirements for Tamilnadu Tourism**

**Dr.T.Joseph Rex\***

**S.Ramila\*\***

### ***Introduction***

*Tourism refreshes the mind, brings happiness, relaxation, enjoyment and delivers new experience etc. to the tourists. Tourism ensures an all-round growth through economic multiplier effect which percolates to various stake-holding sectors like the airlines, railways, surface transport, cruises, hotels, tele -communication etc., Apart from given direct employment, ensures inclusive growth of the local community. From a service sector, tourism has come out as a leading export industry like the Gems and Jewellery Industry, Information Technology and Engineering Products. Therefore, priority is expected by both Central and State governments to give a major fillip to tourism sector. A new thrust is being given for promoting tourist infrastructure of international standard and marketing of destinations. Arrangements of services such as travel, accommodation and food help in attracting repeat visitors and providing effective publicity by word of mouth. Tourism in the past was regarded as a leisure activity. Now, the advanced technology, quality roads and easy access to tourist attractions, e booking, etc. have made travel easier. Monotony of work, stressful lifestyle, and desire to explore new places has necessitated travel and tourism. The free trade and open-sky aviation policies have also helps to tourism growth. The pace of growth in recent times has left the infrastructural facilities and availability of human resources lagging behind, there by leaving a challenge to match the growth and have futuristic and perspective plans in place.*

### ***India Tourism***

*India Tourism enables a world of attractions to tourists. The Taj Mahal, magnificent Temples of Tamil Nadu, long stretch of Beaches, Palaces, places of Worship, historical Monuments, Wildlife, Nature, Rural lifestyle, Cultural Diversity, Art, Crafts, Architecture and the Cuisine are few examples. The Government of India is now making immediate promotional efforts and accord priority for tourism. For establishing infrastructure, financial support is provided to the States. If the tourism potential is fully utilised, a manifold growth and its consequential socio-economic benefits can be derived.*

### ***Tamil Nadu Tourism –Potential and Prospects***

#### ***Vision***

- (i) To develop Tamil Nadu as an attractive tourist destination at the International level.*
  - (ii) To preserve the good cultural heritage and monuments of architectural splendour.*
- Mission***
- (iii) To strengthen the existing tourism infrastructure in the State.*
  - (iv) To find the gaps in tourism infrastructure and formulate development schemes.*
  - (v) To deliver world class services for the tourists visiting the State.*

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### **Importance of Tourism**

*(i) To promote foreign exchange for the country. (ii) To increase employment, especially in the services sector and to improve the standard of living and quality of life for the people.*

### **Goals**

*1. Establish Tamil Nadu the top destination in India for attracting domestic and foreign tourists.*

*2. Develop the number of tourist arrivals.*

*3. Provide the length of stay of tourists.*

*4. Inspiring the average spending by foreign as well as domestic tourists per day*

### **Strategy**

*a. Integrated development of tourism infrastructure in high potential tourism circuits.*

*b. Developing connectivity and improved environment, utilities and tourist services.*

*c. Improvement of institutional and regulatory frameworks that will ensure coordinated efforts of multiple agencies.*

*d. Improvement of environmentally and culturally sustainable and socially inclusive tourism development.*

*e. Participation of private sector and community participation in tourism and*

### **Strengths of Tamil Nadu for Tourism Development**

#### **I. Tourist Spots**

*i) Attractive Hill Stations: Ooty, Kodaikanal, Yercaud, Yelagiri, Javvadhu Hills, Kolli Hills, Sirumalai Hills, Valparai, Top Slip, Kalrayan Hills and Pachamalai Hills.*

*ii) Silvery Cascades: Courtallam, Hogenakkal, Thirparappu, Papanasam, Akasa Gangai (Kolli Hills), Thirumurthi Falls.*

*iii) National Parks: Guindy National Park, Indira Gandhi National Park and Gulf of Mannar Marine National Park.*

*iv) Wildlife and Birds Sanctuaries: a) Wildlife Sanctuaries Mudumalai, Kalakkad, Mundanthurai, Kodiakarai and Berijam. b) Birds Sanctuaries Vedanthangal, Karikilli, Pulicat, Karaivetti, Udhyamarthandapuram, Vaduvor, Chithirankudi, Koonthankulam, Melaselvanur, Vettangudi and Pichavaram Mangrove Coast.*

*v) Botanical Garden: Ooty, Kodaikanal, Coimbatore.*

*vi) UNESCO Declared Monuments: Chola Temples – Big Temple in Thanjavur, Iravatheeswarar Temple in Dharasuram and Siva Temple in Gangaikonda Cholapuram, Nilgiris Heritage Train.*

*vii) Famous Temples: Navagraha temples, Nava Tirupathi temples, Six Abodes of Lord Murugan, Famous temples at Rameswaram, Madurai, Thanjavur, Srirangam, Thiruvannamalai, Kanniyakumari, Kancheepuram.*

#### **viii) Churches:**

*Santhome, Velankanni, Manappad, Panimaya Madha, Poondi Madha Church.*

#### **ix) Mosques:**

*Thousand Light Mosque at Chennai, Nagore Durgha, Thengaipattinam, Keelakkarai, Kayalpattinam.*

*x) Forts: St. George Fort at Chennai, Danish Fort at Tranquebar, Vellore, Dindigul, Namakkal, Gingee, Kattabomman Fort.*

### **II. Transport Infrastructure**

*i) Excellent Road connectivity (4 lane Road and East Coast Road from Chennai to Kanniyakumari) ii) One International Airport at Chennai, Tiruchirappalli, Coimbatore,*

*Salem and Vaagaikulam and Government & Private Airlines. iii) Wide Railway Network connecting major cities in other States with major Cities and Towns in TamilNadu. iv) 3 Major Ports*

### **III. Educational and Medical**

#### **Institutions**

*Top Educational and Medical Institutions, including top Corporate Hospitals are located.*

### **IV. Skilled Manpower**

#### **Industry**

#### **Weakness (key barriers to the development of Tourism Sector)**

*(i) Inadequate access and lastmile connectivity. (ii) Poor and inadequate infrastructure at tourist destinations and sites. (iii) Weak tourism management capacities. (iv) Limited participation by the Private Sector and Local Communities.*

#### **Opportunities**

*A rich, Cultural and Pilgrimage heritage that already attracts significant tourism volumes and that has the 13 potential, with proper management to further expand. primarily to Kancheepuram, Thanjavur, Tiruchirappalli, Rameswaram, Madurai and Thoothukudi Districts, including a number of UNESCO sites such as the Mamallapuram Rock Carved Temples and the Temple Precincts, accounts for an estimated 60% of TamilNadu's total tourist market.*

#### **New Tourism Products**

*(i) Eco-Tourism (ii) Rural Tourism*

*(iii) Adventure Tourism (iv) Medical Tourism*

#### **i) Eco-Tourism**

*A separate Eco-Tourism Wing has been established in TTDC to promote sustainable eco-tourism by integrating facilities at the Hill Stations, Waterfalls, Forests, Bird Sanctuaries, Wild Life Sanctuaries and National Parks for the benefit of Tourists. Various Packages will be developed to promote Eco-Tourism in the State on sustainable basis without causing damage to environment and wildlife.*

#### **ii) Rural Tourism**

*Government of India funds hardware component; United Nations Development Programme funds software (Capacity Building) component and it is implemented with the assistance of local NGOs. Rural Tourism Projects have been funded with a total outlay of Rs.6.21Crores. Rural Tourism leads to the exposure of children brought up in urban areas to rural life.*

#### **iii) Adventure Tourism**

*Adventure Tourism is gaining much popularity among tourists. Trekking in 15 low altitude hill areas, paragliding in Yelagiri, Mudaliarkuppam Boat Houses are some of the innovative sports activities promoted under Adventure Tourism for the benefit of tourists.*

#### **iv) Medical Tourism**

*Tamil Nadu is the leading Medical Destinations in India. Well-equipped Corporate Hospitals, less waiting time, reasonable cost for treatment and skilled medical professionals are the major advantages to develop Medical Tourism in our State. A Core Committee has been setup consisting of the Director of Medical Education and experts of leading medical organizations to assist the Tourism*

**Department**

*The Government of India is permitting a separate category of Medical Visas, which helps in getting visa for a maximum period of one year which covers the medical tourists and their attendants who accompany them. The world class medical facilities and expertise feasible in Tamil Nadu are highlighted in many domestic and international travel marts, seminars, conferences etc. Now, the Medical Tourism has further expanded in its scope. Medical Tourism is regarded much as clinical, whereas Wellness Tourism encompasses both clinical and spiritual needs of the tourists to maintain them in a right frame of health and mind. The Naturopathy, Yoga and Meditation can be promoted as Tourism Products.*

**Heritage Tourism**

*The Government has declared 48 Tourist places in Tamil Nadu as Heritage Places. The tourists, particularly the foreigners have a special liking for Tamil Nadu because of its art, culture, architecture, cuisine etc. The TamilNadu's traditional food, particularly in Madurai, Tirunelveli and Kongu Regions provide a varied taste and forms an attractive factor to enhance tourist arrivals. This is conducting Indian Dance festival, Food festival and Cultural festival to cater to a large number of domestic tourists as well as tourists from abroad. The unique architecture, expansive courtyards, intricate woodwork, peaceful ambience and delicious cuisine etc. are highlighted to attract tourists. Some of the Chettinad Mansions are converted into Heritage Hotels. Heritage building owners are encouraged by the Tourism department to convert heritage buildings into heritage hotels to attract tourists.*

**Promotion of Less Known Tourist Destinations**

*During summer, there is an flow at places like Ooty and Kodaikanal, far beyond the carrying capacity. This situation makes an effect on the destination itself. Therefore, a tourism promotion effort, Tourism Department promotes 'less known tourist destinations' which have tourism potential. Such places can absorb the excess traffic. To deliver alternate destinations, the following 32 less known tourist destinations have been identified to provide infrastructural amenities on priority basis.*

S.No	Less Known Tourist Destinations	District
1	Periyapalayam	Thiruvallur
2	Pulicat	
3	Elagiri	Vellore
4	Thirukkadaiyur	
5	Vedharanyam	Nagapattinam
6	Tranquebar	
7	Thirumanancheri	
8	Sikkal	
9	Sithannaval	Pudukkottai
10	Puliyancholai	Tiruchirappalli
11	Tharamangalam	Salem
12	Kolli Hills	Namakkal
13	Hogenakkal	Dharmapuri
14	Bavani Kooduthurai	Erode
15	Valparai	Coimbatore



16	Megamalai	Theni
17	Sirumalai	Dindigul
18	Thirupudaimaruthur	Tirunelveli
19	Thirparappu	Kanniyakumari
20	Kalrayan Hills	Villupuram
21	Thali	Krishnagiri
22	Parali	Dindigul
23	Kodiveri	Erode
24	Pollachi	Coimbatore
25	Kurangani	Theni
26	Vaigai	
27	Srivilliputhur	Virudhunagar
28	Kattabomman Fort	Thoothukudi
29	Tiruchengodu	Namakkal
30	Pichavaram	Cuddalore
31	Pachamalai	Tiruchirappalli
32	Koothanur	Thiruvarur

*Schemes are formulated under Central Financial Assistance and State Fund to provide basic amenities in 'Less Known Tourist Destinations' to attract tourists. The following are details of subsidy providing for promoting Tourism in Less Known Tourist Destinations.*

#### ***Subsidy for Private Investment***

*The following are details of subsidy given to attract entrepreneurs to invest in setting up Star hotels, Amusement Parks, Golf courses, Spas, Boat houses, etc.*

#### **(i) One Time Subsidy for Construction of Star Hotels**

<b>S. No</b>	<b>Grade</b>	<b>Subsidy</b>
1	Single Star	10 per cent of the total project cost (excluding land value) or a maximum of Rs.25 Lakhs.
2	Two Star	10 per cent of the total project cost (excluding land value) or a maximum of Rs.50Lakhs.
3	Three Star	10 per cent of the total project cost (excluding land value) or a maximum of Rs.100 Lakhs.

#### ***Human Resources Development***

*The following Government Catering Institutes offer Diploma Courses in Hotel Management, Catering Technology and also various Craft Certificate Courses. 1. The State Institute of Hotel Management and Catering Technology, Thuvakkudi, Tiruchirappalli. 2. The Institute of Hotel Management, Catering Technology and Applied Nutrition, Tharamani, Chennai (Government of India Institute)*

#### ***Guide Training Programme***

*Guides play a vital role in tourism promotion. They are responsible for projecting the right image of the country, giving factual information, caring for the safety of the tourists and ensuring their pleasant stay. Tamil Nadu Tourism in co-ordination with the Anna Institute of Management, Chennai conducts Guide Training Programmes for the unemployed youth*



and retired Government officials. Guide Identity cards are given to the trained Guides. **“Virunthinar Potruthum, Virunthinar Potruthum” (Tourist friendly activities)** The Tourist friendliness is an important factor which generates tourist retention value. If the guest care blends well with the multifarious tourist attractions of our state, it can generate a large number of tourists. It is, therefore, necessary that, those who are in direct interaction with the tourists, are to be given the capacity building training to ensure better visitor services. The 'Virunthinar Potruthum, Virunthinar Potruthum' campaign is organised for the taxi drivers, auto drivers, railway staff, airport staff, airline staff, traffic police, guides, counter staff in the travel agencies etc. This has resulted in tourists getting better services. The word-of-mouth publicity carries a very positive impact. The training is arranged in Chennai and other districts / tourist destinations.

**Capacity Building Training**

Training is imparted for local community in Rural Tourism Sites, Front Office Staff in Corporate Hotels, Drivers of Taxis and Auto-rickshaws and Personnel handling tourists at Airports and Railway Stations.

**Tourist Security Organization**

A Tourist Security Organization is functioning in the Tourism Department. It has a Chief Tourist Warden stationed at Chennai to co-ordinate with Station Tourist Wardens at five centres, namely, Mamallapuram, Rameswaram, Kanniyakumari, Kodaikanal and Udthagamandalam. To start with, Tourist Security Organization is functioning at these five centres and based on its success, action will be taken to expand to other important tourist centres. At present, the team has 30 members. When compared to the high growth of tourist arrivals, the size of Tourist Security Organization is minimum. Tamil Nadu is known as a safe and secure State. Tourist Security Organization is functioning to instil a sense of confidence among foreign tourists and domestic tourists. The objectives include hassle-free travel, communication, eliminating touts, any unforeseen requirements which a tourist may find difficult to get while in a new place and in a crowd. The Ex-Servicemen are selected based on their awareness of various regions and knowledge of vernacular languages. They can easily understand the problems of tourists and communicate well in their language, so that the tourists feel at home and secure. Necessary orientation training has been given through Tamil Nadu Police Academy, Chennai to ensure co-ordination between Tourists, Tourist Security Organization and local police. Ministry of Tourism, Government of India also encourages Tourist Security Organization and has appreciated the lead role played by Tamil Nadu Tourism. Performance of the Tourist Security Organization has been well appreciated by the visiting tourists and local public and it have been published in print media.

**Tamil Nadu Tourism at a glance**

1. No. of Tourist Offices: 24 (18 in Tamil Nadu & 6 in other States)	11. Second longest Beach: Marina (Chennai) 13 kms.
2. No. of Tourist Information Centres: 23 (17 in Tamil Nadu & 6 in other States)	12. Highest Peak in Tamil Nadu: Doddabetta (2636 mtrs)
3. No. of World Heritage Monuments: 5	13. No. of International Airports: 1
4. No. of Monuments maintained by State Archaeology Department: 85	14. No. of Domestic Airports: 6
5. No. of Monuments maintained by Archaeological Survey of India in Tamil	15. Total length of Railway line in Tamil Nadu: 3941 kms.
	16. Total number of Youth Hostels: 7

<p>Nadu: 247 6. No. of Forts: 11 7. No. of Museums: 21 8. No. of Temples maintained by Hindu Religious and Charitable Endowment Board: 38436 9. No. of Major Ports: 3 10. No. of Major Hill Stations: 12</p>	<p>17. Total number of TTDC Hotels: 55 18. Total number of Boat Houses: 9 19. Total number of Coaches: 25 20. Total no. of Telescope Houses: 3 21. Amusement Parks: 23</p>
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**Tourism promotional activities**

**A) Publicity – Advertisements,**

**International Travel Marts**

Tamil Nadu Tourism has launched a series of Domestic and International print campaigns, which are released in various Domestic and International In-Flight Magazines and other leading Travel Magazines as well. Advertisements are released in International Magazines and International In-flight Magazines. Further, Audio and Visual Advertisements figure in Radio and Television Media, apart from stories on innovative tourism projects. Tamil Nadu Tourism continues to organize Marketing Campaigns and Marketing Meets in potential cities and regions to attract tourists and tour operators.

**Overseas Travel Marts**

Tamil Nadu Tourism participates in International Tourism Marts, Events to showcase the tourist destination in Tamil Nadu. Tamil Nadu Tourism's brand statement "Enchanting Tamil Nadu, Experience Yourself" has made very positive impact in the travel industry in India and abroad. Enchanting Tamil Nadu is regarded as a widely known tourism brand. This is also reflected from the increasing tourist arrivals.

**B) Fairs, Festivals and Seminars**

The vibrancy and gaiety of festivals of Tamil Nadu which happens almost throughout the year enthralls tourists. The festivals reflect the life-style, customs and cultural overtones of a destination. The foreigners, particularly from Europe, UK, USA, Singapore and Mauritius include important festivals in their travel plans. The foreign tourist arrival is generally high during festival season, especially, during the Music festival, Dance festival, Chithirai festival, etc. The Mamallapuram Dance Festival is now known as Indian Dance Festival in view of its patronage from India and abroad. The summer festivals at Hill Stations, National Tourism Festival at Kanniyakumari and National Pilgrim Festival at Rameswaram attract a large number of tourists. The festivals are highlighted as a tourism product and this helps in reducing the seasonality factor. Apart from this, Tamil Nadu Tourism is participating in important Exhibitions, Trade Fairs and Seminars. Tourism awareness among the students is created by supporting seminars and workshops on Tourism in Universities and Colleges which are actively promoting Tourism studies.

**Newsletter**

It is essential to record the important events to publish them in various sectors and reap advantage in terms of increased tourist arrival. A Newsletter is brought out by Tamil Nadu Tourism and is distributed to all the State Governments and Government of India offices and also to the tour operators, travel agents and hoteliers. All major news pertaining to various activities that the Tourism Department is engaged in, and important tourism-related events held are highlighted in the Newsletter.

### **Cleanliness Drive**

*One of the important aspects which is considered by tourists, particularly foreign tourists is hygiene and tidiness. The poor civic management, particularly waste management, is detrimental to tourism growth. Sometimes, during festivals a large number of visitors as well as local public throw waste material, plastic bags, food items at tourist destinations which overshadow the nature or architecture. It is imposed to declare all tourist spots Litter Free Zones / Plastic Free Zones Green Zones. In co-ordination with the local bodies and Non-Governmental Organisations, 'Cleanliness Drive' will be conducted in specified regulatory zones. Awareness campaigns will be conducted for the tourists as well as the shop keepers / vendors.*

### **Conclusion**

*The State Tourism Department shall strive to realise the vision of making Tamil Nadu as the International Tourism Destination by implementing various Tourism Infrastructure Projects and providing tourist friendly services. The State shall involve the Private Sector and the local community to promote environmentally and culturally sustainable and socially inclusive Tourism Development in the State of Tamilnadu.*

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## **Effectiveness of Human Resource Information System in Selected Software Companies, Bangalore city - an Empirical Analysis**

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**Sankar Naik .B \*\***

### **Abstract**

**Purpose:** In today's global networking era, information technology has become an integral part of human resource management. A human Resource asset is treated as strategic assets need to achieve constant competitive advantage and outperform the rival. The main purpose of this research paper is making an attempt to study effectively of Human Resource Information System (HRIS) in selected Software Companies, Bangalore.

**Design/Methodology/Approach:** A descriptive research design was employed and a 10-item questionnaire was developed on the basis of similar research studies. The study is based on Primary and secondary sources. The respondents were selected by stratified random sampling technique. Responses were collected through field survey and mails from one hundred fifty (150) respondents were identified on quota allotted and 130 (86%) of them filled in the questionnaires and returned. Descriptive statistics along with Chi-Square test were used to answer the research.

**Findings:** The findings of this section reveal that the quick response and access to information were the main benefit of HRIS implementation.

**Research limitations/implications:** The main drawbacks in implementation of HRIS were difficulty in changing the organizations culture, inappropriate induction program, training Schedules, lack of commitment from managers, frightening, inconvenient, and costly in terms of investment and manpower.

**Originality/Value:** The past literature on HRIS mostly comes from the industrial countries and is confined to for earnings organizations. The present study is surrounded by that articulately looking up the issue from startup Organization.

**Keywords:** Human Resource Information System (HRIS), Software Companies, Exploratory research design, Descriptive statistics, Chi -square, Induction program, and Training.

**Research Paper Type:** Empirical Analysis

### **Introduction**

In this era of economic growth of the Asian, human resource has become one of the main driving forces behind the economic success of the third world countries like India. Thus, it has become even more important today that human resources should be managed well and to do so, an integration of technology with the day today activities of employees should be the prime focus of organizations, operating in any domain in a developing country like India. In the human resource management domain the technological solution is the implementation and use of human resource information system, which has in the last

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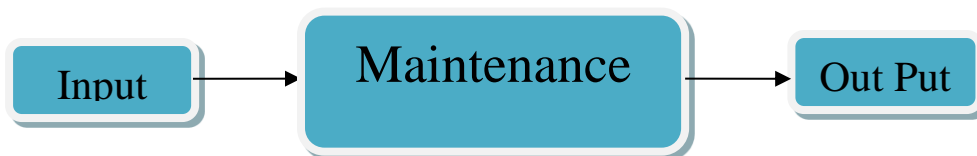
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couple of decades become one of the most important pillar of modern human resource management. This resulted into the emergence of Human Resource Information System (HRIS). HRIS is defined as the 'systematic approach to storing, updating and retrieving information stored as data items, usually in the form of records in a file, by which many users, on even many remote installations, can use common databases.

According to Ulrich (1997), he has been using HRIS provides value to the organization and improves HR professionals own standing in the organization. This process of change has created significant challenges for HR professionals resulting in the transformation of traditional processes into on-line processes.

Kovach, K. A., & Cathcart, C. (1999). Human resource information systems (HRIS): Providing business with rapid data access, information exchange, and strategic advantage research article clearly have shown the three key serviceable components in HRIS by giving the model below shown in figure 1.



**Figure 1, Source: Kovach et al., (1999)**

The Input function enters personnel information into the HRIS. Scanning technology permits scanning and storage of actual image off an original document, including signatures and handwritten notes. In the second stage, the maintenance level updates and adds new data to the database after data have been entered into the information system. Moreover, the last stage in HRIS function visible function of an HRIS is the output generated.

HRIS aims to provide the capability to more effectively plan, control and manage HR costs; achieve improved efficiency and quality in HR decision making; and improve employee and managerial productivity and effectiveness. Most of the Human Resource Information Systems are flexibly designed with integrated databases that help in managing the workforce of any company.

Human Resource Information System can facilitates communication processes and saves paper cost by providing an easily accessible, centralized location for any company policies and procedures, announcements, and links to external URL's. Employee activities such as time-off requests can be automated, resulting in faster approvals and less paperwork. Selecting the right HRIS is important for every company. Companies are required to customize the system to meet their specific and unique needs.

### **Literature Review**

India due to its continuous economic growth stands at the threshold of becoming a member of league of developed countries. And one of the major contributors towards this achievement is the undaunted endeavor of the human resources. In the human resource management domain the technological solution is the implementation and use of human resource information system, which has in the last couple of decades become one of the most important pillar of modern human resource management. This saves time and curbs costs involved in maintaining cumbersome human resource processes. Employees, managers, and HR can log into Human Resource Information System and handle their Human Resource processes fast then log out to concentrate on their real jobs growing the



business. In a recent study on Indian companies found that HR professional had major applications of HRIS as recruitment and selection (67.2% and 71.9%, respectively), pay roll service ,providing general information, Compensation and benefit, performance appraisal system and job analysis and design part, HRIS was quite in use in corporate communication , (Saharan and Jafri, 2012).

**Phahlane and Kekwaletswe (2017)** studied Human resource information systems (HRIS) that are adopted and used in various organizations all over the world with a specific emphasis on universities in South Africa that have also adopted and are using such systems for their human resource (HR) purposes. The authors concluded that there is still a lack of understanding on how Organizations such as universities adopt and use HRIS. The research study provides a conceptual Research framework for HRIS adoption and use. Specifically this research addresses the determinants and dimensions of HRIS as both a process (adoption and use process) and as an outcome in a university. The simultaneous examination of both adoption and use, and how the adoption process may influence use is a novel; holistic approach to understanding IS within organizations.

De Alwis (2010) in his study on Sri Lankan industry shows that the most commonly used modules in HR department are training and development, recruitment and selection and performance appraisal and are being utilized by all the companies. The most popular future applications of HRIS had been predicted as training and development (72.5%), career development (60.8%) and performance appraisal (58.8%) (Teo, et.al, 2001).

In the year 1960's and 1970's, most of the big organizations felt a need to centralize their personnel data in large part to facilitate gathering, record keeping and meet regulatory needs. Recent developments in technology have made it possible to create a real-time information-based, self-service, and interactive work environment. There are a small number of researchers who have tried to explore the area in terms of working papers or articles and brief discussions on the subject. Kaushik Gopalan, in his research paper, "Mechanise, Don't Robotise", explains that HR automation system should be designed and adopted with a focus on efficiency and effectiveness. But HR leaders must make the choices carefully and ensure that the right roles are identified. Raju Foujdar, in his article "Latest HR Tools to Simplify Process", explains that HR has transformed its approach in recent times. There are various tools and techniques available which can help in identifying HR problems and proving the solutions thereof. Jared Lewis, in his article "How do technology impact HR practices?" says that, technology has changed the business world many times over.

### **Research Gap**

Since HRIS is emerging thought, there are a few researchers who had a chance to get into this domain. As a result, there are very few research papers and studies based on this area in India. So there is a huge research gap which can be identified clearly.

### **Objectives of the Study**

- 1) To understand the Effectiveness of new HRIS installed in Selected **Software Companies** at Bangalore
- 2) To recognize the Employee behavior toward new HRIS.
- 3) To analyze the perspective of workforce towards the training program introduced for new HRIS.
- 4) To study issues and challenges faced by the company during implementation of new HRIS.

### **Limitations of the Study**

Time is the main limitation. Due to time constraints only limited population size was taken for this study. The study is partial to Selected **Software Companies** at Bangalore. The effectiveness of HRIS cannot be generalized. There are chances of misrepresentation of the responses. Few respondents were reluctant to disclose correct information. Some of the interviews were telephonic, respondents were least interested in sharing their experiences with new HRIS, few conversations were done through mails, and the questionnaires were not completely filled.

### **Research Methodology**

A descriptive non parametric research has been carried out in this study. To conduct an entry level research, a pilot survey was conducted on existing HRIS in Selected **Software Companies at Bangalore**. The questionnaire was prepared to test the employees on the variables as **Perception Level, Motivation Level, Training needs and Attitude Level**. Variables were tested on Resistance towards HRIS. The focus of this study was to investigate interventions taken while an organization HRIS significant impact on the relationship of independent and dependent variables.

Chi square test was applied for the descriptive questionnaire which was developed purposely to study the objectives needed to be fulfilled by the employees when change is introduced in the working style. The resistance to HRIS and implementation success in the organizations was the focus of the study where the respondent were tested on the above mentioned variables by answering 'yes', 'no' or 'unsure'. The unit of analysis is individual employees. The questionnaire was sent to 150 employees but only 130 filled questionnaires were found to be valid.

### **Hypothesis**

The formula for calculating chi-square  $(X^2) = \sum [(o-e)^2 / e]$ , Chi-square is the sum of the squared difference between observed (o) and the expected (e) frequency divided by the expected frequency in all possible categories.

The Chi-Square test is testing null hypotheses and alternative hypothesis states that there is no significant difference between the expected and observed frequency is null hypothesis and other hand there is a significant. The following hypotheses are postulated to justify the statement of the problem and objectives of study.

**H0:** Inception of HRIS has no significant relationship with its acceptance in an organization.

**H1:** Inception of HRIS in an organization has a significant relationship with its acceptance in Organization.

### **Data Analysis & Interpretation**

#### **Perception Level**

In this level, Most of the employees will be satisfied with new software added will be its reception and effectiveness in an organizations. Rewards were additional for the change acceptors, so as to boost satisfaction level of employees in selected software companies.

**Statement 1**

<i>What is the general perception according to you about the new system in the company?</i>			
<b>Response</b>	<b>Observed Number</b>	<b>Expected Number</b>	<b>% of Respondents</b>
<b>Accepted</b>	121	65	93
<b>Not Accepted</b>	9	65	7
<b>Total</b>	<b>130</b>		<b>100</b>

**Source: Compiled by the authors based on Primary Data  
Chi Square Analysis Table – 1**

**Interpretation:** From the table 1 depicts that the opinion of respondents on general perception according to them about the new system in the companies have 93% accepted. Only 7% were not accepted.

From the above discussion, we concluded that most of the respondents had accepted new system in selected companies and few respondents were not accepted of the new system due to different reasons lack of Technical skills, peer attitude, lack of motivation from top management. From **Chi Square Analysis table**, we get Chi-Square value for this statement is 96.48.

**Statement 2**

<i>Should learning be attached to incentive or reward after Completion?</i>			
<b>Response</b>	<b>Observed Number</b>	<b>Expected Number</b>	<b>% of Respondents</b>
<b>Yes</b>	106	43.33	81.53
<b>No</b>	22	43.33	16.92
<b>Unsure</b>	02	43.33	1.53
<b>Total</b>	<b>130</b>		<b>100</b>

**Source: Compiled by the authors based on Primary Data  
Chi Square Analysis Table – 2**

**Interpretation:** From the table 2 depicts that the opinion of respondents on learning be attached to incentive or reward after Completion about the new system in the companies have 81.53% said yes. The employees who believe that incentives or rewards do not have any impact on motivating employees for learning new HRIS in order to motivate employees are 16.9%. While 1.5% employees are as unsure about this statement.

From the above discussion, we concluded that most of the respondents said yes, some respondents were said no and remaining respondents unsure about this statement. From **Chi Square Analysis table**, we get Chi-Square value for this statement is 140.65.

**Statement 3**

<i>Are you more comfortable with the old system or ready for new?</i>			
<b>Response</b>	<b>Observed Number</b>	<b>Expected Number</b>	<b>% of Respondents</b>
<b>Interested</b>	82	43.33	63
<b>Not Interested</b>	19	43.33	14.5
<b>Unsure</b>	29	43.33	22.5
<b>Total</b>	130		100

**Source: Compiled by the authors based on Primary Data  
Chi Square Analysis Table – 3**

**Interpretation:** From the table 3 depicts that the opinion of respondents on the comfort level of the system where respondents were questioned by the researcher whether they are ready to learn new system; 63% showed interest and were ready for new system. But 14.5% not interested and 22.5% were not sure about ready for new system.

From the above discussion, we concluded that most of the respondents said interested, some respondents were said Not Interested and remaining respondents unsure about this statement. From **Chi Square Analysis table**, we get Chi-Square value for this statement is 52.93. It's the lookout of the line managers to convert towards learning the new system.

**Motivation Level**

The second Variable deals with employee motivation for change. Motivation for change is proportional to willingness of learning new software.

**Statement 4**

<i>Do you feel motivated learning new system inception recently in your organization?</i>			
<b>Response</b>	<b>Observed Number</b>	<b>Expected Number</b>	<b>% of Respondents</b>
<b>Yes</b>	112	65	86.15
<b>No</b>	18	65	13.85
<b>Total</b>	130		100

**Chi Square Analysis Table – 4**

**Source: Compiled by the authors based on Primary Data**

**Interpretation:** From the above table 4 when tested on motivation level 86.15% of respondent says that in favor of learning new system, only 13.85% respondents were not about the introduced change.

From the above discussion, we concluded that most of the respondents said that in favor of learning new system, this is a suitable indication that the manager's intervention was necessary for the success of HRIS implementation in selected software companies. From **Chi Square Analysis table**, we get Chi-Square value for this statement is 67.96.

**Statement 5**

<i>Do you feel like rejecting or felt happy learning new HRIS system?</i>			
<b>Response</b>	<b>Observed Number</b>	<b>Expected Number</b>	<b>% of Respondents</b>
<b>Happy</b>	95	43.33	73
<b>Unhappy</b>	24	43.33	18.5
<b>Unsure</b>	11	43.33	8.5
<b>Total</b>	130		100

**Source: Compiled by the authors based on Primary Data  
Chi Square Analysis Table – 5**

**Interpretation:** From the table 5 reveals that the opinion of respondents 73% were happy with their systematic training program and were willing to learn and fine-tune according to the change induced. 18.5% were unhappy and needed proper guidance on adopting the training program. Only 8.5% showed their unwillingness to learn it through systematic training program.

From the above discussion, we concluded that most of the respondents had willing to learn and adjust according to the change induced. From **Chi Square Analysis table**, we get Chi-Square value for this statement is 94.41.

**Training Need**

The third variable is training need; whenever new software / Technology are implemented in any company it is mandatory for organization to train the employees on that particular software / technologies. The new software can be effective if the employees are properly trained, if they are willing to use that new technology and are comfortable with the new technology.

**Statement 6**

<i>Did you get proper Training before the introduction of HRIS in your Organization?</i>			
<b>Response</b>	<b>Observed Number</b>	<b>Expected Number</b>	<b>% of Respondents</b>
<b>Yes</b>	76	43.33	58.5
<b>No</b>	34	43.33	26.15
<b>Unsure</b>	20	43.33	15.30
<b>Total</b>	130		100

**Source: Compiled by the authors based on Primary Data  
Chi Square Analysis Table 6**

**Interpretation:** From the table 6 reveals that the opinion of respondents only 58 percent of the respondents had some clue about the software / technology. The negative response was alarmingly high around 26% where 15% employees were unsure about training need.

From the above discussion, we concluded that most of the respondents seem to indicate that the line managers do not thoroughly ensure proper training before change is induced. From **Chi Square Analysis table**, we get Chi-Square value for this statement is 39.21.



**Statement 7**

<i>Are you open for a systematic training program in learning HRIS?</i>			
Response	Observed Number	Expected Number	% of Respondents
Yes	106	43.33	81.5
No	15	43.33	11.5
Unsure	9	43.33	7
<b>Total</b>	130		100

**Source: Compiled by the authors based on Primary Data**  
**Chi Square Analysis Table – 7**

**Interpretation:** From the table 7 reveals that the opinion of respondents 81.5% respondents were open for the systematic training program and were willing to learn and adjust according to the change induced. 7% were unsure and needed proper guidance on adopting the training program. Only 11.5% showed their unwillingness to learn it through systematic training program.

From the above discussion, we concluded that most of the respondents were willing to learn and adjust according to the change induced. From **Chi Square Analysis table**, we get Chi-Square value for this statement is 136.45.

**Attitude Levels**

**Statement 8**

<i>Is the attitude of your manager positive on learning HRIS system?</i>			
Response	Observed Number	Expected Number	% of Respondents
Positive	56	43.33	43
Negative	12	43.33	9.2
Neutral	62	43.33	47.8
<b>Total</b>	130		100

**Source: Compiled by the authors based on Primary Data**  
**Chi Square Analysis Table – 8**

**Interpretation:** From the table 8 depicts that the opinion of respondents on attitude of the manager being positive on learning HRIS system towards member of staff 43% of respondents were of the view that the manager was positive and helpful but 9.2% were not of the same opinion. For them the managers were not at all showing interest on learning HRIS. 47.8% seem to be neutral about their manager's attitude.

From the above discussion, we concluded that only 12 of the managers were not at all showing interest on learning HRIS. From **Chi Square Analysis table**, we get Chi-Square value for this statement is 34.41.

**Statement 9**

<i>Is your manager open to your problems?</i>			
Response	Observed Number	Expected Number	% of Respondents
Yes	91	43.33	70
No	24	43.33	18.5
Unsure	15	43.33	11.5
<b>Total</b>	130		100

**Source: Compiled by the authors based on Primary Data  
Chi Square Analysis Table – 9**

**Interpretation:** From the table 9 depicts that the opinion of respondents on manager's openness towards employee problems: The question was put to the respondents and around 70% were in favor of the line managers 11.5% were unsure and only 18.5% said that the managers were not open to discuss their problems.

From the above discussion, we concluded that here the managers can convert the unsure of the respondents in their favor just by attending to them and explaining them the importance of learning and benefits attached to learning of HRIS. From **Chi Square Analysis table**, we get Chi-Square value for this statement is 28.73.

**Statement 10**

<i>Do you feel burdened learning the new system?</i>			
Response	Observed Number	Expected Number	% of Respondents
Yes	16	43.33	12
No	106	43.33	81.5
Unsure	8	43.33	6.5
<b>Total</b>	130		100

**Source: Compiled by the authors based on Primary Data  
Chi Square Analysis Table – 10**

**Interpretation:** From the table 10 reveal that the opinion of respondents on the question of feeling burdened 12% respondent answered in positive. Out of remaining 88% respondents 81.5% said that they are motivated and will not feel burdened learning HRIS and will support implementation. 6.5% were unsure but they sounded positive with a very little resistance.

From the above discussion, we concluded that here most of the respondents are motivated and will not feel burdened learning HRIS and will support implementation. From **Chi Square Analysis table**, we get Chi-Square value for this statement is 136.77.

Sr. No.	Statement	Chi-square	D.f	T.V of Chi	Null Hypothesis
1	What is the general perception according to you about the new system in the company?	96.48	1	0.003	Rejected
2	Should learning be attached to incentive or reward after completion?	140.65	2	0.103	Rejected
3	Are you more comfortable with the old system or ready for new?	52.93	2	0.103	Rejected
4	Do you feel motivated learning new system introduced recently in your organization?	67.96	1	0.003	Rejected
5	Do you feel like rejecting or felt happy learning new HRIS system?	94.41	2	0.103	Rejected
6	Did you get proper training before the introduction of Human Resource Information System (HRIS) in your organization	39.21	2	0.103	Rejected
7	Are you open for a systematic training program in learning HRIS?	136.45	2	0.103	Rejected
8	Is the attitude of your manager positive on learning HRIS system?	34.41	2	0.103	Rejected
9	Is your manager open to your problems?	28.73	2	0.103	Rejected
10	Do you feel burdened learning the new system?	136.77	2	0.103	Rejected

**Findings**

From the above table shows findings of this section reveal that the Null hypotheses was rejected @  $\alpha=0.05$  in all the statements hence the research data was found to be significant. Mainly by completing the pilot research on the related issue and after the literature review of different researchers this can was an observation that introduction of HRIS plays a significant role in the development of the organization and if introduced new technology or software in a systematic way leads to less resistance by the employees in selected Software Companies, Bangalore.

**Conclusions and Suggestions**

We conclude study aimed this research paper is making an attempt to study effectively of Human Resource Information System (HRIS) in selected Software Companies at Bangalore. The study revealed that HRIS plays important role in recruitment and selection, training & development and payroll administration in selected software companies. Human resource information system has the potential to persuade both efficiency and effectiveness. In this research articles in use of Human resource information system consequences into rapidity of retrieval and processing of data, reduce in duplication of efforts leading to reduced cost, very ease in classifying and reclassifying data, more accuracy of report generated, enhanced quality of reports, improve work culture. It also outcome into improving the capabilities of both managers and employees to take quick decisions. The research findings reveal that the resistance for implementation of new human resource information system (HRIS) desires to be recognized and diagnosed visibly by the HR team of the selected Software Companies, Bangalore. Some useful suggestions projected by the researcher are as follows below

- ❖ The first suggestion says before implementing any new system in an Organizational hierarchy, Job analysis, recruitment, selection process, training & development, Performance and Compensation Systems should be in proper structure with the organization mission and vision.
- ❖ The second suggestions reveal that identify people who are resisting to the change, and help them see what's they needed. The fighting to HRIS preamble needs to be recognized diagnose to the source level and then with a very vigilant and positive interference.
- ❖ Final suggestion Management should take action to quickly remove barriers. Proper induction and training should be given before implementing any new system in an organization.

This study will be useful for students, researchers, academicians and forecasters. Further research is also useful in the field of **Human Resource Information System**.

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## **Mutual Funds Investment Plans in India**

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### **Abstract**

A Mutual Fund is a trust that pools the funds through savings and/or investment of a number of investors who preferred and empowered their financial goal. These are increased tremendously financial fund based services accessibility through providing different financial services or Plans into the Indian financial market. Today investors have different saving and investment opportunities but investment have more return or profitable so most of them preferring investment into the financial market, every investment have risk and return. Every investor Preferring minimum risk and Maximum return on investment, these are indentifying before investment. Comparing to risk and return at varies investment, Mutual fund have biggest advantage. Mutual fund investment minimizing risk and maximizing return through diversification of risk (can diversify even more by purchasing different kinds of a stock which helps to spreading out investors' money across the investments and hence).

**Keywords: - Mutual Fund investment, Risk and Return**

### **Introduction**

The concept of mutual fund first emerged in Netherlands in 18th century, later its introduced in India by The Unit Trust of India in 1960s, in the late 3 decades Indian mutual fund market witnessed entry of number of public sector players. The new Economic Policy (1991) Impact private sector was permitted to enter into the Mutual fund Market including foreign fund management companies also in the year 1993, it is creating competitive environment to the public and private mutual fund enterprises. The private sector led to the Market through providing more investment options to the investors.

### **Mutual fund Plans in India**

“Investors are investing without enquiring about the reason behind the additional returns. They do not understand that additional return comes with additional risk”, adds Shweta Jain. Mutual fund is one of the investment opportunities to invest their money into various kinds of investment plans depending on the goal of the investor. Indian mutual fund companies offering different types of fund, these plans are available in Indian financial market. Mutual funds are increase in domestic savings and investment in Indian financial market; Investor can invest in depending on their level of risk tolerance and expected returns or financial need.

Mutual funds in India channel the investments of the shareholders to invest the money into various kinds of securities depending on the goal of the investor. There are different types of funds available in India financial market that one can invest in depending on their level

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of risk tolerance and financial need. There are 7 different kinds of mutual funds available in India. They are as follows: Credit Funds, Equity Funds, Money Market Funds/Liquid Funds, Debt Funds, Index Funds, Fund of Funds and Balanced Funds. These plans are supporting to professional financial Managers, automatic diversifications and Liquidity of funds or investment.

#### ***Credit Funds***

Credit opportunity funds are the debt funds which invest in corporate bonds and debentures combination portfolio consist of government securities and T-Bills as well but in small percentage to provide liquidity. These funds are only suitable for investors who understand the risk involved in investing in low- credit rated securities like AAA credit rating securities. Investors should be mindful of the risk involved and cannot rule out a downgrade of papers or default on interest or capital payment by companies. It is imperative to understand the high risk involved in these funds.

#### ***Equity Funds***

An equity fund is a mutual fund that invests principally in stocks. It can be actively or passively managed funds, these funds are also known as stock mutual funds. Stock mutual funds are principally categorized based on company size, the investment holding period in the portfolio. The Equity mutual funds are also divided into income or capital appreciation or both. The income funds seek stocks that will pay dividends, usually investing in equities of blue-chip securities. Other equity funds primarily seek capital appreciation; it means that the stocks in the portfolio will go up in share price.

***Money Market Funds/Liquid Funds:*** Liquid mutual funds are invest plans, investors amount is invested in Money Market financial instruments such as Bank fixed deposits, Treasury Bills, Bill Rediscounting, Commercial Paper and other debt securities, these investment sources having maturities one day to one year. The Net Asset Value of the funds is calculated for 365 days, unlike other debt mutual funds where Net Asset Value is computed only business days, these funds don't have any lock in Period conditions and facilitating to investors to withdrawals processing period within 24 business hours or one business day. These Liquid mutual funds have the lowest interest risk associated with all the class of debt funds. This is because they primarily invest in fixed income securities with short maturity. You may seek funds which have delivered consistent returns over different time horizons and remember to analyze the fund performance which matches your investment horizon to get appropriate results.

#### ***Debt Funds***

Debt mutual fund Funds is a mixed bag in fixed-interest generating securities like corporate bonds, government securities, treasury bills, commercial paper and other money market instruments. It's facilitating investors to earn interest income and capital appreciation, the interest that you earn on these debt securities is pre-fixed along with the maturity period of the security. Debt mutual funds are also of various types based on maturity period. Debt funds suffer from credit risk and interest rate risk which make them riskier than bank FDs. In credit risk, the fund manager may invest in low-credit rated securities which have the higher probability of default. In interest rate risk, the bond prices may fall due to an increase in the interest rates, even though debt funds are fixed-income havens, they don't offer guaranteed returns.

### ***Index Funds***

An index of mutual fund is a type of mutual fund with a portfolio constructed to market index. These funds are providing broad market exposure, low operating expenses and low portfolio turnover with funds adhere to specific rules or standards. Since the fund managers of an index fund are simply replicating the performance of a benchmark index, they do not need the services of research analysts and others that assist in the stock selection process. The average index fund will perform well over time, with index funds outperforming their actively managed counterparts on a large scale, asset flows have grown significantly in index fund products.

### ***Fund of Funds***

A fund of funds (FOF) – also referred to as a multi-manager investment fund, it is an investment strategy in which a fund invests in other types of funds. This strategy invests in a portfolio that contains different underlying assets instead of investing directly in bonds, stocks and other types of securities. The fund of funds (FOF) investment strategy aims to achieve broad diversification and fitting asset allocation, in these investments is a variety of fund categories that are all wrapped into one fund. These are fund of funds characteristics that attract small investors who want to get better exposure with fewer risks compared to directly investing in securities. There are different kinds of FOFs, with each type acting on a different investment scheme. An FOF may be a mutual fund, a hedge fund, a private equity or an investment trust.

### ***Balanced Funds***

A balanced mutual fund combines a stock component, a bond component and a money market component in a single portfolio. Generally, these funds relatively fixed mix of stocks and bonds that reflects a moderate, higher equity, component, conservative, higher fixed-income and component orientation. Although they are "asset allocation", balanced fund portfolios do not materially change their asset mix. The actively managed asset-allocation funds, which make changes in response to an investor's changing risk-return fervor on overall investment market conditions. Investors who have dual investment objectives, these fund is favor to investor, Typically, investors with low risk tolerance utilize these funds for growth that outpaces inflation and income that supplements current needs. Balanced funds rarely have to change their mix of stocks and bonds; they tend to have lower total expenses these funds for retirement allow investors to withdraw money periodically without upsetting the asset allocation.

### **Investor Awareness on Mutual fund investment Risk and Return**

These initiatives would help towards making the mutual fund industry more vibrant and competitive in financial marketing services, Current Scenario Mutual fund investments are most suitable investment for a common man, as it offers a spacious opportunity to a diversified investment with professionally managed basket of securities at a relatively low cost. The diversification of mutual funds investment plans provides mixture of options to suit the individual objectives according to their age, financial position, risk tolerance and return expectations.

Risk is probability of return on investment of actual return to expected return. It is playing a key role in influencing investors' investment decision. Investor Risk perception is the investors to have an understanding and feeling, on the basis of their experience, of the risk inherent in an investment or asset, it plays a vital role in making Investment fund Allocation decision in risky Investment. The investors are have a large number of

investment choice to make investment so they used to switch (changing investment one to other) their investment from one type of investment to other investment, this decision affected by investors' perception of risk.

### **Need for the Study**

Investors invest their money in Different investment Avenues to satisfy their different Expectations. The investment in various avenues determines the risk taken by the investor and amount of return he could earn. These Investment Risk and Return are determined by the Preference of the investment on Mutual fund investment Plan. Hence this Study explains the most and least preference on Mutual fund Plans by the investor. These initiative studies would help towards making the mutual fund industry to provide more Funds or Plans to Management and creating the convenience to investor trend basis.

### **Objectives of the Study**

Overall level of risk perception is affected by fear psychological of employees to invest in mutual fund, their lack of knowledge and lack of confidence to invest in mutual fund. Out of these factors, the impact of fear psychosis is relatively the highest on mutual fund investment decision.

- To Study the investment Plans in mutual fund.
- To Study the Mutual funds investment awareness based on Risk and Return.

### **Data Collection Sources**

The study is based upon Secondary data collected from a International Journals, Conference proceedings, Books and Company Websites.

### **Review of Literature**

Swarup (2000) conducted a study on investor risk-return perceptions towards various investment avenues and based on this, the strategies that need to be adopted by mutual funds to penetrate the markets were discussed.

Veld and Veld-Merkoulova (2008) studied risk perception of individual investors. They found that most investors implicitly use more than one risk measures, for those investors who systematically perceive risk according to the same risk measure, semi-variance return was most popular.

Madhumarathi (1998) find out the preferences and their perception of the investors about the risk in the Indian markets. Three classes of investors had been identified based on their risk perception namely risk seekers, risk bearers and risk avoiders. The result indicated that a majority of the investors were influenced by the operating performance of the companies. Company Performance influenced the risk perception and investment decisions of the investors.

Walia and Kiran (2009) The study found that greater part of individual investors doesn't consider mutual funds as highly risky investment, In fact on a ranking scale it is considered to be on higher side when compared with other financial Investment avenues and it's also reported that significant relationship of interdependence exists between income level of investors and their perception for investment returns from mutual funds investment.

Markowitz (1952) expressed his opinion on risk and Expected return like risk as the variance of returns. He showed that an investor's best portfolio is diversified to maximize expected returns while minimizing risk.

Karrupasamy and Vanaja (2013) study and evaluate the performance of Large cap, mid cap and small cap equity mutual funds and recommended to investors looking for an

investment below 2 years can give preference to large cap schemes whereas those having investment More than 3 years should invest in small and mid-cap schemes.

Saini et., al. (2011) analyzed investor's behavior, investors' opinion and perception relating to various issues like type of mutual fund scheme, His study found that investors seek for liquidity Funds and online trading regular updates through SMS and stringent follow up of provisions laid by AMFI.

A study done by Singh (2012) Analyzed that demographic factors, the study supposed that return potential and liquidity have been perceived to be most lucrative benefits of investment in mutual funds and the same are followed by flexibility, transparency and affordability.

Xi Dong, Shu Feng & Ronnie Sadka (2011) To summarize, the evidence suggest that the outperformance of high-liquidity-beta funds is largely not a reactions of a liquidity-risk premium, but rather it seigniors a superior managerial skill to generate abnormal performance in the long-run. This ability is especially noticeable during periods that exhibit no large unexpected market-wide liquidity variations.

Shweta Jain says Credit Mutual fund Investors are getting high returns on investment generated by credit opportunity funds, this credit fund investing as this category has generated better returns than comparing to other debt fund schemes

### **Mutual Funds in India - SWOT Analysis**

Mutual funds investment plans are financial products that benefit from conducting a SWOT analysis. By reviewing their strengths, weaknesses, opportunities and threats, an individual investor can be better informed on where to invest their money, and be positioned to shift investment components in the market.

#### **Strengths**

The most critical strength for a mutual fund is its performance with low investment, if the fund is part of a well-established company with a track record of success and a family of high-performing products, that company brand name and historical record may also be strength of the mutual fund. The research department or methodology that has a track record of picking winners is a huge asset as well research applications available for investors. Different financial metrics may be depending on investment style. It is having moderate Risk.

#### **Weaknesses**

The few of active fund managers currently beating the mutual fund market risk and return in market. Fund managing Expenses are high comparing to one plan to other plan. One weakness to look at is your fund's fees. A high expense ratio is a weakness. Risk may be a weakness for some investors looking for a smaller beta or standard deviation. Liquidity investments are better return comparing to mutual fund investment in some time. Lack of awareness of risk and return like risk mitigation with return maximization investment plans in mutual funds investment area.

#### **Opportunities**

Investors are available with low price investment in rural and urban area when creating awareness to risk and return of the mutual fund investment. Emerging distribution channels based on media and small financial institutions and SHGs are supporting to expand the investment on mutual fund. Effective fund management is dominated to vast competition on investment market. A change in the government regulatory environment not only



affects different industries, but the funds that concentrate in those sectors as well. Different investment objective based investment plans are available.

### **Threats**

To some extent, many mutual funds move downward performance along with general economic news and some types of funds do better in a recession while others track well in boom times; those funds are particularly threatened by a sudden change in the unemployment rate that undermines investor's confidence or a stimulus plan that gets people spending again. Overall level of risk perception is affected by fear psychological of employees to invest in mutual fund, their lack of knowledge and lack of confidence to invest in mutual fund. Out of these factors, the impact of fear psychosis is relatively the highest on mutual fund investment decision. All investment plans are not performing single aspects; these are depending different economic factors indirectly.

### **Conclusion**

That overall risk perception towards investment in mutual fund is moderate level. it is clear that mutual fund investors are financial conservatives. They are aware about the principle higher the risk, higher will be the return and at the same time they understand that diversified portfolio will reduce the risk and Maximize the return. Awareness programs have to be conducted to educate the capital market investment and in this regard Investors should take a leading role while imparting investment education, the climate of investment would definitely become very friendly and attractive in Indian Financial Market. Diversified products will keep the present momentum going for the industry in a more competitive and efficient manner. The Asset Management Companies must consider the changing perceptions, especially risk and return perception of investors while launching new Portfolio Funds. This will help the Mutual Funds to capture the market.

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## **Analysis of Model-Based Fuzzy Control Systems**

**Ravinder pawar\***

### ***Abstract***

Fuzzy logic control was originally introduced and developed as a model free control design approach. However, it unfortunately suffers from criticism of lacking of systematic stability analysis and controller design though it has a great success in industry applications. In the past ten years or so, prevailing research efforts on fuzzy logic control have been devoted to model-based fuzzy control systems that guarantee not only stability but also performance of closed-loop fuzzy control systems. This paper presents a survey on recent developments (or state of the art) of analysis and design of model based fuzzy control systems. Attention will be focused on stability analysis and controller design based on the so-called Takagi–Sugeno fuzzy models or fuzzy dynamic models. Perspectives of model based fuzzy control in future are also discussed.

***Index Terms***—Adaptive control, control theory, fuzzy control, fuzzy models, fuzzy systems, Lyapunov functions, robustness, stability, stabilization, Takagi–Sugeno (T–S) fuzzy models.

### **Introduction**

FUZZY sets and systems have gone through substantial development since the introduction of fuzzy set theory by Zadeh [331]–[335] about four decades ago. They have found a great variety of applications ranging from control engineering, qualitative modelling, pattern recognition, signal processing, information processing, machine intelligence, decision making, management, finance, medicine, motor industry, robotics, and so on [7], [11], [14], [16], [65], [154], [164], [165], [210], [241], [248], [258], [261], [277], [289], [328], [334], [348]. In particular, fuzzy logic control (FLC), as one of the earliest applications of fuzzy sets and systems, has become one of the most successful applications. In fact, FLC has proven to be a successful control approach to many complex nonlinear systems or even nonanalytic systems. It has been suggested as an alternative approach to conventional control techniques in many cases. The first fuzzy logic control system is developed by Mamdani and Assilian [199], [200], where control of a small steam engine is considered. The fuzzy control algorithm consists of a set of heuristic control rules, and fuzzy sets and fuzzy logic are used, respectively, to represent linguistic terms and to evaluate the rules. Since then, fuzzy logic control has attracted great attention from both academic and industrial communities.

Many people have devoted a great deal of time and effort to both theoretical research and application techniques of fuzzy logic controllers. This can be witnessed by a number of excellent books and tutorial articles on the topic; see, for example, [7], [164], [165], [210], [236], [240], [241], [251], [259], [269], [299], [300], and [318]. Much success has also been achieved in applying FLC to various areas including power systems [1], [88], [99], [149]; telecommunications [5], [45], [49], [131], [169], [343]; mechanical/robotic systems [8], [10], [18], [40], [102], [109], [118], [138], [139], [180], [182], [204],

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[247], [262], [284], [289], [292], [294], [314], [319]; automobile [16], [102], [116], [185], [205], [218], [222], [260]; industrial/chemical processes [22], [41], [90], [111], [129], [137], [146], [153], [162], [199], [200], [229], [248], [258], [271], [279], [288]; air-crafts [58], [73], [130], [161]; motors [9], [100], [143]; medical services [158], [248], [345]; consumer electronics [106], [156], [170], [172], [219], [255], [263], [311]; and other areas such as chaos control [52], [183] and nuclear reactors [17], [217].

The basic structure of a fuzzy control system consists of four conceptual components: knowledge base, fuzzification interface, inference engine, and defuzzification interface [164], [165]. Fig. 1 shows the block diagram of a fuzzy control system. The knowledge base contains all the controller knowledge and it comprises a fuzzy control rule base and a data base. The data base is the declarative part of the knowledge base which describes definition of objects (facts, terms, concepts) and definition of membership functions used in the fuzzy control rules. The fuzzy control rule base is the procedural part of the knowledge base which contains information on how these objects can be used to infer new control actions. The inference engine is a reasoning mechanism which performs inference procedure upon the fuzzy control rules and given conditions to derive reasonable control actions. It is the central part of a fuzzy control system. The fuzzification interface (or fuzzifier) defines a mapping from a real-valued space to a fuzzy space, and the defuzzification interface (or defuzzifier) defines a mapping from a fuzzy space defined over an output universe of discourse to a real-valued space. The fuzzifier converts a crisp value to a fuzzy number while the defuzzifier converts the inferred fuzzy conclusion to a crisp value.

Based on the differences of fuzzy control rules and their generation methods, approaches to fuzzy logic control can be roughly classified into the following categories: i) *Conventional fuzzy control*; ii) *fuzzy proportional-integral-derivative (PID) control*; iii) *neuro-fuzzy control*; iv) *fuzzy-sliding mode control*; v) *adaptive fuzzy control*; and vi) *Takagi-Sugeno (T-S) model-based fuzzy control*. However, it should be noted that the overlapping among these categories is inevitable. For example, conventional fuzzy control can be adaptive, fuzzy PID control can be tuned by neuro-fuzzy systems, or neuro-fuzzy control is adaptive in nature in many cases. Publications on the topic of fuzzy logic control are so huge that an exhaustive list is impossible. Instead, only a very selective list, in fact a small portion of them, is given in the end of this paper. Many excellent works are unfortunately missed. Moreover, this survey paper is not able to cover all these categories of fuzzy logic control in detail. Instead it will briefly review all these categories in the next section and then focus on T-S model-based fuzzy control in more detail in the rest of this paper. Therefore, the main purpose of this paper is to survey state of the art of approaches to systematic analysis and design of model based, in particular, T-S model-based fuzzy control systems which have been developed during the last few years.

The rest of the paper is organized as follows. Section II briefly reviews the general approaches to fuzzy logic control. Section III formulates T-S fuzzy models and discusses their universal function approximation capability. Section IV summarizes main results on stability analysis of T-S fuzzy systems. Sections V-VII present control design approaches based on common (or global) quadratic Lyapunov functions, piecewise quadratic Lyapunov functions, and fuzzy (or non-quadratic) Lyapunov functions, respectively. Concluding remarks, perspectives and challenges of model based fuzzy control in future are discussed in Section VIII.

## **Brief Review of Fuzzy Logic Control**

### **A. Conventional Fuzzy Control (Mamdani Type Fuzzy Control)**

Mamdani and Assilian's fuzzy control [199], [200], which is classified as Type-I fuzzy control systems by Sugeno [259], has been replicated for many different control processes. For example, the authors in [137] develop a fuzzy control algorithm for a warm water plant. Ostergaard [229] presents results of experiments with a fuzzy control algorithm for a small scale heat exchanger. There are many other applications of conventional fuzzy control, including robot [10], [289], [314], [319], stirred tank reactor [146], traffic junction [237], steel furnace [153], cement kilns [288], automobile [16], [218], [260], waste-water treatment [279], aircraft [58], [161], missile autopilot [73], motor [100], network traffic management and congestion control [131], [169], bioprocesses [111], fusion welding [15], and so on. In addition, fuzzy control has been widely used in various consumer electronic devices such as video cameras, washing machines, TV, and sound systems in the late 1980s and early 1990s [106], [156], [170], [172], [219], [255], [263], [311]. These methods of conventional fuzzy control are essentially heuristic and model free. The fuzzy control "IF-THEN" rules are obtained based on an operator's control action or knowledge. It is obvious that the design method works well only in the case where an operator plays an important role in controlling the system. Even though the performance of such control scheme is generally satisfactory, stability issue of the closed loop fuzzy control system is often criticized in the earlier development of these methods though the authors in [20] provide a stability analysis of fuzzy control systems via a heuristic approach. Moreover, design of such control systems suffers from lack of systematic and consistent approaches. Thus great efforts have been devoted to stability analysis and controller design issues of conventional fuzzy control systems, and various approaches have been developed. The key idea of these approaches is to regard a fuzzy controller as a nonlinear controller and embed the stability and/or control design problem of fuzzy control systems into conventional nonlinear system stability theory. The typical approaches include describing function approach [136], cell-state transition [132], Lure's system approach [59], [208], Popov's theorem [91], circle criterion [226], [244], [252], conicity criterion [69], sliding mode control [120], and hyper-stability [21], [226], among others. However, a general systematic theory for stability analysis and control design of conventional fuzzy control systems is still out of reach. Additional references on the topic of conventional fuzzy control can be found in [5], [62], [66], [88], [99], [108], [158], [160]–[162], [164], [165], [173], [176], [233], [247], [278], [325], and [343].

### **B. Fuzzy PID Control**

Conventional PID controllers are still the most widely adopted method in industry for various control applications, due to their simple structure, ease of design, and low cost in implementation. However, PID controllers might not perform satisfactorily if the system to be controlled is of highly nonlinear and/or uncertain nature. On the other hand, conventional fuzzy control has long been known for its ability to handle nonlinearities and uncertainties through use of fuzzy set theory. It is thus believed that by combining these two techniques together a better control system can be achieved.

The name of fuzzy PID control has been widely used in literature with all sorts of different meanings. For example, the authors in [114] suggest that if a fuzzy controller is designed (or implied equivalently) to generate control actions within PID concepts like a conventional PID controller, then it is called the fuzzy PID controller. In this aspect, the



conventional fuzzy controller developed by Mamdani and Assilian [199], [200] is in fact a two-input fuzzy PI controller. Moreover, this conventional fuzzy controller can be further classified as the “direct-action” type [201] of fuzzy PID controllers, since its fuzzy inference deduces a control action output directly to control a system. In contrast with “direct-action,” another type of fuzzy PID controllers is classified as “gain-scheduling” [107], [344], for the reason that controller gains change as operating condition or dynamics of a system varies.

Generally the “direct-action” type of fuzzy PID controllers is able to do as well as conventional PID controllers. However, high cost of setting up a fuzzy control system would usually discourage replacing a conventional PID controller with a “direction-action” fuzzy PID controller. As suggested by Chiu [57], it is the “gain-scheduling” type of fuzzy PID controllers that is more likely to gain acceptance from industry. In addition, it is shown that many fuzzy PID controllers are nonlinear PID controllers and perform better than conventional PID controllers in most cases [53], [57], [107], [113], [114], [179], [202], [203], [215], [270], [316], [344].

Other topics of interest related to fuzzy PID control include tuning of fuzzy PID parameters [202], [215], [310], [316], optimal fuzzy PID controller based on genetic algorithm [113], [270], realization of conventional PID controllers by fuzzy control method [213], improved robust fuzzy-PID controller with optimal fuzzy reasoning [179], and stability of fuzzy PID controllers [54], [253]. The author in [53] gives excellent overview on fuzzy PID controllers in general, including adaptive fuzzy PID control and applications of fuzzy PID control. One major limitation of fuzzy PID control is the difficulty of its systematic design with consistent and guaranteed performance. Additional references on the topic of fuzzy PID can be found in [8], [108], [182], [211], [216], [230], [250], [254], [262], and [325].

### ***C. Neuro-Fuzzy Control***

Neuro control, more precisely neural network control, and fuzzy control are two of the most popular intelligent control techniques. They are similar in many ways. For example, both of them are basically model-free control techniques, both are able to store knowledge and use it to make control decisions, and both are able to provide robustness of control to certain extent with respect to system variations and external disturbances. However, the two techniques are different in their ways to obtain knowledge. Neuro control acquires knowledge mainly through data training (or learning). This could be an advantage as it lets the data “speak” for itself, but sometimes a disadvantage if the training data set does not fully represent the domain of interest. Fuzzy control, in particular conventional fuzzy control, on the other hand mainly obtains qualitative and imprecise knowledge via an operator or expert’s perspective.

As the two control techniques complement to each other, that is, neuro control providing learning capabilities and high computation efficiency in parallel implementation, and fuzzy control providing a powerful framework for expert knowledge representation, the combination or integration of the two techniques have attracted lots of attention from control community. A typical combination of these two techniques is the so-called neuro-fuzzy control, which is basically a fuzzy control augmented by neural networks to enhance its characteristics like flexibility, data processing capability, and adaptability [17], [63], [72], [90], [123], [124], [138], [163], [177], [178], [186], [187], [193], [205], [209], [217], [271], [294], [305], [306], [342]. The process of fuzzy reasoning is realized by

neural networks, whose connection weights correspond to the parameters of fuzzy reasoning [38], [123], [124], [135], [187], [220], [231], [232], [264]. Using back-propagation type, or reinforcement type, or any other type neuro network learning algorithms, a neuro-fuzzy control system can identify fuzzy control rules and learn (tune) membership functions of the fuzzy reasoning, and thus realize the neuro-fuzzy control. An excellent survey is given in [212] for neuro-fuzzy rule generation in a more general setting of soft computation. Other topics of interest related to this class of control scheme include tuning parameters in neuro-fuzzy controller via genetic algorithm [72], [209], [249], [306], tuning PID controllers via fuzzy neural networks [250], self-organizing or adaptive neuro-fuzzy control [63], [177], [178], [193], [217], [294], and input-output stability analysis based on small gain theorem [89]. Additional references on the topic of neuro-fuzzy control can be found in [64], [89], [93], [149], [174], [185], [189], [222], [223], [227], [292], and [329]. It should be noted that the T-S fuzzy model is one of the general fuzzy systems used to realize the neuro-fuzzy control in this category, for example, see [129], [287], [292], and [329]. One of the main advantages of neuro-fuzzy control is that it does not basically require information on the mathematical model of a system to be controlled. Thus this class of fuzzy control offers a new avenue in solving many difficult control problems in real life where the mathematical model of a system might be hard, if not impossible, to obtain. However, one of its major limitations is the systematic analysis of stability of the closed loop control systems and convergence of the learning algorithms in the context of the closed loop control systems.

#### ***D. Fuzzy Sliding-Mode Control***

It is well known that sliding-mode control provides a robust approach to controlling nonlinear systems with uncertainties [290], [349]. Its salient features include good control performance for nonlinear systems, applicability to multiple-input-multiple-output (MIMO) systems, and most importantly, robustness to parameter changes and/or external disturbances. It however often results in chattering phenomena due to its discontinuous switching which arises from its digital implementation. Although a fuzzy controller is shown to be similar to a modified sliding mode controller [234], the key idea of fuzzy sliding model control is to combine or integrate fuzzy control and sliding mode control in such a way that the advantages of both techniques can be realized. One approach is that a sliding mode controller is equipped with capability of handling fuzzy linguistic qualitative information [50], [94], [235]. A direct benefit of such control is that fuzzy logic can effectively eliminate chattering through construction of fuzzy boundary layers which replace crisp switching surfaces [94], [101], [121]. Another approach is to design fuzzy control systems in a way of conventional fuzzy control, fuzzy PID control, or model based fuzzy control, and then to add a supervisory sliding model controller to not only guarantee stability but also improve robust performance of the closed-loop control systems [80], [206],

#### ***E. Adaptive Fuzzy Control***

Adaptive control refers to the control of partially known systems with some kind of adaptation mechanism. Most works in adaptive control are based on the assumption of linear or simplified non-linear mathematical models of systems to be controlled. In fact, adaptive control of linear systems and certain special classes of nonlinear systems has been well developed from the late 1970s to the 1990s [96], [122], [155], while adaptive control of general nonlinear systems still presents a challenge to control community. Nevertheless,

mathematical models might not be available for many complex systems in practice, and the adaptive control problem of these systems is far from being satisfactorily resolved.

Following the similar idea in neural networks [246] for their universal function approximation capability, it is shown [301] that a fuzzy system is capable of approximating any smooth nonlinear functions over a convex compact region. Other excellent works on the topic of function approximation of fuzzy systems can be found in [326] and [336]–[339]. Based on this function approximation capability of fuzzy systems, the author in [298] presents an adaptive fuzzy controller for affine non-linear systems with unknown functions. Fuzzy basis function based fuzzy systems are used to represent those unknown non-linear functions. The parameters of the fuzzy systems including membership functions characterizing linguistic terms in fuzzy rules are updated according to some adaptive laws which are derived based on Lyapunov stability theory. Since then, a great number of works on adaptive fuzzy control have been reported, see for example, [4], [18], [23], [41], [44], [70], [87], [97], [103], [150], [166], [171], [243], [256], [280], [291], [320], [321], [340], [341], and [346]. The key idea of these works is to use fuzzy systems to approximate unknown nonlinear functions in nonlinear systems and to represent the fuzzy systems in the form of linear regression with respect to unknown parameters and then to apply the well developed adaptive control techniques. However, it should be noted that some kinds of robust approaches have to be adopted for adaptive fuzzy control due to the inherent approximation errors between the approximating fuzzy systems and the original nonlinear functions, and mostlikely only semiglobal stabilization can be achieved if no supplementary control strategy is employed. Other topics of interest include improved adaptive fuzzy control schemes with smaller number of tuning parameters or better performance [87], [320], [321], robust adaptive fuzzy controller with various kinds of performances with respect to external disturbances [39], [44], [97], fuzzy model reference adaptive control [95], [150], [324], using genetic algorithms to adaptively tuning membership functions [190], and self-organizing schemes to tune fuzzy membership functions [4], [189]. Fusion of adaptive techniques and sliding mode control techniques are presented in [13], [55], [63], [67], [116]–[118], [274], and [280]. Comparison of adaptive fuzzy control to conventional adaptive control is reported in [228]. Additional references on the topic of adaptive fuzzy control can be found in [1], [5], [49], [64], [68], [93], [96], [139], [174], [193], [205], [217], [222], [223], [227], [238], [242], [257], [281], [306], [315], [330], and [345].

#### ***F T–S Model-Based Fuzzy Control***

T–S fuzzy model [265], also called the Type-III fuzzy model by Sugeno [259], is in fact a fuzzy *dynamic* model [25], [28], [29]. This model is based on using a set of fuzzy rules to describe a global nonlinear system in terms of a set of local linear models which are smoothly connected by fuzzy membership functions. This fuzzy modelling method offers an alternative approach to describing complex nonlinear systems [28], [71], [127], [269], [326], [336], and drastically reduces the number of rules in modelling higher order nonlinear systems [259]. Consequently, T–S fuzzy models are less prone to the curse of dimensionality than other fuzzy models. More importantly, T–S fuzzy models provide a basis for development of systematic approaches to stability analysis and controller design of fuzzy control systems in view of powerful conventional control theory and techniques.

A great number of theoretical results on function approximation, stability analysis, and controller synthesis have been developed for T–S fuzzy models during the last ten years or

so. T–S fuzzy models are shown to be universal function approximators in the sense that they are able to approximate any smooth non- linear functions to any degree of accuracy in any convex com- pact region [28], [71], [127], [269], [326], [336]. This result provides a theoretical foundation for using T–S fuzzy models to represent complex nonlinear systems approximately. Based on the differences of design approaches, the methods for stability analysis and control design of T–S fuzzy systems can be roughly classified into the following six categories: i) *simple local controller design and stability checking*; ii) *stabilization with/without various performance indexes such as  $H_\infty$  and  $H_2$  control based on a nominal linear model and a single quadratic Lyapunov function*; iii) *stabilization with/without various performance indexes based on a common quadratic Lyapunov function*; iv) *stabilization with/without various performance indexes based on a piecewise quadratic Lyapunov function*; v) *stabilization with/without various performance indexes based on a fuzzy Lyapunov function*; and vi) *adaptive control when parameters of T–S fuzzy models are unknown*.

The first category of methods is proposed in the earlier stage of developments [24], [25], [30], [80], [133]. Its basic idea is to design a feedback controller for each local model, to obtain a global controller by combining the local controllers in cer- tain way, and then to use some stability criteria to check sta- bility of the resulting closed-loop fuzzy control system. Unfor- tunately, this kind of methods suffers from a problem that the design process is not constructive in general and many steps of trial and error might be needed before an acceptable controller design can be obtained. The main idea of the second category of methods is to represent a T–S fuzzy model as a *nominal* linear model with uncertainties around the equilibrium of the system, which include all the nonlinearities of the T–S fuzzy model, and then to recast the control problem as a robust linear con- trol problem with uncertainties [74], [83], [145]. In this way, many available robust control synthesis approaches can be di- rectly applied to or further developed for the T–S fuzzy systems. However, this kind of methods tends to be conservative since one nominal model has to be assumed which might not be the case for many complex highly nonlinear systems, thus has not become a mainstream of research efforts in model based fuzzy control.

The basic idea of categories iii)–v) of methods is to design a feedback controller for each local model and to construct a global controller from the local controllers in such a way that global stability with/without various performance indexes of the closed-loop fuzzy control system is guaranteed. The major techniques that have been used include quadratic stabilization, linear matrix inequalities (LMIs), Lyapunov stability theory, bilinear matrix inequalities, and so on. The third category of methods is most popular to date [2], [3], [6], [12], [33]–[37], [40], [42], [46], [47], [56], [61], [109], [110], [112], [115], [119], [125], [130], [140]–[144], [147], [148], [151], [159], [167], [168], [175], [181], [183], [191], [192], [195], [197], [198], [206], [214], [221], [239], [267]–[269], [273], [275], [276], [282]–[286], [293], [302]–[304], [312], [317], [322], [323], [327]. It, however, requires that a common quadratic Lyapunov function can be found for all the local subsystems in a T–S fuzzy model, and this proves to be conservative in many cases. As a less conservative alternative, the fourth category of methods, at the same time, has also been well developed [26], [27], [29], [51], [52], [74], [76]–[78], [82]–[86], [104], [105], [128], [157], [224], [272], [295]–[297]. The fifth category of methods has attracted some attention recently but it presents more challenges or difficulties [60], [98], [266], [307],



[347]. The sixth category of methods is to deal with control of T–S fuzzy systems when parameters of T–S fuzzy models are un- known. The most works to date however are quite preliminary in the sense that they only consider unknown parameters in local linear models by assuming that the number of fuzzy rules and membership functions are all known *a priori* [75], [81], [126], [144], [238].

All these results on various approaches to fuzzy logic control, in particular on approaches to T–S model-based fuzzy control demonstrate that these methods provide systematic tools for analysis and design of fuzzy control systems, and that conventional linear system control theories can be suitably utilized and developed for analysis and design of model based fuzzy control systems. In the next few sections, the more detailed survey on the T–S fuzzy model based approaches will be presented. For the sake of presentation simplicity only developments of discrete time T–S fuzzy systems will be focused in this paper. However, it should be noted that the developments of continuous time counterparts have also been widely reported in literature.

### I. T–S MODEL AND UNIVERSAL FUNCTION APPROXIMATION

T–S fuzzy models or so-called fuzzy dynamic models can be used to represent complex MIMO systems with both fuzzy inference rules and local analytic linear dynamic models as follows:

$$\begin{aligned} R^l : & \text{IF } z_1 \text{ is } F_1^l \text{ and } \dots z_\nu \text{ is } F_\nu^l \\ & \text{THEN } x(t+1) = A_l x(t) + B_l u(t) + a_l \\ & y(t) = C_l x(t), \\ & l \in L := \{1, 2, \dots, m\} \end{aligned} \quad (3.1)$$

where  $R^l$  denotes the  $l$ th fuzzy inference rule,  $m$  the number of inference rules,  $F_j^l (j = 1, 2, \dots, \nu)$  are the fuzzy sets,  $x(t) \in \mathbb{R}^n$  the state vector,  $u(t) \in \mathbb{R}^p$  the input vector,  $y(t) \in \mathbb{R}^q$  the output vector, and  $(A_l, B_l, a_l, C_l)$  the matrices of the  $l$ th local model, and  $z(t) := [z_1, z_2, \dots, z_\nu]$  some measurable variables of the system, for example, the state variables. It is also assumed without loss of generality that the origin is the equilibrium of the T–S fuzzy system (3.1).

It is noted that the local model in terms of  $(A_l, B_l, a_l, C_l)$  in (3.1) only represents the properties of the system in a local region and thus is referred to as the fuzzy local model.

By using a standard fuzzy inference method, that is, using a singleton fuzzifier, product fuzzy inference, and center-average defuzzifier, the T–S fuzzy model in (3.1) can be rewritten as [269]



$$\begin{aligned} x(t+1) &= A(\mu)x(t) + B(\mu)u(t) + a(\mu) \\ y(t) &= C(\mu)x(t) \end{aligned} \quad (3.2)$$

where

$$\begin{aligned} A(\mu) &= \sum_{l=1}^m \mu_l A_l & B(\mu) &= \sum_{l=1}^m \mu_l B_l \\ a(\mu) &= \sum_{l=1}^m \mu_l a_l & C(\mu) &= \sum_{l=1}^m \mu_l C_l \end{aligned} \quad (3.3)$$

$\mu_l(z)$  is the normalized membership function satisfying

$$\begin{aligned} \mu_l &= \frac{\xi_l(z)}{\sum_{i=1}^m \xi_i(z)} \\ \xi_l(z) &= \prod_{i=1}^m F_i^l(z_i) \\ \mu_l \geq 0 & \quad \sum_{l=1}^m \mu_l = 1 \end{aligned} \quad (3.4)$$

and  $F_i^l(z_i)$  is the grade of membership of  $z_i$  in the fuzzy set  $F_i^l$ .

It should be noted that the previous model is a nonlinear model in nature since the membership functions are nonlinear functions of the premise variables which contain some or all of the state variables in general. The previous T-S fuzzy model is

in fact the state space fuzzy model. Similarly, the input-output fuzzy model can also be defined [28].

*Remark 3.1:* T-S fuzzy models include two kinds of knowledge: one is qualitative knowledge represented by fuzzy IF-THEN rules, and the other is quantitative knowledge represented by local linear models. T-S fuzzy models have a compatible structure with a two level control system with the lower level providing basic feedback control and the higher level providing supervisory control or scheduling. By using T-S fuzzy models, one can formulate these two kinds of knowledge into a unified mathematical framework. This framework provides a possibility for developing a systematic analysis and design method for complex nonlinear control systems.

*Remark 3.2:* T-S fuzzy models are, to certain extent, similar to the concept of typical piecewise linear approximation methods in nonlinear control. Control of a nonlinear system by piecewise linearization is approached by linearizing the system around a number of nominal operating points, and then applying linear feedback control methods to each local linear model [152]. However, analysis of the resulting closed-loop control system is in general difficult and stability or performance of the system can hardly be guaranteed due to the approximation. On the other hand, T-S fuzzy models consist of a set of local linear models smoothly connected by membership functions yielding global models of the systems. Thus, T-S fuzzy models provide a way of designing controllers based on local linear models and analysing stability or performance based on the global nonlinear model, and this also provides a framework to consolidate the general industrial practice of nonlinear control system designs such as gain scheduling control.

*Remark 3.3:* When only the constant term in the consequent part of (3.1) is present, the fuzzy model is called Type II fuzzy model by Sugeno in [259]. It is a simplified special case of more general T-S fuzzy models. Sugeno [259] presents a detailed stability study for this

type of fuzzy models by using Lyapunov stability theory, and also gives an excellent survey on the stability issues of more general fuzzy control systems.

Identification of T–S fuzzy models has attracted great attention from control community and a number of results have been obtained [7], [28], [127], [214], [276], [287], [329]. There are basically two kinds of approaches, one is to linearize the original nonlinear system in a number of operating points when the model of the system is known, which is straightforward, and the other is based on the data generated from the original nonlinear system when its model is unknown (or in the form of black box). The authors in [28] present an approach to identification of T–S fuzzy models, including identification of the number of fuzzy rules (or the number of local linear models) and parameters of fuzzy membership functions by using a fuzzy clustering method, and identification of parameters of local linear models by using a least squares method. The objective is to minimize the global nonlinear prediction error between T–S fuzzy models and the corresponding original nonlinear systems. The authors in [127] present a study of interpretation capability of T–S fuzzy models and propose a method for their identification. The key idea is to achieve not only accurate global nonlinear prediction but also at the same time accurate local models in the sense that the local models are close approximations to the local linearization of the nonlinear system. The latter is particularly important in control design. However, this becomes a difficult multiobjective identification problem. It has been shown that constrained and regularized identification methods may improve interpretability of constituent local models as local linearizations, and locally weighted least squares method may explicitly address the tradeoff between the local and global accuracy of T–S fuzzy models. Before we present a survey on approaches to stability analysis and controller synthesis of T–S fuzzy systems in the next few sections, we first give a result on universal function approximation of T–S fuzzy models.

#### A. Universal Function Approximation

Consider a general nonlinear discrete-time system described by a state–space model of the form

$$x(t + 1) = f(x(t), u(t)) \quad (3.5)$$

where  $x(t) \in \mathbb{R}^n$  is the state vector and  $u(t) \in \mathbb{R}^p$  the input vector of the system. The function  $f(x(t), u(t))$  satisfies the following assumption.

*Assumption 3.1:* There exists an equilibrium  $x_0 = 0 \in \mathbb{R}^n$  such that  $f(0, 0) = 0$  and  $f \in C^2$ , that is,  $f$  has the  $m$ th order continuous derivative with respect to  $x$  and  $u$ .

Let  $\Sigma_n$  be the set of all systems of the form (3.5) satisfying the Assumption 3.1. Let  $\Sigma_{\text{fm}}$  be the set of all T–S fuzzy models of the form (3.1) or (3.2). It is also assumed that  $z(t)$  here, that is, the membership functions depend on the system state variables. It has been shown [28], [31] that T–S fuzzy models are universal function approximators in the sense that given any  $\Sigma_n$  there exists a fuzzy model  $\hat{f}(x, u) = A(\mu)x + B(\mu)u + a(\mu) \in \Sigma_{\text{fm}}$  that will approximate  $f(x, u)$  to any degree of accuracy in any convex compact region. More accurately, let  $X$  and  $U$  be compact sets in  $\mathbb{R}^n$  and  $\mathbb{R}^p$ , respectively, and

$$d_{\infty}(f_1(x, u) - f_2(x, u)) = \sup_{x \in X, u \in U} (\|f_1(x, u) - f_2(x, u)\|) \quad (3.6)$$

be the sup-metric, then  $(X \times U, d_{\infty})$  is a metric space. The following theorem shows that  $(\Sigma_{fm}, d_{\infty})$  is dense in  $(C^2(X \times U), d_{\infty})$ .

*Theorem 3.1 [28], [31]:* For any given  $f(x, u) \in \Sigma_n$  on the compact set  $X \times U \subset \mathbb{R}^n \times \mathbb{R}^p$  and arbitrary  $\varepsilon > 0$  there exists an  $\hat{f}(x, u) \in \Sigma_{fm}$  such that

$$\begin{aligned} d_{\infty}(f(x, u) - \hat{f}(x, u)) &= \sup_{x \in X, u \in U} (\|f(x, u) - \hat{f}(x, u)\|) < \varepsilon. \quad (3.7) \\ &= \sup_{x \in X, u \in U} (\|f(x, u) - \hat{f}(x, u)\|) < \varepsilon. \end{aligned}$$

*Remark 3.4:* It is noted that there are many other results on universal function approximation property of other kinds of fuzzy systems, for example, the fuzzy systems with fuzzy basis functions [301], [337]–[339]. It is also recently proved that the more commonly used T–S fuzzy model in (3.1) with  $a_l \equiv 0$  is also a universal function approximator [269].

*Remark 3.5:* It should be noted that the result in Theorem 3.1 only concerns the approximation between two static nonlinear functions, that is,  $f(x, u)$  and  $\hat{f}(x, u)$ . However, the error between the states of two dynamic systems described in (3.5) and (3.2), which are corresponding to  $f(x, u)$  and  $\hat{f}(x, u)$ , might grow as time goes. Therefore, much care has to be taken in dealing with the approximation between two dynamic systems instead of two static functions.

For the ease of presentation, we will mainly use the more commonly used T–S fuzzy models, that is, the model (3.1) with  $a_l \equiv 0$  in the next few sections, though it is shown that T–S fuzzy models with affine terms has much improved function approximation capabilities [71].

#### IV. STABILITY ANALYSIS

Consider the T–S fuzzy model in (3.1) with  $u \equiv 0$  and  $a_l \equiv 0$  as follows:

$$\begin{aligned} R^l: & \text{ IF } z_1 \text{ is } F_1^l \text{ and } \dots z_\nu \text{ is } F_\nu^l \\ & \text{ THEN } x(t+1) = A_l x(t), \\ l \in L := & \{1, 2, \dots, m\}, \end{aligned} \quad (4.1)$$

which can also be described by

$$x(t+1) = \sum_{l=1}^m \mu_l(z) A_l x(t). \quad (4.2)$$

Stability analysis of T–S fuzzy systems has been pursued mainly based on Lyapunov stability theory but with different Lyapunov functions. One of them is the so-called

common (or global) quadratic Lyapunov functions, another one is the so-called *piecewise* quadratic Lyapunov functions, and the third one is the so-called *fuzzy* (or *non-quadratic*) Lyapunov functions. In the rest of this section we will present stability analysis results of T–S fuzzy systems based on these Lyapunov functions, respectively.

**A. Analysis Based on Common Quadratic Lyapunov Functions**

One of the first results on stability analysis based on common quadratic Lyapunov functions is suggested in [268], and since then numerous modifications and improved methods have been proposed. By defining a Lyapunov function candidate as

ii) if there exists a positive-definite matrix such that the following LMIs are satisfied:

$$\begin{bmatrix} -X & XA_l^T \\ A_l X & -X \end{bmatrix} < 0, \quad l \in L. \quad (4.5)$$

*Remark 4.1:* The equivalence of (4.4) and (4.5) can be easily established by using the Schur complement together with  $P^{-1}$  [19]. However, the form of (4.5) is more suitable to controller synthesis which can be observed in the next section. It is also noted that (4.5) implies that its feasible solution of is positive definite. However, the term of “positive definite” instead of “symmetric” will still be used in subsequent presentation of theorems to avoid any possible confusion.

*Remark 4.2:* Conditions (4.4) or (4.5) are linear matrix inequalities in the variable  $X$  or, respectively. The feasibilities of these LMIs, as well as other LMIs in the rest of this section and the subsequent sections, are easy to be tested by the available software package *LMI Toolbox* [92].

*Remark 4.3:* It has been noted that common quadratic Lyapunov functions tend to be conservative, and even worse, might not exist for many complex highly nonlinear systems as demonstrated in [77], and [128]. This is one of the main limitations of this kind of approaches.

**B. Analysis Based on Piecewise Quadratic Lyapunov Functions**

Due to the drawback of common quadratic Lyapunov functions, it is thus desirable to develop less conservative stability results for T–S fuzzy systems. Piecewise quadratic Lyapunov functions are one of the options available. In order to facilitate development of approaches based on piecewise quadratic Lyapunov functions, one needs partition of the premise variable space, or partition of the state space in the case of  $z(t) = x(t)$ . The following partition will be referred to be the *first* kind in sequel [26], [27], [29].

Define regions in the premise variable space as follows:

$$S_l = \{z \mid \mu_l(z) > \mu_i(z), \quad i = 1, 2, \dots, m, i \neq l\}, \quad l \in L. \quad (4.6)$$

Then the global model of the T–S fuzzy system (4.2) can be expressed in each local region as

$$x(t + 1) = (A_l + \Delta A_l(\mu))x(t), \quad z(t) \in S_l, \quad l \in L \quad (4.7)$$

where

$$\Delta A_l(\mu) = \sum_{i=1, i \neq l}^m \mu_i \Delta A_{li} \quad \Delta A_{li} = A_i - A_l.$$

*Remark 4.4:* It is noted that the number of regions in this kind of partition is the same as the number of fuzzy rules or the number of local linear models, and that the fuzzy model (4.7) is different from the local model in the T–S fuzzy model (4.1) because it considers all interactions among the local models of (4.1) in terms of uncertainty and is in fact the global fuzzy model (4.2) expressed in the local region  $S_l$ .

For purpose of stability analysis and stabilization, we introduce the following upper bounds for the uncertainty term of the fuzzy model (4.7):

$$[\Delta A_l(\mu)]^T [\Delta A_l(\mu)] \leq E_{lA}^T E_{lA}, \quad l \in L. \quad (4.8)$$

*Remark 4.5:* It is noted that there are many ways to obtain these upper bounds, the interested readers can refer to [26], [27], and [29] for details. In addition, we define a set that represents all possible system transitions among regions, that is

$$\Omega := \{(l, j) | z(t) \in S_l, z(t + 1) \in S_j, \forall l, j \in L, l \neq j\}. \quad (4.9)$$

Then, we are ready to present a stability result based on the following piecewise quadratic Lyapunov function candidate,

$$V(x) = x^T P_l x, \quad z \in S_l, \quad l \in L.$$

## I. STABILIZATION BASED ON PIECEWISE QUADRATIC LYAPUNOV FUNCTIONS

In this section, we will present stabilization methods based on piecewise quadratic Lyapunov functions which are suggested in [29], [52], [76], [77], [78], and [85]. With space partition of the first kind and the switching controller defined as

$$u(t) = K_l x(t), \quad z(t) \in S_l, \quad l \in L \quad (6.1)$$

the closed-loop fuzzy control system can be described by

$$x(t + 1) = (A_l + \Delta A_l(\mu) + (B_l + \Delta B_l(\mu))K_l)x(t), \quad z(t) \in S_l \quad (6.2)$$

where the upper bounds for and are given in (4.8) and (5.15), respectively. By using a piecewise quadratic Lyapunov function candidate of the form

$$V(x) = x^T X_l^{-1} x, \quad z(t) \in S_l$$

$$= x^T X_l^{-1} x, \quad \in$$

one has the following stabilization result for the T–S fuzzy system described in (5.1).

*Theorem 6.1 [52]:* The closed-loop fuzzy control system (6.2) is globally exponentially stable, if there exist a set of positive-definite matrices  $X_{l,l}$  and a set of matrices



$Q_l, l \in L$  such that the following LMIs are satisfied:

$$\begin{bmatrix} -X_l & X_l A_l^T + Q_l^T B_l^T & X_l E_{lA}^T & Q_l^T E_{lB}^T \\ A_l X_l + B_l Q_l & -(X_l - I) & 0 & 0 \\ E_{lA} X_l & 0 & -\frac{1}{2}I & 0 \\ E_{lB} Q_l & 0 & 0 & -\frac{1}{2}I \end{bmatrix} < 0, \quad l = 1, 2, \dots, m \quad (6.4)$$

$$\begin{bmatrix} -X_l & X_l A_l^T + Q_l^T B_l^T & X_l E_{lA}^T & Q_l^T E_{lB}^T \\ A_l X_l + B_l Q_l & -(X_j - I) & 0 & 0 \\ E_{lA} X_l & 0 & -\frac{1}{2}I & 0 \\ E_{lB} Q_l & 0 & 0 & -\frac{1}{2}I \end{bmatrix} < 0, \quad l, j \in \Omega. \quad (6.5)$$

Moreover, the controller gain for each local region is given by

$$K_l = Q_l X_l^{-1}, \quad l \in L. \quad (6.6)$$

With space partition of the second kind and the switching controller defined as

$$u(t) = K_l x(t), \quad z(t) \in S_l, \quad l \in \bar{L} \quad (6.7)$$

the closed-loop fuzzy control system can be described by

$$x(t+1) = \sum_{k \in K(l)} \mu_k(z(t))(A_k + B_k K_l)x(t), \quad z(t) \in S_l \quad (6.8)$$

where the set  $K(l)$  is defined in (4.16). By using the same piece-wise quadratic Lyapunov function candidate as in (6.3) one has the following stabilization result for the T-S fuzzy system described in (5.1).

**Theorem 6.2 [295]:** The closed-loop fuzzy control system (6.8) is globally exponentially stable, if there exist a set of positive-definite matrices  $X_l, l$  and a set of matrices,  $Q_l, l$  such that the following LMIs are satisfied:

$$\begin{bmatrix} -X_l & X_l A_k^T + Q_l^T B_k^T \\ A_k X_l + B_k Q_l & -X_l \end{bmatrix} < 0, \quad l \in \bar{L}, \quad k \in K(l) \quad (6.9)$$

$$\begin{bmatrix} -X_l & X_l A_k^T + Q_l^T B_k^T \\ A_k X_l + B_k Q_l & -X_j \end{bmatrix} < 0, \quad (l, j) \in \Omega, \quad k \in K(l). \quad (6.10)$$

Moreover, the controller gain for each local region is given by

$$K_l = Q_l X_l^{-1}, \quad l \in \bar{L}. \quad (6.11)$$

The stabilization results in Theorems 6.1 and 6.2 can be further improved in the sense of less conservatism by introducing extra slack variables in LMIs as in [225]. It is noted that the matrices are not even required to be symmetric. One improved result for Theorem 6.2 is summarized in the following theorem.

## **Conclusion**

This paper presents a brief survey on analysis and design methods of model based fuzzy control systems. The particular attention is given to the so-called T–S models or fuzzy dynamic models which consist of a family of local linear models smoothly combined with fuzzy membership functions. The issues of universal function approximation, stability analysis, and controller synthesis of T–S fuzzy models have been addressed. It is shown that T–S fuzzy models are able to approximate any smooth nonlinear functions to any degree of accuracy in any convex compact region. Approaches to stability analysis and controller synthesis of T–S fuzzy systems based on either common quadratic Lyapunov functions, piecewise Lyapunov functions, or fuzzy (or nonquadratic) Lyapunov functions are then presented. It is believed that these methods provide a systematic approach to analysis and design of model based fuzzy control systems, and they probably suggest an efficient alternative way to solve more difficult general nonlinear control problems.

The approaches based on common quadratic Lyapunov functions have been well developed for both discrete time and continuous time T–S fuzzy systems, while the approaches based on piecewise quadratic Lyapunov functions have had more challenges. The early works [27], [29], [74], [83], [84], [104], and on controller synthesis based on piecewise quadratic Lyapunov functions suffer from a drawback of some extra restrictive boundary conditions which are in general hard to test or satisfy. Those restrictive conditions have been removed from the most recent works on stability analysis and controller synthesis based on novel piecewise quadratic Lyapunov functions [51], [52], [76]–[78], [82], [128], [295], [296]. However, many issues still need to be addressed for these approaches based on piecewise quadratic Lyapunov functions or fuzzy Lyapunov functions. For example, if local models are affine for T–S fuzzy systems, the best available stabilization results are given by solving a set of bilinear matrix inequalities which is more difficult to solve and computationally much more expensive. Is it possible to cast the problem as one by solving a set of linear matrix inequalities instead? How less conservative are the approaches based on piecewise quadratic Lyapunov functions or fuzzy Lyapunov functions compared to the approaches based on common quadratic Lyapunov functions? Which kind of approaches, the approaches based on piecewise quadratic Lyapunov functions or the approaches based on fuzzy Lyapunov functions, is less conservative? How to further reduce the conservatism of these approaches?

Moreover, there are many other challenges which have not been well studied in model based fuzzy control.

- What kind of nonlinear systems can be well represented by T–S fuzzy models? How to identify T–S fuzzy models to facilitate both accurate approximation and effective controller synthesis? The authors in [127] and [339] have shed some light on the issues.
- Are there any other better techniques which can be used for stability analysis and controller synthesis of T–S fuzzy systems in addition to common/piecewise quadratic Lyapunov functions or fuzzy Lyapunov functions?
- How can one use as much information of T–S fuzzy models as possible to achieve more effective controller synthesis and/or better performance? It is known that much information on fuzzy membership functions have not been used in the approaches based on common/piecewise quadratic Lyapunov functions or fuzzy Lyapunov functions. In fact, only little information of membership functions has been used in space partitions for the approaches based on piecewise quadratic Lyapunov functions.

- How can one design adaptive controllers for T–S fuzzy systems if information/parameters of the models are not known *a priori*, including information on the number of fuzzy rules, the shape and parameters of membership functions, and the parameters of local models? The issue of adaptive control becomes prohibitively difficult if all the information has to be identified online. Some preliminary results have been obtained where only the parameters of local models are assumed unknown [75], [81], [126], [144], [238].
- Whether can fuzzy controllers, which are designed to stabilize T–S fuzzy models, stabilize the original nonlinear systems, even if the T–S fuzzy models universally approximate the original nonlinear systems? If it is possible, how can one design the fuzzy controller to achieve such stabilization of the original nonlinear systems?
- Whether does there exist a fuzzy controller to stabilize a given nonlinear system if it can be stabilized by a smooth controller? This is usually called the *universal fuzzy control* problem. How can it be designed if it exists? Some preliminary results have been obtained in [31] and [32].
- Whether can stability analysis and controller synthesis results on deterministic T–S fuzzy systems be extended to stochastic T–S fuzzy systems? Several authors have made attempts to address these issues [43], [48], [308]. However, to make such results useful one needs to define fuzzy sets, membership functions, fuzzy inferences, etc., in the context of stochastic variables and systems. Some results on probabilistic fuzzy logic and probabilistic fuzzy systems provide a possible way to address the issues on this topic [194], [207].

In addition to the aforementioned challenges, the authors in [245] have also listed a number of open problems and perspectives in a more general setting of fuzzy systems and control, such as fuzzy system identification, adaptive fuzzy control, expert control, supervision and diagnosis, as well as the integration of fuzzy logic techniques and other artificial intelligence techniques for the more sophisticated intelligent control systems. All these challenges also provide great opportunities for our fuzzy logic control community.

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## **Employee Engagement in Relation to Various Factors of Foundry Industries in Belagavi City**

**Dr. Devaraju\***

### **Abstract**

Employee Engagement is a complex and challenging goal for an organization. In today's diversified workforce it has become even more challenging. An engagement friendly culture is valuable as it considers the value of multi-generational and multi-cultural workforce. An organization is considered a great place to work that respects the needs of each individual employee along with motivating each of them to pursue their individual goals. The present study is carried out with the objectives to explore the relationship among employee engagement and various factors such as leadership, job satisfaction, compensation, communication, motivation, growth opportunities, recognition and awards, and work life balance. Convenience sampling technique was used to collect the data. The present study consisted 380 employees of the foundry industries from Belagavi city. The study revealed that the leadership, job satisfaction, communication, motivation, growth opportunities, recognition and awards, and work life balance have a positive and leadership having negative relationship with employee engagement and relationship was not found with compensation.

**Key Words:** Employee Engagement, leadership, job satisfaction, and work life balance.

### **Introduction**

The growing level of uncertainty, high level of expectation from the employees and changing business environment requires Organizations to continuously adapt to reactive and proactive changes and employees have to both physically and mentally engage, adopt changes to make fit for new purpose the different needs of the workforce. Organizations often compete and attempt to survive by lowering prices, cutting costs, redesigning business processes and downsizing the number of employees. Assuming that there is a limit to cutting costs and downsizing, new approaches to human resource management are inevitable for Organizational survival and progress. Rather than focusing on reducing costs, the shift of the focus in Human Resource Management (HRM) is to build Employee Engagement. The notion of Employee Engagement has sparked widespread interest over the last decade. Engaged employees are those who give full discretionary effort at work, and are highly vigorous and dedicated to their job, while disengaged employees are those who are motivationally disconnected from work, who do not have the energy to work hard and who are not enthusiastic at work place. Employee Engagement affects productivity, profitability, employee retention, and customer services, even so, not much is offered in the current body of knowledge concerning how best to stimulate Employee Engagement. According to Singh & Kumar in 2012, there are many other ways in which Employee Engagement has been defined earlier. The crux of the definition of Employee Engagement includes energy, involvement, commitment, vigor, and attachment with the work, Organization, and colleagues. Employee Engagement has been construed by varied academicians and consultancies in different ways. The critical analysis of Employee

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Engagement has been done numerous times by different researchers. Employee Engagement has been conceptualized and defined in ways that suit their purpose of the action.

Some of the researchers compare Employee Engagement to 'Old Wine in New Bottle', because the construct of Employee Engagement looks quite similar to some of the already established constructs of Job Satisfaction, Organizational Citizenship Behavior, Organizational Commitment, Job Involvement and so on and so forth. Employee Engagement is related to, and emancipated from earlier similar looking constructs; or whether Employee Engagement is just a superior manifestation of such aforesaid constructs, and if at all Employee Engagement is such a superior manifestation of such constructs then what was the need to have another so similar looking construct. In order to cater to this task, specific outcomes of having an engaged workforce was pre-decided keeping in mind the support of the literature.

Over the past decade, and particularly in the past three years, employers and employees have faced human capital challenges and an uncertain economy. The economic downturn that started in 2008 has had a significant impact on companies and the resulting decisions made by management. These decisions have impacted Employee Engagement levels and Perceptions Globally, leading to changes in leading drivers of Employee Engagement. In uncertain times, Organizations need to focus on harnessing the discretionary effort that engaged employee. This makes a difference in how companies are affected during the economic downturn, how quickly they emerge from it, and how strong they are in the future after the downturn passes. Employee Engagement initiative has a direct impact on the Organization's productivity. Also, Employee Engagement is directly influenced by the growth of the Organization, value addition experienced by employees and employee perception of the Organization. When managers become disengaged, employees are 37% more likely to be frustrated with company systems, processes, and procedures. (Excerpts are taken from FLS Research 2012-13)

### **Objectives**

1. To investigate the relationship between employee engagement and leadership
2. To investigate the relationship between employee engagement and job satisfaction
3. To find out the relationship between employee engagement and compensation
4. To explore the relationship between employee engagement and communication
5. To examine the relationship between employee engagement and motivation
6. To study the relationship between employee engagement and growth opportunities
7. To investigate the relationship between employee engagement and recognition and awards
8. To explore the relationship between employee engagement and work life balance

### **Hypotheses of the study**

- Ha<sub>1</sub>: There is a relationship between employee engagement and leadership  
Ha<sub>2</sub>: There is a relationship between employee engagement and job satisfaction  
Ha<sub>3</sub>: There is a relationship between employee engagement and compensation  
Ha<sub>4</sub>: There is a relationship between employee engagement and communication  
Ha<sub>5</sub>: There is a relationship between employee engagement and motivation  
Ha<sub>6</sub>: There is a relationship between employee engagement and growth opportunities  
Ha<sub>7</sub>: There is a relationship between employee engagement and recognition and awards  
Ha<sub>8</sub>: There is a relationship between employee engagement and work life balance

### Sample

By using Convenience sampling technique data was collected in the present study. In the present study, 380 employees working in Foundry Industries from Belagavi city are taken as a sample for this study.

### Data collection

In the present study, primary data was collected. Before collecting data participant were informed the purpose of the study and their consent was taken. After taking the consent from the participants, some personal information and main questionnaire which aims to assess the employee engagement administered. The responses given by each person are carefully scrutinized for wrong marking and omission. The answer sheets which are complete in all aspects were retained and the rest were rejected. Each response sheet is hand scored.

### Results and Discussion

Ha<sub>1</sub>: There is a relationship between employee engagement and leadership

**Table no.1: Correlations between Employee Engagement and Leadership**

	Leadership
Employee Engagement	-.698***

\*\*\*p<0.001; Very Highly Significant

An inspection of table no.1 shows that there is a negative correlation of employee engagement with leadership ( $r = -.698^{**}$ ), which is very high. It is clear from the above table that the relation between the two variables is negative. It means higher they show engagement in a job, they have shown lesser leadership.

Ha<sub>2</sub>: There is a relationship between employee engagement and job satisfaction

**Table no.2: Correlations between Employee Engagement and Job Satisfaction**

	Job Satisfaction
Employee Engagement	.546***

\*\*\*p<0.001; Very Highly Significant

An observation of the table no. 2 shows there is a correlation between employee engagement and job satisfaction which is very high. It is clear that the relation between the two variables is positive. It means higher they show engagement in the job, express more satisfaction in the job they do.

Ha<sub>3</sub>: There is a relationship between employee engagement and compensation

**Table no.3: Correlations between Employee Engagement and Compensation**

	Compensation
Employee Engagement	-.025

Correlation was not found between employee engagement and compensation. It is clear that there no relation between the two variables.

Ha<sub>4</sub>: There is a relationship between employee engagement and communication

**Table no.4: Correlations between Employee Engagement and Communication**

	Communication
Employee Engagement	.612***

\*\*\*p<0.001; Very Highly Significant

An inspection of table no.4 shows that employee engagement is positively and significantly very high relation with communication. It means more they engage themselves in job, better communicate themselves with others.

Ha5: There is a relationship between employee engagement and motivation

**Table no.5: Correlations between Employee Engagement and Motivation**

	Motivation
Employee Engagement	.576***

\*\*\*p<0.001; Very highly significant

The above table no.5 shows the positive and significantly very high relation between employee engagement and motivation of employees of foundry industries. It means that Higher the employees are engaged they will be more motivated towards their job.

Ha6: There is a relationship between employee engagement and growth opportunities

**Table no.6: Correlations between Employee Engagement and Growth Opportunities**

	Growth Opportunities
Employee Engagement	.535***

\*\*\*p<0.001; Very Highly Significant

Table no 6 clearly shows of employees of foundry industries have significantly very high relation between employee engagement and growth opportunities. It means more the employees are engaged at a job they have more growth opportunities.

Ha7: There is a relationship between employee engagement and recognition and awards

**Table no.7: Correlation between Employee Engagement and Recognition and Awards**

	Recognition and Awards
Employee Engagement	.501***

\*\*\*p<0.001; Very Highly Significant

An inspection of table no.7 shows that there is a positive high significant relation between employee engagement and recognition and awards. It means that Higher the employees are engaged in a job they have more recognition and awards.

**Table no.8: Correlation between Employee Engagement and Work-Life Balance**

	Work-Life Balance
Employee Engagement	.281*

\*p<0.05; Significant

There is a positive and significant relation between employee engagement and work-life balance. It means that even though employees are engaged more in their jobs they are managing both work and personal life very well.

**Discussion**

There is a negative relationship between employee engagement and leadership. It may due to the fact that employees are engaged more in their work; they do not get enough time for leadership activities in the organization. This finding is contrary to the finding of Bhatnagar (2007) where he found that one of the factors that increase engagement is supportive management, which is also another trait that transformational leaders have. There is positive correlation between employee engagement and job satisfaction. Employees are satisfied with the amount of work responsibilities allotted to them and related policies adopted within the organization. This finding is also contrary to the finding of Fernandez (2007) which shows the distinction between job satisfaction, the well-known construct in management, and engagement contending that employee satisfaction is not the same as employee engagement and since managers cannot rely on employee satisfaction to

help retain the best and the brightest. Therefore, the full engagement equation is obtained by aligning maximum job satisfaction and maximum job contribution. There is no correlation between employee engagement and compensation.

There is positive correlation between employee engagement and communication. Employees are highly involved in their work and work-related communication does happen within the organization. When top management communicates frequently and openly on Company objectives, vision and goals among employee's engagement will increase subsequently. Consequently, open and face to face communication is a key driver in employee engagement, the effect multiplies. (Dernovsek, 2008; Perrin, 2003; Ellis and Sorensen, 2007; Blessing White, 2008). CIPD (2006)

There is positive and significantly very high relation between employee engagement and motivation of employees of foundry industries. It means that Higher the employees are engaged they will be more motivated towards their job.

Employees of foundry industries have significantly very high relation between employee engagement and growth opportunities. It means more the employees are engaged at a job they have more growth opportunities. The Blessing White (2006) study has found that almost two thirds' (60%) of the surveyed employees want more opportunities to grow forward to remain engaged and satisfied in their jobs. There is a positive and high significant relation between employee engagement and recognition and awards. It means that Higher the employees are engaged in a job they have more recognition and awards. Employees when they enter the world of work, they also have high expectations of recognition, approval and being rewarded by their employers.

There is positive correlation between employee engagement and work life balance since employees get equal amount of time for work and spending time with family. Paul (2003) those organization which focus on employee work life balance have better result of their business and as well performance and profit. In today's organization need to be more flexible balancing the work and home life which will help to reduce the absenteeism, lateness (Lazer et al, 2007, p 207).

### **Conclusion**

This research concludes that leadership and development practiced within an all encompassed engagement will leads to new learning linked to growth opportunities and its recognition and awards has a positive and significant effect on employee engagement. Finally, employee engagement has a positive and significant impact on happiness among employees, increased productivity. Engaged employees increase innovation, quality of work, work efficiency, and bottom-line performance while reducing, absenteeism, safety incidents, costs related to hiring and retention in highly competitive talent markets. Enhanced effective productivity leads to significant increases in the key business performance measures such as revenue, market share, earnings per share, and net promoter score (NPS).

### **Limitation of the study**

1. In the present study only few variables have taken.
2. Large number of samples could have been taken.
3. The present study is restricted on to Belagavi city.



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## **A Study on Performance of Mudra Bank: A Key Enabler to Access Finance to MSME Sector**

**Ms. SMRITI NAGARIA\***

### **Abstract**

Every organization needs finance for its functioning, survival and to strengthen its management. Finance is defined as the management of monetary affairs of a company. The time and extent of availability of finance indicates the health of the concern. Finance is not only required for a company, organization, college, school, bank but also for entrepreneurs who have a dream of setting up their own business. In order to accomplish this dream MSME sector caters to the needs of small business entrepreneurs by funding them. It is quoted by Llyod Banks that *“When you get money you’re always a target because there’s always somebody who needs money out there”* which signifies the role of money and indicates that money flows from those who have in surplus to those who need it. Keeping this in mind, MSME sector in order to facilitate flow of funds at the right time has established MUDRA( Micro Limits Development and Refinance Agency) Bank which is a non –banking financial institution which was set up by Government of India for development and refinancing micro unit enterprises. It is a statutory body which was set up as a result of Pradhan Mantri MUDRA Yojana (PMMY) which was launched by our Prime Minister Sri Narendra Modi on 8<sup>th</sup> April, 2015 announced by our Honourable Finance Minister Arun Jaitley while presenting Union Budget for the FY – 2016 – 17. It provides services to small entrepreneurs outside the service area of regular banks, by using last mile agents. The paper focuses on MSME sector, objectives, and products of Mudra Bank and concludes by sharing the success stories of individuals who were benefited by the loans provided by Mudra Bank which fulfils the aim “Funding the Unfunded”.

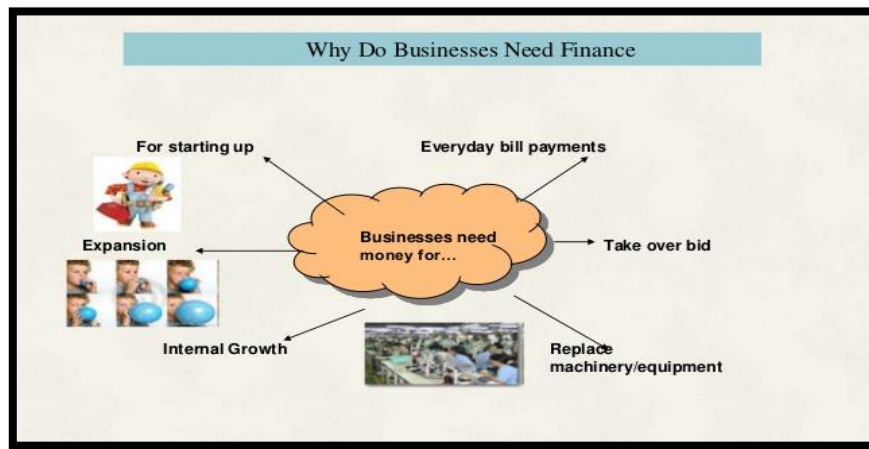
**Keywords: Survival, Micro Units, Entrepreneurs, Funding and Business.**

### **Introduction**

Finance is the life blood of an enterprise which is very important for keeping a business grows and exists. A well-established or a startup company needs flow of money in order to meet its needs. An entrepreneur’s dream or idea can’t be fulfilled without some sort of cash infusion into the business. For a start-up company, it usually starts with some investment from the stakeholders and can also include funds from friends or family members. As the business grows, ownership needs to turn to a third party for additional financing which can take the form of debt or equity financing. Each option has its own advantages and disadvantages that must be considered while assessing the cash needs of the business for both short and long-term goals.

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### Need for Finance

MSME sector is the engine of economic growth and promotes equitable development all over the world. It constitutes over 90% of the total enterprises in most of the economies and is credited for generating higher rates of employment growth and account for major share of industrial production and export. It is a significant contributor for nation's economy. MSME rapid growth is seen as Indian entrepreneurs are making remarkable progress in various industries like food processing, pharmaceuticals, textiles, garments and service sector. Small Businesses form the foundation of economic development which needs to be strengthened and supported. Most individuals, especially those living in rural and interior parts of India have been excluded from the benefits of formal banking system. Therefore, they never had access to insurance, credit, loans and other financial instruments to help them establish and grow their micro businesses. Most individuals depend on local money lenders for credit which is offered at a high interest rate and often with unbearable conditions, which make these poor people fall in a debt-trap for generations. There is a huge demand for finance from MSME sector which has increased and easy credit has helped MSME to expand, hire more people and become a larger contributor of economic growth. An initiation was taken by the Government to establish MUDRA Bank which is a financial institution that provides loan to microfinance institution and NBFI which then provide credit to MSME. It was set up under Pradhan Mantri Mudra Yojana (PMMY) Scheme which provides loan up to 10 Lakhs to non – corporate, non – farm small /micro enterprises. These loans are provided by Commercial Banks Regional Rural Banks, Co-operative Banks, MFI's and NBFC's .Only 4 % businesses get financed from regular banks whereas MUDRA bank ensures that loans are granted to their clients with responsibility without falling into indebtness.

### Categories of PRADHAN MANTRI MUDRA YOJANA

The micro units are further classified based on their growth stage, development and funding requirements. The three categories are as follows:

- 1. Shishu (Child) Category:** This category is for the start-ups that have just started out and are looking for loan. Loan cover offered to this category of micro units is Rs.50,000.
- 2. Kishor Category:** This is the category where the business has started but it is yet to be established. The loan cover offered to this category ranges from Rs.50,000 to Rs.5 lakh.

**3. Tarun Category:** The businesses that have started and established themselves fall under this category. The loan might be to expand their business or to buy assets. The loan cover offered to this category ranges from Rs.5 lakhs to Rs.10 lakhs.



### Mudra Offerings

Mudra refinances all banks, Microfinance institutions and other lending institutions which are in the business of lending to Micro/Small business entities engaged in manufacturing, trading and service sectors. MUDRA strengthens last mile financial institutions by extending refinance and other development support to expand their outreach.

### Objectives of Mudra Bank

- ✓ To extend finance and credit support to MFI and agencies that lend money to small business, self Help Groups and retailers.
- ✓ To provide structured guidelines for borrowers to follow to avoid failure of business and lenders to recover money in case of default.
- ✓ Regulate lenders and borrowers of Micro Finance.
- ✓ Offer Credit Guarantee Scheme for providing guarantee of loans being offered to Micro Business.
- ✓ Introduce appropriate technologies to assist in the process of efficient lending, borrowing and monitoring distributed capital.

### Eligibility Criteria to Avail Mudra Loan (PRADHAN MANTRI MUDRA YOJANA)

The borrowers must be from the following Non-corporate Small Business Segment:

- Proprietorship
- Partnership firms
- Small manufacturing units
- Service sector units
- Shopkeepers
- Fruit or vegetable vendors
- Truck operators
- Food service units
- Repair shops
- Machine operators
- Small industries
- Food processors
- Other industries in rural and urban areas.



### **Funding Support Offered By Mudra**

MUDRA offers four distinct types of funding assistance and support:-

- **Micro Credit Scheme (MCS)**

This particular support is offered by MUDRA to various micro enterprises via MFIs (Micro Financial Institutions). Under this they offer support with a credit limit of Rs 1 lakh to enterprises so they can undertake all enterprise related activities. The funding support is also offered via JLG and SHG in the form of loan amounts to help them take care of their enterprise activities.

- **Refinance Schemes**

Various corporative banks (Scheduled), regional rural banks and Commercial banks are valid to seek refinance support via MUDRA. This assistance is offered to them in the form of capital and term loan amount. The amount given is equivalent to around Rs 10 lakh for each unit. All registered banks and financial institutions can request for support under any three categories offered.

- **Women Enterprise Program**

This scheme is offered with an aim to encourage women entrepreneurs. They are offered with extra facilities from banks and institutions. The interest rate offered is also low with a reduction equivalent to 25bps, given to the financing banks.

- **Loan Portfolio Securitization**

Support is also offered by MUDRA to various banks/ MFIs/NBFCs for making the funds available for loan. All their assets are also secured by MUDRA and provide them with loss default guarantee. At the same time it provides with PTC (pass through certificates) for the investors.

### **Innovative Offerings**

#### **1) MUDRA Card**

MUDRA Card is an innovative product which provides working capital facility as a cash credit arrangement. MUDRA Card is a debit card issued against the MUDRA loan account, for working capital portion of the loan. The borrower can make use of MUDRA Card in multiple withdrawal and credit so as to manage the working capital limit in a most efficient manner and keep the interest burden minimum. This Card will also help in digitalization of MUDRA transactions and creating credit history for the borrower and can be operated across the country for withdrawal of cash from any ATM / micro ATM and also make payment through any 'Point of Sale' machines.

#### **2) Portfolio Credit Guarantee**

To mitigate the issue of collaterals, MUDRA is offering a Credit Guarantee Product. MUDRA Credit Guarantee is extended by creation of a Fund called "**Credit Guarantee Fund for Micro Units**" [CGFMU]. Under this Credit Guarantee or Risk Sharing is provided for a portfolio of homogenous loans instead of a Scheme for individual loan by loan guarantee. This is expected to create administrative efficiencies and increase receptiveness for the Credit Guarantee product. The Guarantee product is one of the key interventions proposed with the objective of bringing down the cost of funds for the end beneficiary to improve its creditworthiness.

#### **3) Underwriting for Intermediaries**

It is necessary that the intermediaries and last mile financiers which have the real expertise in funding the NCSB sector have access to a steady flow of long term debt capital at a

reasonable cost to smoothly continue their on lending activities as also scale up sustainably.

**4) Business / Banking Correspondent Model**

To capitalize on expertise in lending and collections developed by intermediaries / last mile financiers in the small / informal business segment to meet their capital requirements, a product for lending through the Business / Banking Correspondent Model is envisaged.

**Literature Surveys**

**I C.B.Bhave (2010)** In his opinion MSME's are a catalyst in most of the economies and constitute a major part of the industrial activity. MSME's generally face financial crisis. He foresees that the SME Stock Exchange will be a great boon to this sector as it will provide a wide pool of capital, increased status and credibility and other benefits.

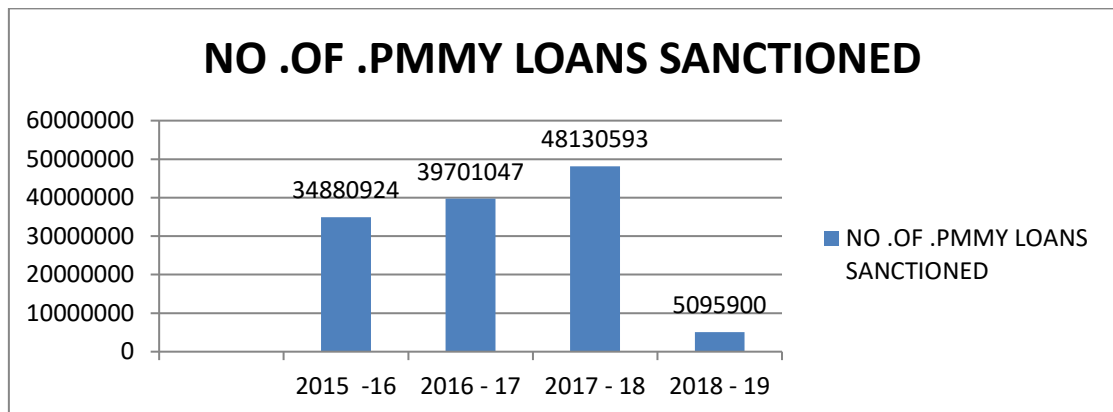
**II SME Chamber of India (2011)** SMEs are now exposed to greater opportunities than ever for expansion and diversification across the sectors. Indian market is growing rapidly and Indian entrepreneurs are making remarkable progress in various Industries like Manufacturing, Precision Engineering Design, Food Processing, Pharmaceutical, Textile & Garments, Retail, IT and ITES, Agro and Service sector.

**III Jalan Bimal (2003)** opined that micro credit institutions and SHGs have been recognized as an important vehicle for generation of income and delivery of credit to self-employed persons. The Reserve Bank has been emphasizing on the flow of bank credit to microenterprises in rural and semi-urban areas initiated in this regard and banks to be advised to provide maximum support to SHGs. Further, in order to put in place a more vibrant micro finance delivery environment, the RBI had a widening interface with a cross section of micro-finance providers. Pursuant to these interactions, four informal groups have been set up by RBI to look into various issues relating to structure and sustainability, Funding, Regulations, and Capacity building for micro finance delivery.

**IV According to the NSSO Survey of 2013**, there are 5.77 crore small business units, mostly individual proprietorships, which run small manufacturing, trading or services activities. Many of these own account enterprises' are owned by people belonging to Scheduled Caste, Scheduled Tribe or Other Backward Classes. However, only 4% of such units get institutional finance. Providing access to institutional finance to such micro/small business units would turn them into strong instrument of GDP growth and also employment.

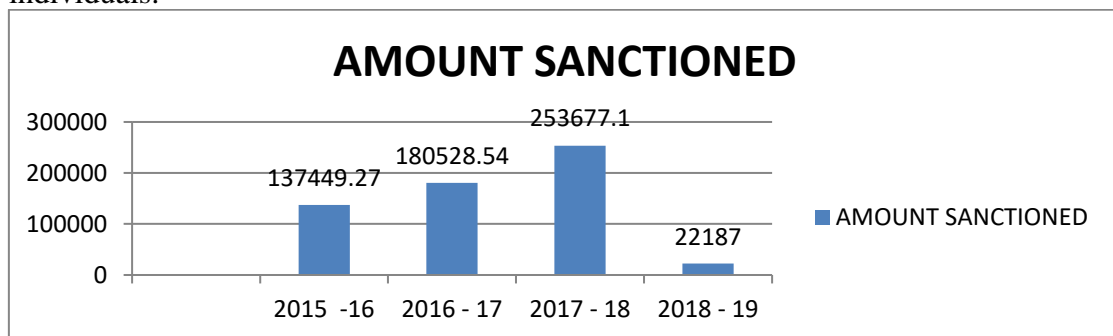
**ACHIEVEMENT UNDER PMMY (2015- 16 to 2018- 19)**

	<b>ACHIEVEMENT UNDER PMMY SINCE INCEPTION</b>			
<b>FINANCIAL YEARS</b>	<b>2015 -16</b>	<b>2016 - 17</b>	<b>2017 - 18</b>	<b>2018 - 19</b>
<b>NO .OF .PMMY LOANS SANCTIONED</b>	<b>34880924</b>	<b>39701047</b>	<b>48130593</b>	<b>5095900</b>
<b>AMOUNT SANCTIONED</b>	<b>137449.27 CRORES</b>	<b>180528.54 CRORES</b>	<b>253677.10 CRORES</b>	<b>22187 CRORES</b>
<b>AMOUNT DISBURSED</b>	<b>132954.73 CRORES</b>	<b>175312.13 CRORES</b>	<b>246437.40 CRORES</b>	<b>19621.72 CRORES</b>



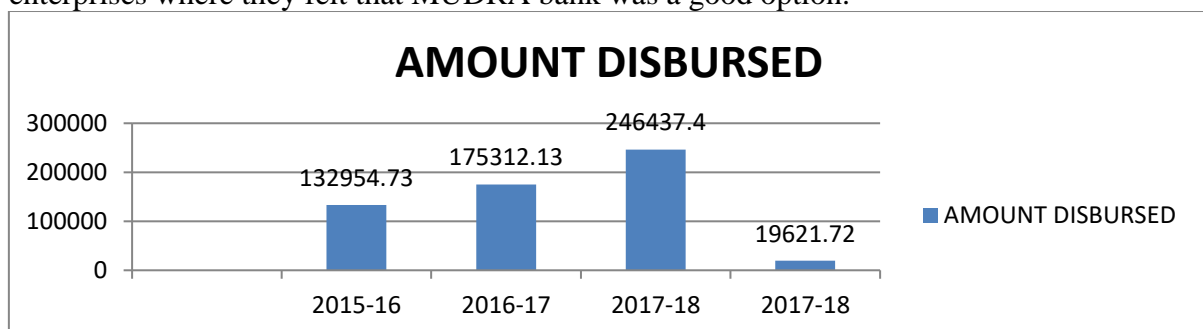
#### Interpretation

From the above graph we infer that No. of PMMY loans sanctioned has increased from its inception as there was awareness created about MUDRA Bank and its schemes to individuals.



#### Interpretation

From the above graph we infer that the amount sanctioned under PMMY has shown an increasing trend for first three years as there was huge demand for individuals to set up enterprises where they felt that MUDRA bank was a good option.



#### Interpretation

From the above graph we infer that the amount disbursed has risen as years progressed which indicates that loans granted have been used for the purpose of developing a business enterprise.

**YEARWISE PROGRESS OF PMMY IN TELANGANA STATE FROM 2015-16 TO**

**Pradhan Mantri MUDRA Yojana (2015-2016) - Telangana**

*[Amount Rs. in Crore]*

Shishu (Loans up to Rs. 50,000)			Kishor (Loans from Rs. 50,001 to Rs. 5.00 Lakh)			Tarun (Loans from Rs. 5.00 to Rs. 10.00 Lakh)			Total		
No Of San ctio ns	San ctio ned Amt	Disbu rsem ent Amt	No Of San ctio ns	San ctio ned Amt	Disbu rsem ent Amt	No Of San ctio ns	San ctio ned Amt	Disbu rsem ent Amt	No Of San ctio ns	San ctio ned Amt	Disbu rsem ent Amt
286 985	612. 17	588.3 7	986 75	2082 .34	2014. 98	151 01	1140 .04	1090. 99	400 761	3834 .55	3694. 34

**2018-19**

**Pradhan Mantri MUDRA Yojana (2016-2017) - Telangana**

*[Amount Rs. in Crore]*

Shishu (Loans up to Rs. 50,000)			Kishor (Loans from Rs. 50,001 to Rs. 5.00 Lakh)			Tarun (Loans from Rs. 5.00 to Rs. 10.00 Lakh)			Total		
No Of San ctio ns	San ctio ned Amt	Disbu rsem ent Amt	No Of San ctio ns	San ctio ned Amt	Disbu rsem ent Amt	No Of San ctio ns	San ctio ned Amt	Disbu rsem ent Amt	No Of San ctio ns	San ctio ned Amt	Disbu rsem ent Amt
379 247	884. 03	867.4 2	864 16	1705 .71	1651. 17	170 31	1288 .64	1261. 90	482 694	3878 .38	3780. 49

**Pradhan Mantri MUDRA Yojana (2017-2018) - Telangana**

*[Amount Rs. in Crore]*

Shishu (Loans up to Rs. 50,000)			Kishor (Loans from Rs. 50,001 to Rs. 5.00 Lakh)			Tarun (Loans from Rs. 5.00 to Rs. 10.00 Lakh)			Total		
No Of San ctions	San ction ed Amt	Disbu rsem ent Amt	No Of San ctions	San ction ed Amt	Disbu rsem ent Amt	No Of San ctions	San ction ed Amt	Disbu rsem ent Amt	No Of San ctions	San ction ed Amt	Disbu rsem ent Amt
637 258	1534 .28	1523. 82	121 014	2742 .36	2668. 37	310 43	2268 .63	2238. 61	789 315	6545 .26	6430. 81

**Pradhan Mantri MUDRA Yojana (2018-2019 Provisional) - Telangana**

*[Amount Rs. in Crore]*

Shishu (Loans up to Rs. 50,000)			Kishor (Loans from Rs. 50,001 to Rs. 5.00 Lakh)			Tarun (Loans from Rs. 5.00 to Rs. 10.00 Lakh)			Total		
No Of San ctions	San ction ed Amt	Disbu rsem ent Amt	No Of San ctions	San ction ed Amt	Disbu rsem ent Amt	No Of San ctions	San ction ed Amt	Disbu rsem ent Amt	No Of San ctions	San ction ed Amt	Disbu rsem ent Amt
637 258	1534 .28	1523. 82	121 014	2742 .36	2668. 37	310 43	2268 .63	2238. 61	789 315	6545 .26	6430. 81

**Interpretation**

From the above tables we infer that individuals have mostly opted and availed Shishu (Loans Upto 50,000) which indicates small businesses have been set up and next in order is Kishor (Loans from 50,001 to 5,00,000) which is used to set up moderate business and least availed is Tarun (Loans from 5,00,000 to 10,00,000) availed by those who wish to set up huge business with higher risk.

**Success Stories of People Benefited By Availing Mudra Loan**

**I JASPREET KAUR, 26**, took a loan of Rs 50,000 from State Bank of India (SBI) to add women's cosmetic products to her family's existing shop selling ready-made garments.



She deposits an equated-monthly installment or EMI of Rs 1,250 for the loan. After adding the cosmetic products, Kaur says her monthly earnings increased by Rs 1,000. Right now, she deposits her EMI in cash at the CB Ganj branch of SBI in Bareilly and plans to get an auto debit done in future. "Bank ko loan amount zyada dena chahiye. (Bank should increase the loan amount)," Kaur says.

**II SHIV NANDAN, 35**, runs a shoe manufacturing unit in Chandausi in Sambhal district, nearly 70 kilometer from Bareilly. He took a Mudra loan of Rs 2 lakh from PNB and repays an installment of around Rs 2,000 per month. A resident of Bareilly, Nandan says that the loan helped him expand production at his unit and he could manage a turnover of Rs 7-8 lakh last year. From daily manufacturing of 16-24 pair of shoe earlier, he increased the production to 48-60 pair of shoes in a day. Branded as Z-Lee shoes, these are priced in the range of Rs 250-600 per pair, giving him a profit margin of around 25-30 per cent. To build a transaction history, which will help him take loan of a higher amount in future, Nandan says that he has been doing over 50 per cent of his receipts and payments transactions online.

**III MUNAWWAR KHAN, 28**, makes wood furniture and has taken a loan of Rs 50,000 for his business from one of the SBI's branches in Bareilly. Khan, having an EMI of Rs 1,250, has been irregular in his repayment of the loan, a branch officer dealing with his loan says. When asked why he took the loan, Khan says, "Zaroorat thi bhi, nahin bhi thi, bass loan ho Gaya. (I felt like taking the loan and not taking the loan, but ended up taking it)." The loan benefits big business but is not of much help for micro entrepreneurs, he says. "Bankon ko byaz dar ghatani chahiye. Payment 2-3 din late hi jaata hai to penalty lag jaati hai (Banks should reduce their interest rate. If loan repayment is delayed by 2-3 days, then banks impose a penalty)," he says

**IV An unemployed youth, Rajkumar** Bangkimchandra was living in Imphal west of State of Manipur. From his early childhood, he had a hobby of making dolls and toys. By nature, Rajkumar was a creative and a hardworking person. He kept all his collection of dolls and toys in a small unit at his house. But, there was nobody to guide him to turn his creativity into business. Being unemployed and illiteracy took a toll on his livelihood. One day one of his friends informed him about Prime Minister Mudra Yojana and asked him to approach a bank. Rajkumar enquired about the formalities of the loan with the State Bank of India, Singjamei. Thereafter, for some days he kept quiet moving nothing to get Mudra Loan. Realising his lack of response, the bank approached Rajkumar and made him aware of how he can develop his creativity into business and guided him to get the Mudra Loan under Shishu category. Thereafter, Rajkumar fulfilled the bank formalities and got a loan of ` 30,000/-. With that amount he hired a place and started making beautiful dolls, toys and statues. Today, Rajkumar's Doll and Toy making business is developing rapidly and now the demand for his goods also comes from outside Manipur. He successfully runs his business with a turnover of ` 15,000/- to ` 20,000/- per month. Rajkumar takes part in many exhibitions in the state of Manipur also in the Trade Fair held at Delhi. His work is greatly appreciated by everybody, thanks to PMMY Mudra Yojana for unearthing such an exceptional talent and creativity.

### **Conclusion**

Banking services are not available in the remote areas; people those who are in need of money, usually take loans from money lenders who exploit them by charging a very high interest which surely affects the upliftment of the small business sectors. The main target

of the Mudra bank is to reach those people and serve them, who are in great needs of a banking service like saving accounts, loan, credit cards and some other special benefits. The biggest potential advantage of the Mudra Bank programme is that it can help a large number of countless entrepreneurs across the country by providing financial support. Which is such an important component in their existence and eventual success. This will surely make a difference and hence the Indian economy will also start rising. It is not only that the large business and dealers who are the main source of the Indian economy. Even the smallest of them can affect the whole Indian economy. MSME sector has slowly come into limelight with increased focus from Government which have developed strategies to promote and support MSME sector and is viewed as one of the greatest agents of growth now.

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## **Environmental Conservation Policies, Programmes and Legislations in India**

**Dr. I. Sundar\***

### **Abstract**

In the Directive Principles of State Policy, Article 48 says "the state shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country"; Article 51-A states that "it shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures. This paper deals with environmental conservation policies, programmes and legislations in India. It outlines the various government schemes on environmental conservation and their implications. This paper makes a special note on environmental conservation policies and legislations in India and their implications. This paper concludes with some interesting findings along with policy suggestions.

### **Introduction**

There are many environmental issues in India. Air pollution, water pollution, garbage and pollution of the natural environment are all challenges for India. Nature is also causing some drastic effects on India. The situation was worse between 1947 through 1995. According to data collection and environment assessment studies of World Bank experts, between 1995 through 2010, India has made some of the fastest progress in addressing its environmental issues and improving its environmental quality in the world. Still, India has a long way to go to reach environmental quality similar to those enjoyed in developed economies. Pollution remains a major challenge and opportunity for India.

Ramesha Chandrappa and Ravi.D.R (2009), report that major Indian environmental issues are forest and agricultural degradation of land, resource depletion such as water, mineral, forest, sand, and rocks, environmental degradation, public health, loss of biodiversity, loss of resilience in ecosystems, livelihood security for the poor. As per the report by Milind Kandlikar, Gurumurthy Ramachandran (2000), Tripathi, Anshuman; Mishra, Rajesh Kumar; Bouskill, Nik; Broadway, Susan C.; Pyle, Barry H.; Ford, Timothy E.; et al. (2006), Sushil and Batra; Batra, V (2006), the major sources of pollution in India include the rapid burning of fuel wood and biomass such as dried waste from livestock as the primary source of energy, lack of organized garbage and waste removal services, lack of sewage treatment operations, lack of flood control and monsoon water drainage system, diversion of consumer waste into rivers, cremation practices near major rivers, government mandated protection of highly polluting old public transport, and continued operation by government owned, high emission plants built between 1950 and 1980.

European External Action Service, European Union. (2007), reports that air pollution, poor management of waste, growing water scarcity, falling groundwater tables, water pollution, preservation and quality of forests, biodiversity loss, and land/soil degradation are some of the major environmental issues India faces today. India's population growth adds pressure to environmental issues and its resources. Rapid urbanization has caused a buildup of heavy metals in the soil of the city of Ghaziabad, and these metals are being ingested

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through contaminated vegetables. Heavy metals are hazardous to people's health and are known carcinogens.

### **Environmental Conservation Programmes**

The National Environmental Awareness Campaign was launched in 1986 with the objective of creating environmental awareness at the national level. In this campaign, nominal financial assistance is provided to NGOs, schools, colleges, universities, research institutes, women and youth organizations', army units, government departments etc. from all over the country for conducting awareness raising and action oriented activities. Thirty four Regional Resource Agencies appointed by the Ministry of environment, Forest and Climate Change are involved in conducting, supervising and monitoring the National Environmental Awareness Campaign activities.

### **Biosphere Reserve**

Biosphere reserves are sites established by countries and recognized under UNESCO's Man and the Biosphere (MAB) Programme to promote sustainable development based on local community efforts and sound science. The programme of Biosphere Reserve was initiated by UNESCO in 1971. The purpose of the formation of the biosphere reserve is to conserve in situ all forms of life, along with its support system, in its totality, so that it could serve as a referral system for monitoring and evaluating changes in natural ecosystems. Accordingly India has 18 notified biosphere reserves in India

### **Integrated Development of Wildlife Habitats**

The Government of India provides financial and technical assistance to the State/UT Governments for activities aimed at wildlife conservation through the Centrally Sponsored Scheme viz. 'Integrated Development of Wildlife Habitats'. The scheme has following three components: Support to Protected Areas such as National Parks, Wildlife Sanctuaries, Conservation Reserves and Community Reserves, Protection of Wildlife outside Protected Areas and Recovery programmes for saving critically endangered species and their habitats.

### **Recovery Programme for Critically Endangered Species and Habitats**

This programme aims at recovering the critically endangered species in the country. Initially 17 species have been identified under this component. These are Snow Leopard, Bustard (including Floricans), Dolphin, Hangul, Nilgiri Tahr, Marine Turtles, Dugongs, Edible Nest Swiftlet, Asian Wild Buffalo, Nicobar Megapode, Manipur Brow-antlered Deer, Vultures, Malabar Civet, Indian Rhinoceros, Asiatic, Lion, Swamp Deer and Jerdon's Courser.

### **National Wetland Conservation Programme**

Government of India operationalized National Wetland Conservation Programme in closed collaboration with concerned State Government during the year 1985 - 1986. Under the programme 115 wetlands have been identified till now by the Ministry of Environment, Forest and Climate Change which requires urgent conservation and management initiatives. This scheme aims at conserving and wise use of wetlands in the country so as to prevent their further degradation. The objectives of the Scheme include: to lay down policy guidelines for conservation and management of wetlands in the country; - to undertake intensive conservation measures in priority wetlands; - to monitor implementation of the programme; and - to prepare an inventory of Indian wetlands.

### **National Afforestation Programme**

As per 10th Plan document of Planning Commission relating to the Forests and Environment sector, the National Afforestation Programme Scheme was initiated by scaling-up the Samnavit Gram Vanikaran Samridhi Yojana project experience and converging all afforestation schemes of the 9th Plan period to avoid duplicity or redundancy, and at the same time keeping in focus the decentralization agenda of the government. National Afforestation Programme is being operated as a 100% Central Sector Scheme. The overall objective of the scheme is to develop the forest resources with people's participation, with focus on improvement in livelihoods of the forest-fringe communities, especially the poor. National Afforestation Programme Scheme aims to support and accelerate the ongoing process of devolving forest protection, management and development functions to decentralized institutions of Joint Forest Management Committee at the village level, and Forest Development Agency at the forest division level.

### **National Mission for Green India**

National Mission for Green India is one of the eight Missions outlined under the National Action Plan on Climate Change. It aims at protecting; restoring and enhancing India's diminishing forest cover and responding to climate change by a combination of adaptation and mitigation measures. It envisages a holistic view of greening and focuses on multiple ecosystem services, especially, biodiversity, water, biomass, preserving mangroves, wetlands, critical habitats etc., along with carbon sequestration as a co-benefit. This mission has adopted an integrated cross-sectoral approach as it will be implemented on both public as well as private lands with a key role of the local communities in planning, decision making, implementation and monitoring.

### **National Green Corps**

National Green Corps is a major initiative of Ministry of Environment Forest and Climate Change for creating environmental awareness launched in 2001-02 which aims at building cadres of young children working towards environmental conservation and sustainable development. The phenomenal response that National Green Corps has received and has made the network more than 100000 Eco clubs across the country. It is one of the largest conservation networks that indicate its importance at grass root level in taking the environment awareness at mass.

The unique partnership between the Ministry of Environment Forest and Climate Change, the state Government agencies along with the dedicated NGOs, working in the field of Environmental Education has contributed to the success of the programme. It is operated through Eco-clubs set up in schools registered as members of National Green Corps; this programme exposes school children to in-depth field experiences, and provides opportunities to convert their ideas into creative action.

The programme has a cascading effect, seeks to redirect the consciousness of students towards environment friendly attitudes and actions and goes beyond schools, promoting school-society interactions to sensitize the society. Also in order to strengthen monitoring mechanism of National Green Corps programme, Ministry of Environment Forest and Climate Change is in process to establish Management Information system which will open up vistas in sharing and accessing the information on NGC among all stakeholders. The Management Information system reporting and monitoring would be interactive and creative in ensuring National Green Corps mobility and services.



### **Eco-Development Forces Scheme**

The Scheme was initiated by the Ministry of Defence in 1982 with a view to securing involvement of ex-servicemen in afforestation and eco-development in remote and difficult areas to undertake restoration of degraded ecosystems through afforestation, soil conservation and water resource management techniques. The scheme also serves as a mechanism to rehabilitate the ex-servicemen for productive work and to create employment for retired army personnel mainly in the rural areas. The Scheme has been in operation for last four Five Year Plans. Therefore, the basic requirements with regard to procedural and financial aspects stand fulfilled. Eco task force battalions work under the scheme. The progress of the Eco- Task Force Battalions is being closely reviewed jointly by Ministry of Defence and Ministry of Environment Forest and Climate Change.

### **Environmental Impact Assessment**

Environmental Impact Assessment is an important management tool for ensuring optimal use of natural resources for sustainable development. A beginning in this direction was made in India with the impact assessment of river valley projects in 1978-79 and the scope has subsequently been enhanced to cover other developmental sectors such as industries, thermal power projects, mining schemes etc. To facilitate collection of environmental data and preparation of management plans, guidelines have been evolved and circulated to the concerned Central and State Government Departments. Environmental Impact Assessment has now been made mandatory under the Environmental (Protection) Act, 1986 for 29 categories of developmental activities involving investments of Rs.50crores and above.

### **Policies to Protect Environment in India**

Many policies have been framed by the government of India towards protection of environment, ecosystem and biodiversity. Hence there is a need to review their content and implications of such policies.

### **Environment Protection Act, 1986**

In the wake of Bhopal tragedy, the Government of India enacted the Environment (Protection) Act, 1986 (EPA) under article 253 of the constitution. The purpose of the Act is to act as an "umbrella" legislation designed to provide a frame work for Central government co-ordination of the activities of various central and state authorities established under previous laws, such as Water Act and Air Act. The potential scope of the Act is broad, with "environment" defined to include water, air and land and the inter-relationships which exist among water, air and land, and human beings and other living creatures, plants, micro-organisms and property. Environment protection rules were also enacted as a corollary to this Act.

### **National Conservation Strategy and Policy Statement on Environment and Development, 1992**

The National Conservation Strategy and the Policy Statement on Environment and Development are in response to the need for laying down the guidelines that will help to weave environmental considerations into the fabric of our national life and of our development process. It is an expression of India's commitment for reorienting policies and action in unison with the environmental perspective. It talks about the nature and dimensions of the environmental problems, actions taken in response to the problems and lists out priorities and strategies for action. It also views development policies from environmental perspectives and the support policies and systems required.

### **Policy Statement for the Abatement of Pollution, 1992**

The objective of this document is to integrate environmental considerations into decision-making at all levels. To achieve this, the document lays down steps to be taken to prevent pollution at source, encourage, develop and apply the best available practicable technical solutions.

The Policy Statement for Abatement of Pollution, adopted in 1992 lays emphasis on pollution prevention in place of the conventional end-of-the-pipe treatment also identified the adoption of best available and practicable technologies as the key element for pollution prevention. The focus of the various programmes and schemes of the Ministry and its associated organizations related to pollution prevention and control is, therefore, on such issues such as promotion of clean and low waste technologies, waste minimization, reuse or recycling, improvement of water quality, environment audit, natural resource accounting, development of mass based standards, institutional and human resource development etc. The whole issue of pollution prevention and control is dealt with by a combination of command and control methods as well as voluntary regulations, fiscal measures, promotion of awareness etc.

### **National Environment Policy, 2006**

A diverse developing society such as India provides numerous challenges in the economic, social, political, cultural, and environmental arenas. All of these coalesce in the dominant imperative of alleviation of mass poverty, reckoned in the multiple dimensions of livelihood security, health care, education, empowerment of the disadvantaged, and elimination of gender disparities. The present national policies for environmental management are contained in the National Conservation Strategy and Policy Statement on Environment and Development 1992, Policy Statement on Abatement of Pollution 1992, National Agriculture Policy 2000, National Population Policy 2000 and National Water Policy, 2002 have also contributed towards environmental management. All of these policies have recognized the need for sustainable development in their specific contexts and formulated necessary strategies to give effect to such recognition.

The National Environment Policy seeks to extend the coverage, and fill in gaps that still exist, in light of present knowledge and accumulated experience. It does not displace, but builds on the earlier policies. Sustainable development concerns in the sense of enhancement of human well-being, broadly conceived, are a recurring theme in India's development philosophy. The present day consensus reflects three foundational aspirations. First, that human beings should be able to enjoy a decent quality of life; second, that humanity should become capable of respecting the finiteness of the biosphere; and third, that neither the aspiration for the good life, nor the recognition of biophysical limits should preclude the search for greater justice in the world. The National Environment Policy is also a response to India's commitment to a clean environment, mandated in the Constitution in Articles 48 A and 51 A (g), strengthened by judicial interpretation of Article 21. It is recognized that maintaining a healthy environment is not the state's responsibility alone, but also that of every citizen. A spirit of partnership should thus be realized throughout the spectrum of environmental management in the country. While the state must galvanize its efforts, there should also be recognition by each individual – natural or institutional, of its responsibility towards maintaining and enhancing the quality of the environment.

### **Draft National Forest Policy, 2016**

The Ministry of Environment Forests and climate change has released the draft of India's new National Forest Policy replacing the one crafted in 1988. It is drafted by the Indian Institute of Forest Management, the research arm of the environment ministry. It has proposed the levy of a green tax; it addresses the issue of human-animal conflict. Incorporating consequences of climate change but entirely ignoring one of the three forest related laws, the Forest Rights Act, the policy brings new focus to Plantations, Growing trees outside forest lands and Wood industry. The policy continues with the national goal of a minimum of one-third of the geographical area under forest or tree cover. But it does away with the goal for hill and mountainous regions to maintain two-thirds of the geographical area under forest cover.

### **Vision Statement on Environment and Health**

The purpose of vision document was to evolve a strategy of health-risk reduction arising from environment pollution would help the implementing agencies to revise the environmental and industry specific actions. Ministry of Environment Forests and climate change had constituted a Committee on Environment and Health in July, 1999 and the report was submitted in May, 2000. The Report of the "Committee on Environment and Health" brought out issues requiring attention of various stakeholders. The "Conference on Environmental Health" organized by Ministry of Environment Forests and climate change in November, 2002 also brought out thrust areas and action points that need to be implemented for protection of public health.

The environment in which we live greatly influences our health. The household, workplace, outdoor and indoor environments may pose risks to health in a number of different ways. The poor quality of air which we may breathe, the contaminated water we may drink and the surroundings in which we live, determine our quality of life. While the genetic factors may also be responsible for causing diseases but the environmental factors play much more active role in contracting various diseases. The key purpose of this Vision Statement on Environment and Human Health is to evolve a strategy for health risk reduction. It also offers a comprehensive approach to the environmental health management plans, which would be a systematic approach to estimate the burden of disease and injury due to different environmental pollutants. Therefore, the activities and programmes required to be taken up for the protection of the public health due to environmental pollution are also given in this statement in the form of a road map.

### **Legislations and Rules for the Protection of Environment in India**

Much legislation has been framed by the government of India towards protection of environment, ecosystem and biodiversity. Hence there is a need to analysis the content and implications of such legislations.

### **The Water (Prevention and Control of Pollution) Act, (1974) Amended in 1988**

This was enacted to provide for the prevention and control of water pollution, and for the maintaining or restoring of wholesomeness of water in the country. The Central and State Pollution Control Boards have been constituted under section 3 and 4 of the Act respectively. The Act was amended in 1978 and 1988 to clarify certain ambiguities and to vest more powers in Pollution Control Board. Salient items and obligations on the part of industries and local bodies are: To obtain prior consent to establish industry for new discharge U/S 25 of the Act. This is mandatory for every industry/local body discharging any domestic sewage or trade effluent into water, stream, well, sewer or on land. For this

purpose consent application has to be filed with State Pollution Control Board in form XIII complete in all respects along with prescribed consent fee.

Once after obtaining the consent to establish and installing all facilities as communicated by the industry, the industry shall apply for consent to operate U/S 25 of the Act for which same form XIII has to be used. Similar provisions of application and grant of consent exists for industries discharging the trade/effluent waste prior to enactment of the Act [U/S 26 of the Act]. The Water (Prevention and Control of Pollution) Cess Act, 1977 and amended in 1992 and 2003. This was enacted to provide for the levy and collection of a cess on water consumed by persons operating and carrying on certain types of industrial activities. This cess is collected with a view to augment the resources of the Central Board and the State Boards for the prevention and control of water pollution constituted under the Water (Prevention and Control of Pollution) Act, 1974. The Act was last amended in 2003.

#### **The Air (Prevention and Control of Pollution) Act (1981) and Amended in 1987**

This is an act to provide for the prevention, control and abatement of air pollution in the country so as to preserve the quality of air. Central and State Boards constituted under section 3 and 4 of Water (Prevention and Control Pollution) Act, 1974 were deemed also as Central and State Boards for Prevention and Control of Air Pollution. The salient features of the act are:

- The Act is applicable to whole India.
- U/S 19 of the Act, the State Gov. in consultation with State Pollution Control Board is vested with power to declare Air Pollution Control Area in which provisions of the Act shall be applicable.
- As per provisions in Sec. 21 (1) & (2), no person can establish or operate any industrial plant without the previous consent of State Pollution Control Board. Every application for consent shall be made in Form-I and shall be accompanied by prescribed fee.
- Within a period of four months after the receipt of application, the Board shall complete the formalities to either grant, or refuse consent. During the course of processing consent application, Board may seek any information about the industry after giving notice in Form II.
- U/S 22, 22 (A) operating any industrial plant so as to cause emission of any air pollutant in excess of standard laid down by state Board is liable for litigation by the board.
- Besides providing consultation to State Government for declaring or restricting areas as Air Pollution Control Area, State Board is vested powers of entry and inspection, power to take samples, power to give direction etc.: State Board may issue any direction to any person or authority.

#### **The Environment (Protection) Act (1986) and Amended in 1991**

Against the backdrop of the United Nations Conference on the Human Environment held at Stockholm in June 1972, in which India was a participant, the Central Government enacted a legislation, 'The Environment (Protection) Act, 1986', with an objective for protection and improvement of the environment and for matters connected therewith. As per this Act, the Central Government shall have the power to take all such measures for the purpose of protecting and improving the quality of the environment and to prevent environmental pollution. Further, the Central Government shall have the power to give directions in writing to any person or officer or any authority for any of the purposes of the Act, including the power to direct the closure, prohibition or regulation of any industry,

operation or process. No person carrying on an industry, operation or process shall discharge or emit any environmental pollutant in excess of standards prescribed by the Government. Further, persons handling with hazardous substances shall comply with the procedural safeguards as may be prescribed by the authorities.

As per the Act where the discharge of any environmental pollutant in excess of prescribed standard occurs, or is apprehended to occur due to any accidental or other unforeseen act or event, the person responsible for such discharge shall be bound to prevent or mitigate the pollutant so caused as well as intimate the fact of such occurrence to the concerned authorities. The Central Government or any other officer empowered by the Central Government shall have the powers to take the samples of air, water, soil or any other substances from any factory, premises, etc., for the purpose of analysis. For the purposes of protecting and improving the quality of the environment and preventing and abetting environmental pollution, standards of emission or discharge of environmental pollutants from the industries, operations or processes are specified in Schedules 1 to IV of the Environment (Protection) Rules.

#### **The Wildlife (Protection) Act (1972) Amended in 1993 in 2002 and 2006**

This act was enacted with the objective of effectively protecting the wild life of this country and to control poaching, smuggling and illegal trade in wildlife and its derivatives. The Act was amended in January 2003 and punishment and penalty for offences under the Act have been made more stringent. It provides a powerful legal framework for prohibition of hunting, protection and management of wildlife habitats, establishment of protected areas, regulation and control of trade in parts and products derived from wildlife etc. Specifically it provides for creation of a network of Protected Areas consisting of National Parks, Wildlife Sanctuaries, Tiger Reserves, Conservation Reserves and Community Reserves. No wild mammal, bird, amphibian, reptile, fish, crustacean, insects, or coelenterates listed in four Schedules of the Act can be hunted either within or outside protected areas. On conviction, the penalty for hunting is imprisonment for a period ranging from a minimum of three to a maximum of seven years with fines not less than 10,000 rupees. It prohibits the destruction or diversion of wildlife and its habitat by any method unless it is for improvement or better management and this is decided by the state government in consultation with the National and State Boards for Wildlife. The 2006 amendment introduced a new chapter (IV B) for establishment of the National Tiger Conservation Authority and notification of Tiger Reserves. The Wildlife Crime Control Bureau (WCCB) was constituted vide the 2006 amendment to monitor and control the illegal trade in wildlife products. The act provides for investigation and prosecution of offences in a court of law by authorized officers of the forest department and police officers.

#### **The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006**

The Act seeks to recognize and vest the forest rights and occupation in forest land in forest dwelling Scheduled Tribes and other traditional forest dwellers who have been residing in such forests for generations but whose rights could not be recorded. The Act was notified for operation with effect from 31.12.2007. The Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Rules, 2008 for implementing the provisions of the Act were notified on 1.1.2008. The Ministry of Tribal Affairs is to ensure that the intended benefits of this welfare legislation flow to the eligible forest dwellers, has



also issued comprehensive guidelines to the State/UT Governments on 12.7.2012 for better implementation of the Act.

### **Forest (Conservation) Act (1980) and amended in 1988**

In order to check rapid deforestation due to forestlands being released by state governments for agriculture, industry and other development projects allowed under the Indian Forest Act the central government enacted the Forest Conservation Act in 1980 with an amendment in 1988. The Act made the prior approval of the central government necessary for de-reservation of reserved forests, logging and for use of forestland for non-forest purposes. This powerful legislation has, to a large extent, curtailed the indiscriminate logging and release of forestland for non-forestry purposes by state governments.

### **Biological Diversity Act, 2002**

The Convention on Biological Diversity (CBD) was inspired by the world community's growing commitment to sustainable development. It represented a step forward in the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from the use of genetic resources. In pursuance to the Convention on Biological Diversity (CBD), to which it was a signatory, India enacted the Biological Diversity Act in 2002 following a widespread consultative process over a period of eight years. The Biological Diversity Rules were notified thereafter in 2004. The Act gives effect to the provisions of the CBD. It also addresses access to biological resources and associated traditional knowledge to ensure equitable sharing of benefits arising out of their use to the country and its people. It included provisions like prohibition on transfer of Indian genetic material outside the country without specific approval of the Indian Government; prohibition on anyone claiming an Intellectual Property Right, such as a patent, over biodiversity or related knowledge, without the permission of the Indian Government; regulation of collection and use of biodiversity by Indian nationals, while exempting local communities from such restrictions; measures for sharing the benefits from the use of biodiversity, including the transfer of technology, monetary returns; measures for sharing the benefits from the use of biodiversity, including the transfer of technology, monetary returns; Setting up of Biodiversity Management Committees at local, village and urban levels, State Biodiversity Boards at the state level, and a National Biodiversity Authority etc.

### **The Prevention of Cruelty to Animals Act, 1960**

This was enacted in 1960 to prevent the infliction of unnecessary pain or suffering on animals and to amend the laws relating to the prevention of cruelty to animals. After the enactment of this Act, the Animal Board of India was formed for the promotion of animal welfare.

### **The Plastic Waste Management Rules, 2016**

This rule was formulated to increase minimum thickness of plastic carry bags from 40 to 50 microns and stipulate minimum thickness of 50 micron for plastic sheets also to facilitate collection and recycle of plastic waste, - Expand the jurisdiction of applicability from the municipal area to rural areas, because plastic has reached rural areas also; To bring in the responsibilities of producers and generators, both in plastic waste management system and to introduce collect back system of plastic waste by the producers/brand owners, as per extended producer's responsibility;

- To introduce collection of plastic waste management fee through preregistration of the producers, importers of plastic carry bags/multi layered packaging and vendors selling the same for establishing the waste management system;

- To promote use of plastic waste for road construction as per Indian Road Congress guidelines or energy recovery, or waste to oil etc. for gainful utilization of waste and also address the waste disposal issue; to entrust more responsibility on waste generators, namely payment of user charge as prescribed by local authority, collection and handing over of waste by the institutional generator, event organizers.

-An eco-friendly product, which is a complete substitute of the plastic in all uses, has not been found till date. In the absence of a suitable alternative, it is impractical and undesirable to impose a blanket ban on the use of plastic all over the country. The real challenge is to improve plastic waste management systems.

#### **Construction and Demolition Waste Management Rules, 2016**

Applies to everyone who generates construction and demolition waste. Duties of waste Generators. Every waste generator shall segregate construction and demolition waste and deposit at collection centre or handover it to the authorized processing facilities.

#### **Solid Waste Management Rules, 2016**

The Rules are now applicable beyond Municipal areas and extend to urban agglomerations, census towns, notified industrial townships, areas under the control of Indian Railways, airports, airbase, Port and harbour, defence establishments, special economic zones, State and Central government organizations, places of pilgrims and religious and historical importance, The source segregation of waste has been mandated to channelize the waste to wealth by recovery, reuse and recycle.

#### **Hazardous and Other Wastes Management Rules, 2016**

The salient features of Hazardous and Other Wastes (Management and Trans boundary Movement) Rules, 2016 include the following:- The ambit of the Rules has been expanded by including 'Other Waste'. Waste Management hierarchy in the sequence of priority of prevention, minimization, reuse, recycling, recovery, co-processing; and safe disposal has been incorporated. All the forms under the rules for permission, import/export, filing of annual returns, transportation, etc. have been revised significantly, indicating the stringent approach for management of such hazardous and other wastes with simultaneous simplification of procedure.

#### **E-Waste Management Rules, 2016**

According to the rules Responsibilities of the manufacturer should Collect e-waste generated during the manufacture of any electrical and electronic equipment and channelize it for recycling or disposal, Apply for an authorisation from the concerned State Pollution Control Board, Ensure that no damage is caused to the environment during storage and transportation of e-waste, Maintain records of the e-waste generated, handled and disposed and make such records available for scrutiny by the concerned State Pollution Control Board and File annual returns to the concerned State Pollution Control Board.

#### **Wetland (Conservation and Management) Rules, 2017**

These rules shall apply to the following wetlands or wetlands complexes, namely: - Wetlands categorised as 'wetlands of international importance' under the Ramsar Convention. Wetlands as notified by the Central Government, State Government and Union Territory Administration: (Provided that these rules shall not apply to the wetlands falling in areas covered under the Indian Forest Act, 1927, the Wild Life (Protection) Act,

1972, the Forest (Conservation) Act, 1980, the State Forest Acts, and the Coastal Regulation Zone Notification, 2011 as amended from time to time.)

### **Restrictions of Activities in Wetlands**

The wetlands shall be conserved and managed in accordance with the principle of 'wise use' as determined by the Wetlands Authority. The following activities shall be prohibited within the wetlands, namely, Conversion for non-wetland uses including encroachment of any kind. Setting up of any industry and expansion of existing industries, Manufacture or handling or storage or disposal of construction and demolition waste covered under the Construction and Demolition Waste Management Rules, 2016; hazardous substances covered under the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 or the Rules for Manufacture, Use, Import, Export and Storage of Hazardous Micro-organisms Genetically engineered organisms or cells, 1989 or the Hazardous Wastes (Management, Handling and Trans-boundary Movement) Rules, 2008; electronic waste covered under the E-Waste (Management) Rules, 2016, Solid waste dumping, Discharge of untreated wastes and effluents from industries, cities, towns, villages and other human settlements, Any construction of a permanent nature except for boat jetties within fifty metres from the mean high flood level observed in the past ten years calculated from the date of commencement of these rules and Poaching.

### **The National Green Tribunal**

The National Green Tribunal has been established on 18.10.2010 under the National Green Tribunal Act 2010 for effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for matters connected therewith or incidental thereto. It is a specialized body equipped with the necessary expertise to handle environmental disputes involving multidisciplinary issues. The Tribunal shall not be bound by the procedure laid down under the Code of Civil Procedure, 1908, but shall be guided by principles of natural justice.

The Tribunal's dedicated jurisdiction in environmental matters shall provide speedy environmental justice and help reduce the burden of litigation in the higher courts. The Tribunal is mandated to make and endeavour for disposal of applications or appeals finally within 6 months of filing of the same. Initially, the NGT is proposed to be set up at five places of sittings and will follow circuit procedure for making itself more accessible. New Delhi is the Principal Place of Sitting of the Tribunal and Bhopal, Pune, Kolkata and Chennai shall be the other 4 place of sitting of the Tribunal.

### **Conclusion**

Despite implementation of a large number of environmental conservation programmes, policies and legislations India is the fourth worst country in the world when it comes to handling environmental issues, according to the 2018 Out of 180 countries, India ranked 177, only better in environmental performance than the Democratic Republic of Congo, Bangladesh and Burundi. This is especially worrying because two years ago, India's rank was 141. The Environmental Performance Index report said that a low rank meant that a nation needed to step up its efforts in cleaning up air quality, protecting biodiversity and reducing greenhouse gas emissions. It also said that countries like India with an air quality of 5.75, China and Pakistan faced a public health crisis. The fact that rapidly growing economies like China and India ranked low reflects the strain which economic growth has

on the environment. That said, China is ranked 120 and ostensibly in much better shape than India. "India's low scores are influenced by poor performance in the Environmental Health policy objective. Deaths attributed to particulate matter 2.5 micrometers have risen over the past decade and are estimated at 1,640,113, annually (Institute for Health Metrics and Evaluation, 2017). Despite government action, pollution from solid fuels, coal and crop residue burning, and emissions from motor vehicles continue to severely degrade the air quality for millions of Indians," said the report.

It is observed from the rating of environmental performance index that India has a lot of environmental problems particularly air pollution, water pollution, land pollution, noise pollution, deforestation, solid waste pollution and overall environmental degradation. In order to protect the environment many policies, programmes and legislations have been brought out in India. The success of such approaches depends on participation of people in environmental conservation activities and effective implementation of environmental conservation policies, programmes and legislations. The planners, policy makers and environmentalists should effectively monitor the process of implementation of environmental conservation policies, programmes and legislations. The effective implementations of environmental conservation depends on road traffic rationing, increasing green cover alongside roads, sprinkle water on trees nearby the roads, vacuum cleaning of roads, promoting Swachh Bharat Abhiyan, cleaning of rivers and water bodies, strict instructions to construction companies regarding pollution, and reducing carbon emissions by focusing on renewable energy generation.

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## **“Effect of Job and Household Satisfaction on Work Performance of Working Women in Higher Education”**

**Dr. Pramod Kumar Tripathi\***

**Abstract:** Job satisfaction at work place is a important factors in quality of work performance. Working women face two different climates for work. House hold climate and climate at work place. At both place satisfaction plays significant role in quality and quantity of job they perform, this has effect on their behavior and personality. The present study is to find out level of Job and household satisfaction of working women from higher education and performance at work place. Fifty working women in higher education department were randomly selected. Job Satisfaction scale by Dr. Amar Singh and Dr. T.R. Sharma was administered. For house hold satisfaction, house hold scale of Dr. Pramod Kumar Tripathi, Ph.D, was used. Analysis of data reveals that job performance was highly correlated with house hold satisfaction. Women happy and satisfied at home are also satisfied at work place. Happy workers are productive workers and productive workers are likely to be happy. Role of women today has changed. They are expected to work at home as well as at job also. Now women perceive themselves as productive contributive unit of development besides their role at home as house wife and mother. House hold satisfaction and job satisfaction both have deep influence on personality, ultimately on behavior. In higher education this has further significant role.

**Keywords:** Job Satisfaction, Household Satisfaction, Work Performance and Working Women.

### **Introduction**

Job satisfaction plays an important role towards personal attitude and belief system. Teachers" job satisfaction may be considered as one of the important factors, which can enhance teaching competency. So it is very important that teacher must be satisfied with their job. Because a well satisfied teacher can gave his best to his students.

The role of today's women has changed drastically, new women perceive her to be productive and constructive unit of national development besides her role at home as a wife and mother.

Recent years have brought a great change in the life throughout the world, influencing their attitudes, values, aspiration, ways of feelings and action for effective participation in all walks of life. Indian women have come out of walls of home in search of economic gain as well as fulfillment of their personal hope and desires.

Household responsibilities are such that they need whole time efforts to plan and manage. Non-working wives are in a better position to manage them as they have only family roles which are more or less homogeneous and the same extent complimentary to each other, but women who are teachers and elsewhere employed are unable to meet the expectations and demands of the family members as well as the demands of their employer and other authorities as well as subordinates. Both set of expectations demand their time and energy

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and the working women may not be able to cope with them. Family stress certainly contribute negatively to job satisfaction (Hang-yue et al, 2005)

The role of women in society is radically changing in most western countries (Hall & Hall, 1980) as well as in India. It is often said that “Happy employee is a productive employee” and a happy employee must be satisfied with his job.

Women who is satisfied with her role and responsibilities at home enjoys in the performance of house hold jobs and one who is not satisfied feels the job monotonous and boring and hence she is frustrated with her duties at home. Her frustration leads to bad family environment making every member of the family unhappy.

The satisfaction and appreciations derived from sound home making practices influences family and community life. Home makers satisfaction is often linked with performance at work while dissatisfaction at home is regarded as an indicator of negative performance and low output. Kaur and Punia (1986) found that small family size, good health, adequate family income and grown up children are the main factor's promoting satisfaction level of working women in respect to her home role performance.

#### **Review of Related Literature**

Panda (2002) studied the level of job satisfaction among teachers of government and non – government colleges. Analysis revealed that the college teachers both from government and non- government colleges were satisfied with their job. Type of management of the college had no significant effect on job satisfaction. Ahmed, Raheem and Jamal (2003) studied the job satisfaction of teachers in senior secondary schools. Female teachers enjoyed greater satisfaction than their male counterparts did. Married teachers showed more job satisfaction than unmarried teachers did. Teachers who were teaching in government schools showed greater job satisfaction than teachers teaching in private schools.

Rashmi Sharma and Naresh Chandra Srivastava (2015) found that both Hindi and English medium school teachers are satisfied with their job. But English medium teachers show comparatively more satisfaction than Hindi medium teachers. Job satisfaction is complex phenomenon with multi facets and influenced by the factors like salary, working environment, autonomy, communication, and organizational commitment (Vidal, Valle and Aragón, 2007).

Job satisfaction is a worker's sense of achievement and success on the job. It is generally perceived to be directly linked to productivity as well as to personal well-being. Job satisfaction implies doing a job one enjoys, doing it well and being rewarded for one's efforts. Job satisfaction further implies enthusiasm and happiness with one's work. Job satisfaction is the key ingredient that leads to recognition, income, promotion, and the achievement of other goals that lead to a feeling of fulfillment (Kaliski, 2007).

Lathia & Sam (2004) studied job satisfaction and spiritualistic orientation among the teachers of Arts and Science College. The results show that arts college teachers are more satisfied than their counterparts in Science College. Research evidences as above prove that teacher's professional satisfaction improves their effectiveness and competencies as teacher.

Women's job satisfaction and quality of life were different according to their marital status and education; unmarried women were satisfied more in their job than married ones and the higher education shows the better job satisfaction and quality of life. Usually

discrimination against women workers, lower wage and opportunity cause women unsatisfied in their job (Lee & Kim, 1998).

**Problem**

“EFFECT OF JOB AND HOUSEHOLD SATISFACTION ON WORK PERFORMANCE OF WORKING WOMEN IN HIGHER EDUCATION”

**Objective**

To study the effect of job satisfaction on work performance

To study the effect of household satisfaction on work performance of working women

To study the interactive effect of job satisfaction and household satisfaction on the work performance of working women

To study the contribution of job satisfaction and household satisfaction on work performance of women in teaching in higher education.

**Hypothesis**

H1- Women teacher who feel more satisfied in their job, perform better at work place than those who feel less satisfied in their job.

H2- Women teacher who feel more satisfied in their household work, perform better at work place than those who feel less satisfied in their household work.

H3- The interactive effect of job and household satisfaction will lead to high work performance.

H4- Job satisfaction and household satisfaction will be significantly related to work performance.

H5- Job satisfaction will have a significant relation with household satisfaction.

**Method and Procedure**

**Sample**

Fifty (50) working women as a teacher in higher education department and posted in Degree College were target group for study.

**Tools**

1. Job satisfaction Scale (JSS) Developed by Dr. Amar Singh and Dr. T.R. Sharma.

2. Grih Karya Santosh Mapini, Hindi Translation/ Adaption by Dr. Pramod Kumar Tripathi (2001), of Dr. Murali, P.S. Karegaonkar and M.S. Kulkarni (1994)

3. Work Performance scale for Teachers, developed by Dr. Pramod Kumar Tripathi (2001).

**Statistical Technique**

Following statistical techniques were applied,

1. Mean Score

2. S D

3. t-Values

4. Correlation Coefficient (r)

5. To Way Analysis of variance

**Result and Discussion**

**Effect of Job satisfaction and household satisfaction on work performance of lady teachers**

**TABLE – 1: Comparison on work performance of high and low job satisfaction of women teachers**

Group	N	Mean of W.P.	SD of W.P.	t/CR
High J.S.	25	39.76	7.80	3.624 *
Low J.S.	25	33.2	4.64	

\*Significant at .01 level

**TABLE – 2: Comparison on work performance of high and low Household satisfied women teachers**

Group	N	Mean of W.P.	SD of W.P.	t/CR
High J.S.	19	39.05	6.48	2.135 *
Low J.S.	31	34.96	6.73	

\*Significant at .05 level

The work performance of high and low job satisfied lady teacher differ significantly. This indicates that women teachers who are satisfied with job, show better performance as a teacher. It is in support of our hypotheses H-1. House hold satisfaction also play important role on work performance of women teachers those satisfied with household affairs show better performance on work.

**TABLE – 3: Summary of the analyses of the variance for work performance of lady teachers**

Sores of Variance	Sum of Squares	df	Mean squares	F- ratio
Between JS	37.21	1	37.27	.663 NS
Between HS	83.28	1	83.28	1.48 NS
Intraction JS\ HS	273.92	1	273.92	4.89 *
Within Group	2583.97	46	56.17	-

\*- Significant at .05 level, NS- Not Significant

**Interactive effect of Job satisfaction and household satisfaction on work performance of lady teachers**

Interactive effect of job and house hold satisfaction on work performance for women teachers is significant 0.01 level. This shows that household satisfaction is an important factor in work performance of lady teachers.

Satisfaction is an important factor in work performance of lady teachers. Job satisfaction and household satisfaction when interacting with each other, or not making significant difference on work performance. This indicated that some other factors are affecting.

**TABLE – 4: Correlation between job satisfaction, household satisfaction and work performance among lady teachers**

Variables	Job S 1	H S 2	W P 3
Job Satisfaction	1.0	-	-
Household Satisfaction	0.135	1.0	-
Work Performance	0.557	0.032	1.0

Table.4 show low to Moderate correlation coefficient was found for all categories of subjects among the Job Satisfaction, Household Satisfaction and Work Performance.

### **Conclusions**

Job satisfaction represents one of the most complex areas facing today's managers when it comes to managing their employees. Many studies have demonstrated an unusually large impact on the job satisfaction on the motivation of workers, while the level of motivation has an impact on productivity, and hence also on performance of business organizations. There is a considerable impact of the employee's perceptions for the nature of his work and the level of overall job satisfaction. Financial compensation has a great impact on the overall job satisfaction of employees.

Teachers are satisfied with their job. They feel that teaching is the best profession for them and they feel proud to be a teacher. It may be concluded that there are indications that teacher's level of job satisfaction have a positive relation with success in teaching. A positive favorable attitude makes the work not only easier but also more satisfying and professionally rewarding. If the teachers enjoy their job with positive attitude, their work will be easier and will have long lasting impact on the society.

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## **Impact of Cognitive Biases and Gender on Investment Behaviour of Working Professionals in India**

**DIVYA VERMA\***

### **Abstract**

*The study analyses the relationship between cognitive biases, demographic variables and choice of investment alternatives of working professionals in India. A questionnaire was administered on 100 respondents related to cognitive biases like representativeness bias, availability bias, cognitive dissonance bias and self-attribution bias. Males are more risk seeker than females. Females prefer more investment in low risk instruments. The results reveal that representativeness bias and availability bias significantly impact investment decision making and choice of investment alternatives.*

### **Introduction**

Investor behaviour is affected by various demographic factors of our life. These include our income, our savings, marital status, and financial knowledge, number of years of experience, our age, gender and personality. More importantly our attitude towards life affects our financial decisions as well. Our attitude or behaviour is formed by our habits, experiences, lessons, actions and heuristics. We make many mistakes or are affected by many biases which end up in investment mistakes. In this study we have taken into consideration role of gender and cognitive biases on our investment decisions.

Cognitive biases are related to our memory, logic and can emerge from the logical reasoning of various situations in life. In this study we have taken four cognitive biases namely representativeness bias, availability bias, cognitive dissonance bias and self-attribution bias. Representativeness bias makes us adopt those alternatives with which we are able to represent some past experience or memory of ours. If in past a person has earned very good returns from mutual fund so next year while making investment decision he will have a positive outlook towards mutual funds and can invest even larger share in it. Availability bias makes us use only that information which is easily available to us for taking decision; it can be our past memory, latest news report, suggestion by a friend or consultant. So, a person may not try to go in depth of a choice before deciding to put his money in it. Based on one's cognition people have certain set of beliefs, choices, experiences and they take decisions. If in life you have taken a decision and someone tells you that your decision was wrong, it brings us to a level of discomfort .i.e. cognitive dissonance, and later on one tries to prove it to oneself that his decisions were correct. This bias can lead an investor to stick to his investments or not learn lessons from previous mistakes. Self-attribution bias is that tendency of humans to assign the success to their skills and knowledge and failure to bad luck or external factors. This bias can make someone not learn anything from investment mistakes. With proper awareness of these biases in our attitude one can manage to ensure that we do not take wrong investment decisions. All these biases are affecting our investment decisions of investing our money in low risk or medium risk or high risk investment alternatives. The focus of the present study is to analyse relationship between gender, cognitive biases and investment choices.

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The rest of the paper is organised as follows. Section two discusses related literature, section three covers methodology of the study section four analyses the results and section five concludes the study.

### **Review of Literature**

Various researchers have studied link between gender and behavioural biases. Barber and Odean (2001) concludes that men are more subject to overconfidence bias rather than women as reflected in their trading behaviour. Riaz et al. (2012), in their research concluded that the asymmetry of information, risk taking behaviour and decision context affect the perceptions of risk associated in a particular investment situation. The examination of risk propensity reveals that risky decisions are generally avoided by risk-averse individuals while risk seeking individuals are more likely to take risky decisions.

According to Cohen et al. (2007), "Psychological studies have shown that risk perceptions can be greatly influenced by the framework in which the investors are put in, when they make investment decisions".

Overconfidence is a key concept to understand why investment strategies are so actively pursued and trading is excessive (DeBondt and Thaler, 1995). Daniel et al. (1998) found that even small individual investors can be overconfident, though they apparently have less information. In this area, three major consequences of overconfidence have been documented: overconfidence causes too much trade (Barber and Odean, 2000; Glaser and Weber, 2007; Kim and Nofsinger, 2002; Odean, 1999; Statman, Thorley, and Vorkink, 2006), excessive volatility (Daniel, Hirshleifer, and Subrahmanyam, 1998; Gervais and Odean, 2001) and a combined phenomenon of under- and overreaction to information (Daniel and Titman, 2000; Daniel et al., 1998; Glaser and Weber, 2007; Lee and Swaminathan, 2000). Significant influence of overconfidence has been observed in corporate finance such as overinvestment or preference for debt financing (Malmendier and Tate, 2005). The theoretical models developed by Odean (1998) and Gervais and Odean (2001) suggest that overconfident investors will more readily engage in trading than they would if they were rational investors, thereby overestimating their expected profits and continually getting involved in costly trading. Barber and Odean (2001) proved that males trade more aggressively than females, incur higher transaction costs, and consequently earn lower (post-transaction cost) returns. In experimental markets, overconfident traders generally give less weightage to information and actions of others (Bloomfield et al., 1999). In such markets, it is observed that investors tend to overreact more in case of unreliable information than reliable information (Bloomfield et al., 1999). Barber and Odean (1999) also found that investors who have experienced the greatest past success in trading are the most likely to switch to online trading and will trade the most in the future because of overconfidence.

The self-attribution bias model of Gervais and Odean (2001) posits that investors tend to take too much credit for their own success, and this makes them overconfident. The model has theorized that how investors gradually become overconfident when their few initial bids become successful. The impact of overconfidence on incentive contracts has been studied by Keiber (2002) who finds that when both the principal and the agent are overconfident then the agency cost is less. Palomino and Sadrieh (2011) derive the optimal contract by comparing the performance of financial institutions which hire overconfident managers relative to institutions which hire rational agents and examine the impact of overconfidence on asset prices. Oskamp (1965) shows that people become increasingly

overconfident as they receive more information. Russo and Schoemaker (1992) find that managers are grossly overconfident regarding the accuracy of their knowledge about their own company or field of industry. Plous (1993) goes on to state that “No problem in judgment and decision making is more prevalent and more potentially catastrophic than overconfidence.”

**Methodology**

The objective of the study is to analyse the relationship between demographic variables and cognitive biases on investment decision making. For the purpose of the study a sample of 100 respondents were taken and their responses were collected from them related to their age, employment, income and they were also asked questions related to various cognitive biases like representativeness bias, availability bias, self-attribution bias and cognitive dissonance bias. They were also inquired about their investment portfolio where they have invested their funds.

**Analysis and Discussion**

Out of the total respondents, 58 percent were male and 42 percent were females. 92 percent respondents were between age group of 20-35 years as the data focused on young working professionals in India. 78 percent respondents have more than 5 years of work experience. It was seen that most of the investors prefer to invest in a balanced portfolio which take low risk on their investment. 48 percent respondents prefer to invest in fixed deposit and then in saving bank account and gold. The investment in highly risky investment like derivatives is very low among the sample respondents.

**Table 1: Gender-wise Distribution of Choice of Risk based Investment Alternatives**

	Percentage of Investors	Low Risk Investment Portfolio	Medium Risk Investment Portfolio	High Risk Investment Portfolio	Balanced Portfolio Investment	Total	Chi Square (Sign.)
<b>Gender</b>	<b>Male</b>	18.97	17.24	8.62	55.17	100	4.603 (0.203)
	<b>Female</b>	28.57	16.67	0.00	54.76	100	
	<b>Total</b>	23	17	5	55	100	

Most of the respondents invest in balanced portfolios (55 percent) rather than opting for high risky investments (males 8.62 percent). 28.57 percent females and 18.97 percent males invest in low risk portfolios. The chi-square test is not significant which shows that there is no significant difference in risk attitude of males and females.

**Table 2: Distribution of Respondents based on Cognitive Biases**

Percentage of Investors	Low Biased	Balanced	Highly biased	Total
<b>Representative Bias</b>	24	58	18	100
<b>Cognitive Dissonance Bias</b>	45	13	42	100
<b>Availability Bias</b>	30	57	13	100
<b>Self-Attribution Bias</b>	11	59	30	100

Table 2 shows distribution of respondents based on four cognitive biases which affect investor decision making. If an investor is affected by a certain bias then he is categorised as highly biased and someone who is not influenced by a bias will fall in low on bias category. The results show that only 18 percent respondents are affected by representativeness bias, 42 percent are affected by cognitive dissonance bias. Only 13 percent are influenced while taking decisions by availability bias and 30 percent are affected by self-attribution bias. 65 percent investors who are self-employed are balanced in terms of cognitive dissonance bias. The further analysis of availability bias shows that the female investors have more presence of this bias as compared to males. It is seen that females are more risk averse as compared to males.

<b>Table 3: ANOVA Results of Investors</b>					
	<b>Sum of Squares</b>	<b>Df</b>	<b>Mean Square</b>	<b>F</b>	<b>Sig.</b>
<b>Representativeness Bias</b>					
<b>Between Groups</b>	10.04	3	3.347	1.028	0.034
<b>Within Groups</b>	312.52	96	3.255		
<b>Total</b>	322.56	99			
<b>Cognitive Dissonance Bias</b>					
<b>Between Groups</b>	3.073	3	1.024	0.343	0.194
<b>Within Groups</b>	286.317	96	2.982		
<b>Total</b>	289.39	99			
<b>Availability Bias</b>					
<b>Between Groups</b>	4.51	3	1.503	1.499	0.02
<b>Within Groups</b>	96.25	96	1.003		
<b>Total</b>	100.76	99			
<b>Self-Attribution Bias</b>					
<b>Between Groups</b>	1.666	3	0.555	0.474	0.201
<b>Within Groups</b>	112.444	96	1.171		
<b>Total</b>	114.11	99			

In table 3 relationships between cognitive biases and investment alternatives is given using ANOVA. The ANOVA results for representativeness bias shows f value of 1.028 which is highly significant which shows that there is significant difference in the investment choices of those investors who are affected by representativeness bias as compared to those who are not affected by this bias. With respect to cognitive dissonance bias f value results are insignificant which indicates that there is no significant difference in three groups with different level of dissonance and their choice of risky investments. The availability bias results are highly significant at f value of 1.499 which indicates that availability bias affects investor's choice of investment alternatives. The results of self-attribution bias are not significant which shows that self-attribution does not affect investment choices of investors.

**Conclusion**

This study was an attempt to understand the relationship of cognitive biases on investment decision making and risk attitude of investors. The study identified that the sample respondents were governed by cognitive dissonance and self-attribution biases more as

compared to representativeness bias and availability bias. Majorly the investors put their investments in balanced portfolios rather than investing in high risk portfolios. Females had larger preference to invest in low risk portfolios. The results indicate that representativeness bias and availability bias have significant impact on investment choices made by investors. If investors are affected by cognitive biases then proper awareness about it, can help the investor avoid investment mistakes based on these biases.

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## **Antecedents of Job Satisfaction among Engineering Faculty**

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**Sripathi Kalvakolanu\*\*\***

### **Abstract**

*The role of academic professionals is not much researched on the dimensions of professional satisfaction. Measuring job satisfaction needs to assess the extent to which the job holders favorably evaluate their feelings or cognitions about the job. With many institutes spreading the engineering education among the students, it is imperative that the quality and outcomes of these programmes are highly dependent on the faculty members who play key role in imparting this knowledge. In this context, the present study is taken up to understand the job satisfaction among the engineering faculty. An explorative study was conducted among 500 engineering faculty working in the engineering colleges in the Kadapa district of Andhra Pradesh, India. An effort is made to elicit opinions of faculty members about various factors such as salary, career development and working environment etc. The Minnesota Satisfaction Questionnaire (MSQ) was used to capture the facets of job satisfaction among the respondents. The study indicated that factors such as gender, designation, age, experience and the overall job satisfaction were independent of one another. However, factors such as compensation and working conditions were found to be related to the overall job satisfaction.*

**Key Words:** Job Satisfaction; Demographics; Engineering Faculty; MSQ;

### **1 Introduction**

An important yet undermined to be called a profession is 'academics'. In the field of higher education, the role of academic professionals is not much researched on the dimensions of professional satisfaction and the corresponding value proposition to the institute and society at large.

Job satisfaction can be understood as the extent to which an individual is content with her/his job. This comes from looking at the job both on an overall perspective as well as specific facets of jobs. Job satisfaction, as derived from the attitude model, essentially can have the cognitive, affective, and behavioral components. Thus, measuring job satisfaction needs to assess the extent to which the job holders favorably evaluate their feelings or cognitions about the job. Research in this domain shows that employees who show high satisfaction in their jobs tend to show higher productivity, involvement and low tendency to leave the job (Sowmya & Panchanatham, 2011).

Among the definitions of job satisfaction, that of Locke (1976) is the popular and widely accepted one. Locke defines job satisfaction as "a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences".

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The profession of teaching is distinct from others, as it is rendered with service orientation. Professionals who take up this career render their services selflessly and without looking for the balancing benefits. However, it is important that these faculty fraternities are also happy and content with their jobs, which will make them go that extra mile in building a great nation. India has seen a big leap in the number of institutions offering engineering programmes in the past two decades. There are about 10,000 institutes offering the engineering programmes across the country. This number is significantly high in the southern states. Andhra Pradesh and Telangana constitute nearly 1500 institutes together. With these many institutes spreading the engineering education among the students, it is imperative that the quality and outcomes of these programmes are highly dependent on the faculty members who play key role in imparting this knowledge. In this context, the present study is taken up to understand the job satisfaction among the engineering faculty. The study mainly focuses on assessing the facets that affect job satisfaction, while also measuring the impact of those factors on job satisfaction.

## **2 Literature Review**

Hagedorn (2000), in their work on studying job satisfaction related dimensions, developed a conceptual framework that identified two categories of variables labelled mediators and triggers. Each category comprises several individual and environmental characteristics. The mediator category components are seen to be having the features to predict the levels of satisfaction.

When coming to the teaching fraternity, globally they are coming together on shared platforms. Increased number of academic staff is spreading around the world and also there are faculty exchange programmes on rise. However, not all developing countries have caught this opportunity. Many of the developing countries are lagging in this context and are at the bottom level of unequal academic relationships (Altbach 2004).

Sabharwal and Corley (2009) studied and categorized the job satisfaction related variables into three categories. According to their classification satisfaction may be influenced by factors ranging from demographic, institutional as well as career related issues.

Balbachevsky and Schwartzaman (2010) made attempt to study different factor in the academic context and how academic institutions put job satisfaction in place. Through their study they identified significant differences in terms of governance styles across the institutions (Balbachevsky and Schwartzman, 2010).

Jones and Weinrib (2010) studied the differences of conditions prevalent in the academic institutes. Their study concluded that among the individuals who opt for research and teaching professions, there are significant differences in conditions of employment and the pay they receive (Jones and Weinrib 2010).

While studying the factors that influence job satisfaction among the university professors, Metcalfe et al. (2011) found that the size of the institutions may also play role. Their study identified that the professors who belong to smaller universities were considering themselves more influential in decision making than those of a larger universities.

Nagar. K. (2012) studied the job satisfaction among 153 university teachers. The study focused on assessing how organizational commitment and satisfaction were related among the teachers when they undergo burnout. The study found females to be more satisfied with their jobs than their male counterparts. Also, the study identified that greater job satisfaction was leading to increased organizational commitment.

Tahir. S. & Sajid. S.M. (2014) made a comparative analysis of level of job satisfaction among teachers of a private management college in Delhi and a college of Delhi University. Their study used Paula Lester's Teacher Job Satisfaction questionnaire to collect the information pertaining to job satisfaction. The study found significant levels of differences in satisfaction among the male and female faculty members while no big differences were found between the two institutes compared.

Kumar et. al (2017) in their study on job satisfaction of teachers working in schools and colleges found nature of work as an important factor for determining the job satisfaction. They found differences in gender giving priority to factors of job satisfaction. While the male members were more inclined towards growth factor, the female were interested in the nature of work.

Chintala. G. & Rao. H. (2017) studied the job characteristics and the corresponding job satisfaction levels among the teachers working in technical institutions in Telangana state. From the review of literature, it is drawn that there is a greater need to study the specific nuances of the job satisfaction among the faculty of higher education institutions. There are very few studies in this area. The engineering faculty of the Andhra Pradesh state is under severe pressure to deliver best results, as the state places higher importance on transforming itself into an educational hub. In this context, a study on job satisfaction is taken up with the following methodology.

### **3 Methodology**

The present study is formulated using an explorative research design. The study attempts to explore job satisfaction among engineering faculty members. Most studies that are taken up in measuring job satisfaction use a quantitative approach. Research in assessing job satisfaction has progressed by using validated instruments such as the Minnesota Satisfaction Questionnaire (MSQ) (Weiss et al., 1967). Over the period of time, several new versions and types of satisfaction study questionnaires have evolved. MSQ is among the comprehensive forms of assessing job satisfaction levels. Holmberg (2017) is of the opinion that some studies have adapted qualitative methodology by preferring individual interviews (Holmberg et al., 2017). Hence in the present study the Minnesota Satisfaction Questionnaire was used to interview the respondents.

The main data for the study is collected by conducting personal interviews with faculty members of engineering colleges, Heads of Departments, Principals and management in Kadapa district of Andhra Pradesh, India during 2016-17. An effort is made to elicit opinions of faculty members about various factors such as salary, career development and working environment etc. The Questionnaire (MSQ) was circulated to all the faculty members in the engineering colleges in Kadapa district. Purposive sampling technique was used to select engineering colleges. Simple Random Sampling Technique was used for selecting the faculty members. A total number of 500 faculty members were selected from different colleges for the present study. Engineering colleges in Kadapa district affiliated to JNTU, Anantapur and Yogi Vemana University having five years of standing were considered for inclusion in the study. Faculty members who came forward voluntarily to participate in the study were considered.

Secondary data from the records, articles and other documentary materials maintained by All India Council for Technical Education, Ministry of Human Resource Development, Books on technical education, News Papers etc. were included in the study.

### **3.1 Objectives of the study**

The objectives of the study are

- To identify the effect of demographic factors on the overall job satisfaction of the employees
- To study the relationship between the different job facets and job satisfaction

### **3.2 Hypotheses**

The following null and supporting hypotheses are formulated to assess the study objectives.

H01: There is no significant relationship between gender and job satisfaction among faculty

H02: There is no significant relationship between designation and job satisfaction among faculty

H03: There is no significant relationship between working conditions and job satisfaction faculty

H04: There is no significant relationship between compensation and job satisfaction among faculty

### **4 Minnesota Job Satisfaction Questionnaires**

The Minnesota Satisfaction Questionnaire (MSQ) measures job satisfaction in 20 facets and has a long form with 100 questions (five items from each facet) and a short form with 20 questions (one item from each facet). Subjects who responded to the "Minnesota Satisfaction Questionnaire" were asked to indicate their level of satisfaction using a five-point scale for each of the 100 items. The Minnesota Job Satisfaction Questionnaire (MSQ) has been developed by David J. Weiss, Rene Y Dawis, George W England and Lloyd H Lofquist (1967). The MSQ consists of 100 items. Each item refers to reinforce in the work environment. The respondent indicates how she/he is satisfied with the present job. Five response alternatives will be given. The items appear in blocks of 20 item intervals. Following is the list of MSQ scales. All 100 responses from 20 sub headings will be clubbed to obtain overall job satisfaction score.

1. Ability Utilizations
2. Achievement
3. Activity
4. Advancement
5. Authority
6. College policies and practices
7. Salary
8. Co-faculty members
9. Creativity
10. Independence
11. Moral Values
12. Recognition
13. Responsibilities
14. Security of Job
15. Social Status
16. Social Services
17. HOD's Supervision
18. Management Supervision on working conditions



- 19. Supervision on technical aspects, infrastructure
- 20. General satisfaction

**5 Results And Discussion**

**5.1 Reliability**

In order to identify the reliability of the study instrument, Cronbach alpha coefficients were computed. The items had a Cronbach's alpha coefficient of 0.931, indicating acceptable reliability. Table 1 presents the results of the reliability analysis.

**Table 1: Reliability Statistics**

Cronbach's Alpha	N of Items
.931	100

**5.2 Chi-Square Test of Independence between gender and satisfaction of respondents**

The results of the Chi-Square test for gender and satisfaction were not significant,  $\chi^2(2) = 1.58, p = .453$ , suggesting that gender and satisfaction could be independent of one another. This implies that the observed frequencies were not significantly different than the expected frequencies. Table 2 presents the results of the Chi-Square test.

**Table 2**

*Observed and Expected Frequencies*

Gender	Satisfaction		
	Excellent and good	Poor	Satisfactory
Female	124[128.74]	46[40.61]	46[46.66]
Male	174[169.26]	48[53.39]	62[61.34]

Note.  $\chi^2(2) = 1.58, p = .453$ . Values formatted as Observed [Expected].

**5.3 Chi-Square Test of Independence for Designation and Satisfaction**

The results of the Chi-Square test for designation and satisfaction were not significant,  $\chi^2(6) = 2.52, p = .866$ , suggesting that designation and satisfaction could be independent of one another. This implies that the observed frequencies were not significantly different than the expected frequencies. Table 3 presents the results of the Chi-Square test.

**Table 3**

*Observed and Expected Frequencies*

DESIGNATION	Satisfaction		
	Excellent and good	Poor	Satisfactory
Associate Professor	31[29.20]	11[9.21]	7[10.58]
Asst. Professors	254[255.68]	78[80.65]	97[92.66]
HoD	5[4.77]	2[1.50]	1[1.73]
Professor	8[8.34]	3[2.63]	3[3.02]

Note.  $\chi^2(6) = 2.52, p = .866$ . Values formatted as Observed [Expected].

#### 5.4 Chi-Square Test of Independence for Age and Satisfaction

The results of the Chi-Square test for age and satisfaction were not significant,  $\chi^2(10) = 9.99, p = .441$ , suggesting that Age and Satisfaction could be independent of one another. This implies that the observed frequencies were not significantly different than the expected frequencies. Table 4 presents the results of the Chi-Square test.

**Table 4**

*Observed and Expected Frequencies*

AGEBINNED	Satisfaction		
	Excellent and good	Poor	Satisfactory
30	96[102.51]	40[32.34]	36[37.15]
30 - 34	67[67.35]	18[21.24]	28[24.41]
35 - 40	36[37.55]	10[11.84]	17[13.61]
41 - 45	60[52.45]	11[16.54]	17[19.01]
46 - 51	27[25.63]	9[8.08]	7[9.29]
52+	12[12.52]	6[3.95]	3[4.54]

Note.  $\chi^2(10) = 9.99, p = .441$ . Values formatted as Observed [Expected].

#### 5.5 Test of ANOVA for significant differences in Age by Satisfaction

The results of the ANOVA were not significant,  $F(2, 497) = 0.65, p = .525$ , indicating the differences in age among the levels of Satisfaction were all similar (Table 5). The main effect, Satisfaction was not significant at the 95% confidence level,  $F(2, 497) = 0.65, p = .525$ , indicating there were no significant differences of age by satisfaction levels. The means and standard deviations are presented in Table 5.

**Table 5**

*Analysis of Variance Table for age by Satisfaction*

Term	SS	df	F	p	$\eta_p^2$
Satisfaction	90.48	2	0.65	.525	0.00
Residuals	34799.00	497			

#### 5.6 Test of ANOVA for significant differences in Experience by Satisfaction

The results of the ANOVA were not significant,  $F(2, 497) = 1.57, p = .209$ , indicating the differences in experience among the levels of Satisfaction were all similar (Table 6). The main effect, satisfaction was not significant at the 95% confidence level,  $F(2, 497) = 1.57, p = .209$ , indicating there were no significant differences of Experience by Satisfaction levels. The means and standard deviations are presented in Table 6.

**Table 6**

*Analysis of Variance Table for Experience by Satisfaction*

Term	SS	df	F	p	$\eta_p^2$
Satisfaction	99.35	2	1.57	.209	0.01
Residuals	15732.22	497			

#### 5.7 Chi-Square Test of Independence for Compensation and satisfaction of employees

A Chi-square Test of Independence was conducted to examine whether compensation and overall satisfaction were independent. The sub items considered for measuring satisfaction towards compensation are: the amount of pay for the work done, the chance to make as

much money as possible (in other sectors), how pay compares with that of similar jobs in other academic institutions, salary and the amount of work done, and whether pay is according to AICTE norms.

**Table 7: Chi-square statistics for Compensation & satisfaction of employees**

S. No.	Variable	Chi-square statistic	P-value	Result
1	The amount of pay for the work done	13.71	$p = .090$	Not significant
2	The chance to make as much money as possible (In other sectors)	80.62	$p < .001$	Significant
3	How pay compares with that of similar jobs in other academic institutions.	43.15	$p < .001$	Significant
4	Salary and the amount of work done	40.57	$p < .001$	Significant
5	Whether pay is according to AICTE norms	50.24	$p < .001$	Significant

Except for the sub variable amount of pay for the work done and overall satisfaction, The results of the Chi-square test were significant for all other variables ( $p < .001$ ) indicating that the compensation and overall satisfaction are related to one another.

**5.8 Chi-Square Test of Independence for working conditions and satisfaction of employees**

A Chi-square Test of Independence was conducted to examine whether the working conditions and overall satisfaction were independent. The variables considered include: the working conditions (teaching/research/consultancy), the physical surroundings of the college, the pleasantness of the working conditions, the physical conditions of the job (canteen/Gym/Library/ Lab etc.), the working conditions in the college.

**Table 8: Chi-square statistics for working conditions and satisfaction of employees**

S.NO	Variable	Chi-square statistic	P-value	Result
1	The working conditions (teaching/research/consultancy)	107.83	$p < .001$	Significant
2	The physical surroundings of the college	110.69	$p < .001$	Significant
3	The pleasantness of the working conditions	129.69	$p < .001$	Significant
4	The physical conditions of the job (canteen/Gym/Library/ Lab etc.)	203.37	$p < .001$	Significant
5	The working conditions in the college	101.14	$p < .001$	Significant

The results of Chi-square test were significant for all sub variables were significant ( $p < .001$ ). Thus, it can be concluded that working conditions and overall satisfaction are related to one another.

**6 Conclusions**

The data analysis of the present study indicated that gender and job satisfaction were independent of one another. Unlike in some studies cited earlier, satisfaction levels did not differ across gender. Also, the study was suggestive of designation and satisfaction could

be independent of one another. It can be inferred that members were not much considerate about the designations they were holding to be associated with their satisfaction. The study has shown that age of the employees and satisfaction could be independent of one another. The analysis of variance found no significant differences of age by satisfaction levels. Besides, no significant differences were indicated of experience by satisfaction levels. The study has shown that compensation and overall satisfaction are related to one another. Also, the working conditions and overall satisfaction were found to be related to one another.

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## **Management by Walking around MBWA Stress for employees Or Boost of productivity**

**MEGHA BANSAL \***

### **Abstract**

If you want to connect with your people better, step out from behind the glass.

You're likely based in the same building as your manager, but how often do you see him or her? OK, so you see him any time you look through the spotless glass walls of his office, but how often do you get the chance to sit down together and really talk? Once a week? Once a month? Less, may be. A manager like this can seem distant, unapproachable and even intimidating. And yet, it is possible to be a manager who is admired for being wise and knowledge able, and one who is engaged and connected with the people around her. Which would you prefer to be? If you build a wall around yourself as a manager, your team members won't gain from your knowledge and you won't gain from their experience. Worse still, you'll be unable to spot and deal with problems before they become serious, and you'll miss out on the key, tacit information that you need to make good decisions. Connecting with your team is a major factor in success. We live in a world where communication is easier than ever, yet face-to-face conversations tend to be difficult to maintain. Interaction is becoming increasingly digitalized, with most of us rather sending an e-mail than arranging a meeting. But one management method challenges our communication strategies by calling for deeper integration of actual conversations in the workplace. It is management by walking around or (MBWA). Management by walking around is the habit of stopping by to talk with people face to face, get a sense of how they think things are going, and listen to whatever may be on their minds. Management by walking around has been around for a while, but what is the strategy about? We'll explore the history and the concept behind this management theory. Before providing you tips on how to best utilize the method, we'll look into the strengths and weaknesses of it as well. And this article shows you how to keep in touch with what's going on.

**Keywords:** distant, unapproachable, communication, interaction, digitalized, conversations.

### **Introduction**

You've probably encountered plenty of management theories and you might have your own ideas about an effective management style. A key part of being a good manager is being in touch with your subordinates. In order for management to work, you need to be aware of what is going on around you and this is, essentially, what management by walking around is about. The **management by wandering around (MBWA)**, also **management by walking around**,<sup>[1]</sup> refers to a style of business management which involves managers wandering around Managers consistently reserving time to walk through their departments and/or to be available for impromptu discussions. MBWA frequently goes together with an open-door management policy. The opportunity is for the leader to connect with staff, and when used effectively, to gain hugely valuable

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\* LECTURER, GOVT. COLLEGE FOR GIRLS, GURUGRAM, HARYANA

information. When done well, the habit also can better connect employees to your team and organization. How do you make the most of MBWA and maximize your time spent? First, be purposeful when you walk around. What are your goals in talking with employees? What might you learn that will help you run the business better and/or further drive engagement? With your goals in mind, you then can determine the best questions to ask.

### **History**

The concept of having management walk amongst subordinates and talk to them face-to-face, had been used by managers and organizations for decades, the term '*Management by Walking Around*' was popularized in the 1980s. In 1982, management consultants Tom Peters and Robert H. Waterman proposed the concept in their book *In Search of Excellence: Lessons from America's Best Run Companies*. In the book, Peters and Waterman examined the successful companies, realizing a common nominator between the most successful. According to them, the successful companies had CEOs and managers who spent much of their time in the field instead of being confined to their office. Peters and Waterman noticed these managers were more aware of the operations and in general, had better ability to solve problems. Peters went on to write a book *A Passion for Excellence* in which he continued to assert the style as the core element of excellent leadership. The idea gained further attention when William Hewlett and David Packard, the founders of Hewlett Packard, mentioned the theory to be part of the "*HP Way*". The lessons learned from the technology company were, in fact, examined and presented by Peters and Waterman. The up-close-and-personal style of management became a popular option for organizations and other big companies soon followed the teachings of Peter and Waterman. Disney has implemented management by walking, having its managers work shifts along with subordinates. Apple's Steve Jobs was another big believer in the style, putting himself in situations where he had to deal directly with the customers.

### **Definition**

Is management by walking around just about, well, walking? The theory is both simple, yet often misunderstood. Although the main core is to have the management moving about, you can't just expect aimless walking around the company to solve problems. The method is essentially a management style in which the managers walk around in unstructured and unplanned manner amongst the employees. The objective is to interact with the subordinates and supervise their work, while they are performing it. According to the proponents, this kind of interaction will allow the managers to better understand the issues, ideas and concerns of the subordinates. This in turn will ensure the management can act on the findings accordingly. The theory is also referred to as Management by Wandering Around or MBWA.

The **management by wandering around (MBWA)**, also **management by walking around** refers to a style of business management which involves managers wandering around, in an unstructured manner, through the workplace(s), at random, to check with employees, equipment, or on the status of ongoing work. The emphasis is on the word *wandering* as an unplanned movement within a workplace, rather than a plan where employees expect a visit from managers at more systematic, pre-approved or scheduled times.

The expected benefit is that a manager, by random sampling of events or employee discussions, is more likely to facilitate improvements to the morale, sense of organizational

purpose, productivity and total quality management of the organization, as compared to remaining in a specific office area and waiting for employees, or the delivery of status reports, to arrive there, as events warrant in the workplace.

### **Components of MBWA**

The broad concept of the theory is about getting the management moving about. It's about monitoring the subordinates in their work environment and creating a more meaningful relationship with them in order to boost the organization's successes. But what are the key components of the management method? The so-called building blocks you must focus on to practice MBWA and not just end up randomly walking about. In his book, Peters outlined three components behind successful MBWA. According to Peters, the method works when:

- **Managers listen to people** – You can't just walk around and talk, but you have to listen to what subordinates are telling you. As a manager, you have to become good at reading the subtle signs people are telling you. Your subordinates might not feel comfortable being very honest with you, especially right at the start of implementing the new method.
- **Managers use discussion as an opportunity to transmit the company's values** – The walks and discussions provide you the possibility to strengthen the subordinate's understanding of the company's values and vision.
- **Managers are willing to provide on-the-spot assistance and support** – If your subordinates require help, you must be willing to lead by example and provide support on the spot. The method has a sense of urgency to it and it isn't about "looking into it", but getting problems fixed quickly.

### **Strategy of MBWA**

How did management by walking around become such a popular technique? Much of its popularity is down to the positive benefits companies and management teams have experienced as a result of the strategy. While the benefits are numerous, the strategy doesn't come without a few pitfalls. There are three elements, which are essential for the style: walking around, striking up conversations, and creating networks. These are the key objectives the management must focus on in order to implement an MBWA strategy.

**1. The manager must take time to walk around the organization-** While the method is based on spontaneous and non-planned interactions, the manager must consciously focus on getting up and away from the desk. In a hectic work environment it can be too easy to sit down and think about doing the rounds later on, only to realize the day is over. The manager must create a system, where he or she is compelled to get up and talk to the employees on a regular basis. The manager must also ensure the walks are directed to areas directly under his or her command. You don't need the manager to walk around parts that don't involve him or her, but the manager must get walking amongst his or her subordinates.

**2. The manager must strike up conversations-** when you are walking around the organization as the manager; you shouldn't just be aimlessly walking and saying 'Hi' to subordinates. These conversations can be directly related to the work the subordinate or the business is doing, or the discussion can occasionally touch up on private issues. The focus, of course, should be on learning from these informal situations. The manager can utilize different situations from corridor discussions to lunch breaks. The objective is to gather information, which can be beneficial in making decisions and resolving problems.

Therefore, the idea is to learn more about the current situation of the subordinates, gain insight into his or her views, and stay on top of any problems they might encounter both at work and in private (private issues might directly influence the person's ability to work).

**3. Creating networks within the organization-** The manager wants to encourage better relationships and open communication. Even when a single discussion doesn't lead to direct, new information, the management might have strengthened the communication between him or her and the subordinate. This can ensure that when problems arise, the person is immediately sharing the news with the management. The objective isn't solely about the strengthened relationship between the management and the subordinates. MBWA can set an example for better communication throughout the organization.

#### **What MBWA Can Achieve**

MBWA can produce a huge range of results which are described as follows:-

- 1. Easily approachable-** People are often reluctant to speak with their managers because they feel intimidated or they think that they won't care. But when your team members see you as a person as well as a manager they'll trust you and be more willing to share ideas and pain points with you.
- 2. Solve big problems-**Frequent, natural and trusting communication can be infectious, and it encourages people to work together as a team. With better communication and an improved sense of what's happening in your team, you'll likely spot big problems before they happen, and you'll be in a better position to coach your team to avoid them.
- 3. Increase of commercial awareness-**Business knowledge, commercial awareness and problem-solving opportunities can all take leaps forward when you better connect with your "front line." You'll improve your understanding of the functions, people and processes at work there, and you'll boost people's company and industry knowledge. Everyone is better equipped to perform their roles when they have the right information, and they are energized by an improved flow of ideas.
- 4. Lifting of morale-** Morale will likely get a lift from MBWA, too. Casual exchanges and opportunities to be heard really do help people to feel more motivated, more inspired, and more connected. Furthermore, you'll boost accountability and productivity, as any actions that you agree upon with your people will likely get done because you see one another regularly.

#### **Why MBWA is so important?**

Here are the top 5 reasons why MBWA is so important, and so effective:

- 1. You don't know the whole story:** You may have a great finance and accounting department or sales reporting system that really "crosses the Ts and dots the Is"; well, that is barely half of the story. The other half remains outside of your office and well beyond the reach of daily, weekly or monthly reports, balance sheets or income statements. A manager will never know the rest of the story while hiding in their office.
- 2. You get the real story from your staff:** We are not talking about rumors here but instead the day to day "Here is the real reason that things are the way they are" story. For example, I have been dead set against using a certain function in our computer management system, until recently one of our junior staff members shared some difficulties that she encountered that might have been solved by this function. Our office will now at least have a dialogue on the pros and cons of starting to use that function.

3. **You get the real story from other divisions:** It is arrogant to think that you know everything you need to know across your organization. At the same time it is foolish to think that you will be told everything that you need to know for you to be successful in your duties. Most of my information comes first hand. Why? MBWA!
4. **People trust someone they see frequently:** I refer to this as a relationship piggy bank. Each time you have a positive interaction with individuals in your organization; it is another quarter or a dime in the "positive piggy bank". Eventually you are very likely to make a decision that upsets a coworker. But if that person has seen you 100 times and 99 of those times has been in a positive light, they are far more likely to still work with you than if they never got to know you well. You can make that small withdrawal from the bank and still accomplish your duties with effectiveness.
5. **You create happenstance.** As I think back upon some of my more casual meetings, some of them have resulted in the largest and most impactful events that our office presently offers to our stakeholders. Each interaction outside of the office creates happenstance that brings you into contact with more people, more information and more ideas. Further, it allows you to be more vigilant and to better predict possible pitfalls or bends in the road.

#### **Benefits of MBWA**

1. There are a lot of advantages in organisation by using the technique of MBWA. We will discuss these advantages in three parts. There are three core benefits to using the method as a management strategy: improvements in communication and employee-superior relationships, effective operational focus, and enhanced efficiency. The table below outlines the benefits in more detail.
2. **Creating stronger communication channels and improving employee-superior relationships :-**
  - **Improvement in listening skill** - The strategy forces the management to improve the way it communicates with the subordinates. It emphasizes the importance of good communication throughout the organization. The managers teach the practice of listening effectively and talking efficiently to the subordinates.
  - **Healthy environment** -The enhanced level of communication helps create an environment of openness. The discussions are based on positive exchange of ideas and not enforcement. The managers are not enforcing communication, but make it part of the fabric of the organization.
  - **Good relations-** The relaxed and regular communication has been shown to improve relationships and make subordinates feel more motivated about their work.
  - **Less labour turnover** -The above breeds understanding within the organization, as people feel listened to. Feeling like you are part of the organization and valued by your managers can help boost employee motivation and loyalty. If you are treated well by your organization, you most likely won't want to leave elsewhere in the immediate future.



### **3. Helping everyone focus on the correct operational aspects with work**

- **Enhanced understanding** - The manager meets subordinates in the actual work situation and environment and therefore, gets a first-hand experience of what is going on. This allows him or her to have a better sense of the things that are happening around him and it will result in enhanced understanding of the strengths and weaknesses of the organization.
- **Feedback facilities** - MBWA strengthens an environment of feedback, in which the subordinates can provide the manager with ideas, tips and suggestions to act upon.
- **Get a realistic idea** - The 'management bubble' is removed and managers don't just see what they want to see or what the employees want to present them, but get a realistic idea of what is going on.

### **4. Improving the organization's efficiency**

- **Enhancing operational efficiency-** Both of the above points can lead to enhancing operational efficiency. The positive work environment increases work motivation and the managers have a better understanding of the correct operations decisions that must be made.
- **Quickly solve the problem-** The management will be able to clear problems quicker by meeting people face-to-face, rather than relying on writing a string of e-mails. Instead of waiting for a reply, a manager can simply go and ask about the situation.
- **Immediately action-** This also means the feedback on problems and ideas is instant, resulting in faster actions. The subordinate or the manager doesn't have to wait for the 'right' moment, but can make adjustments immediately when things arise and are solved. If clarification is required, it can be dealt with on the spot.

#### **How can MBWA become successful?**

If we want that MBWA will be successfully implemented in our organisation then we have to follow some suggestions described by Stevens for doing it right. These are as follows-

**1. Make MBWA part of your routine.** Dropping in on employees' workspaces for an informal chat is most effective if you don't do it on any fixed schedule, since "you'll realize the greatest returns by seeing what is going on when people aren't prepared for you," Stevens says. But do plan for a bit of MBWA on your own calendar every day, if you possibly can, even if it's only for half an hour: "The more often you do it, the more beneficial it is."

**2. Don't bring an entourage.** MBWA works best as a continual stream of one-on-one conversations with individual employees. Bringing aides or assistants with you will probably just inhibit the discussion by making people more self-conscious or, worse; make them feel you're ganging up on them.

**3. Visit everybody.** As anyone might guess who's familiar with how office rumor mills get spinning, dropping in on some folks more often than others is likely to create the wrong kind of buzz. Try to spend roughly the same amount of time — not

necessarily all in the same day or even the same week, but over the long run — with each person who reports to you.

**4. Ask for suggestions, and recognize good ideas.** “Ask each employee for his or her thoughts about how to improve products, processes, sales, or service,” Stevens says. Then, if someone’s idea leads to a positive result, make it known whose suggestion it was and show you’re ready to give credit where it’s due.

**5. Follow up with answers.** If you can’t answer an employee’s question off the top of your head, don’t forget to get back to him or she with an answer later, Stevens suggests. Besides being common courtesy, it builds trust.

**6. Don’t criticize.** Remember, you’re on a fact-finding mission, with the secondary purpose of building rapport. To avoid undermining those aims, Stevens says, “If you find that an employee isn’t performing his or her job correctly, don’t attempt to change the behavior on the spot. Instead, make a note of it and address the problem at another time and in another setting.”

Clearly, MBWA takes some extra time and effort, but apart from any tangible payoff it might yield down the road, you might even find that you enjoy it. Stranger things have happened.

**7. Talkback:** If you’re a manager, have you tried MBWA? If your boss is prone to dropping in on you, do you find it distracting or do you welcome it? Leave a comment below.

By using of these suggestions we can easily implement MBWA successfully.

#### **How to Manage by Wandering Around**

The biggest challenge when implementing MBWA is to overcome the habit of being "too busy," and to start walking around. These tips can help you to get going.

#### **Relax**

People will sense your casualness and they'll respond accordingly. Stiff discussions held in formal spaces will lead to rigid responses, so keep your team members at ease with relaxed and unstructured conversations. Hold these where people will likely feel relaxed such as at their desks or in a neutral place, rather than in your office. Watch your body language, too, and your dress. Turning up at a production line wearing a crisp pinstriped suit, for instance, may distance you from your people and put them off talking to you.

#### **Listen and observe more than you talk**

Take care to sound inquisitive rather than intrusive. You can ask your people what they're working on, how comfortable they feel doing their jobs, what they find difficult, whether they see how their work contributes to "the big picture," and so on. Ask them for ideas about how to make things better.

Hold back from saying what you think, and listen actively to your team members' replies. Give them your undivided attention. When they see that you're interested in what they have to say, they'll likely be more open and receptive, and you'll build rapport.

When you talk, be open and truthful. If you don't know the answer to someone's question, find it out afterward and follow up. If you can't share something, say so. Telling half-truths can break down trust, and trust is crucial for successful MBWA.

To take it a step further, consider trying out your team members' work, to experience what they experience and to understand the issues that they face.

## **Conclusion**

"Wandering around" may seem easy to do and harmless enough, but it's important to do it right. Research has shown that simply being physically present with your people isn't enough. It's the post-walk actions that you take and the problems that you solve that will determine the success of your MBWA strategy. If you don't strike the right balance, you can wind up doing more harm than good.

Don't, for example, do MBWA just because you feel obliged to – this probably won't work very well. You must truly want to get to know your staff and operations, and you have to commit to following up on people's concerns and to seeking continuous improvement. A big benefit of MBWA is that people can be open with you, but, if you "shut down" when you hear a negative comment or fail to follow up when you promise to do so, they might perceive you as defensive or as someone who doesn't keep his word. Gauging the level of trust within your environment is important because, if people don't trust you, MBWA could make them think that you're interfering or spying. It's also important to consider your team members' preferences and to tailor your approach to these. For example, one team member may be happy for you to offer suggestions for improvements within earshot of co-workers, but another might be embarrassed by it, or even get angry about it.

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## **Management Goal Setting To Organisational Results: Transforming Strategies Into Action**

**Jyoti Nirban\***

### **Introduction**

What is strategy, strategy is a plan or course of action which is of vital pervasive or continuing importance to the organization as a whole. In simple terms, strategy is a planned or emergent course of action that is expected to contribute to the achievement of organizational goals. Strategy can also be an idea or a thought that is viewed to be productive to complete a course of action.

### **Simple Planning Models To Get Started**

Who, what, and why

If we study the examples of ARTOS INDUSTRIES LIMITED. Artos soft drinks limited, Ramachand rapuram, was one of the leading soft drinks industrial unit during 1960s in Andra Pradesh consumption of soft drinks was a luxurious item for most of the consumers during this period in the region. Strategic themes of the company during this period includes:

- A----**
- 1- Develop its brand as a major brand with market leadership.
  - 2- Sophisticated, yet efficient, operating systems.
  - 3- Create the awareness among customers about soft drink consumption.

Explanation- the Company could implement the first strategy. It could become the leader in the area through its niche strategy which a few followers. Then Artos soft drinks limited merged with closest competitors in 2002. During 1980's the company's sales declined year by year and reached the lowest level of Rs 2 lakh. The board of directors meeting was called by management and considered several alternative strategies.

**B----**1- Conversion of soft drink manufacturing plant into beer manufacturing plant with additional investment.

- 2- Turn around the existing company
- 3- Diversiting the present company as it is
- 4- Merge with the new company

Explanation- the Board of Directors after considering SWOT analysis of each of the above strategies selected the strategy of converting the existing plant and facilities to produce beer as the competition in beer industry was significantly less? The company changed its name as ARTOS industries limited in 1982

### **Strategy and Social Responsibility**

#### **1 TRADITIONAL VIEW**

In traditional societies, the prime purpose of business was profit maximization. Even as late as 1970, Milton Friedman stated that "the business of business is business". In the other words, the only objective of business is the making of profits.

#### **2 MODERN VIEWS**

It is now being increasingly recognized that the business is not an end in itself. It is only a means to an end. That end is man, be it a worker, customer, consumer or any member of

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\* M.com, UGC Net (commerce)

society. It is also recognized that business is a social and economic institution which cannot live in isolation.

The establishment and development of business is dependent on the contributions made by society. Society has to bear the cost and consequences of the establishment and operations of business.

### **Strategy and Business Ethics**

To perform the activities more ethically, judiciously and wisely. Business has the responsibility of product selectivity in the sense that it has to produce the goods and render the services that contribute to the welfare and well-being of the people at large.

#### **“5 steps to convert strategic plan into action”**

- 1- Define your strategic forms areas.
- 2- Create at least one measurable outcome for each forms area.
- 3- Design pathfinder projects with milestones.
- 4- Draft a short strategic action plan.
- 5- Commit to a plan and review process.

### **Corporate Strategic Failures**

Management of almost all the companies makes strategic decisions systematically and yet some of the companies fail to achieve their basic purpose of survival while other companies fail to achieve the objectives like earning profits as well as maximizing shareholder's wealth.

Around 30,000 companies were established in USA in 2003, but about 95% collapsed in the following year itself. Success is transient and sustained superior. Performance can be claimed by just a few companies.

Therefore, one should understand not only the strategies of successful companies, but also the strategies of failed companies in order to prevent the possible failure of achievement of strategic goals. Now, we shall study various cases of failed companies in order to draw lessons.

#### **1- Strategic failure of Satyam computer Services**

The saga of Satyam computers will go down as the worst episode of corporate governance failure in corporate India. The fraud which is in excess of Rs 7000 crore, is unfortunately of a truly global scale. Post the aborted merger with Maytas, many had suspected that Ramalinga Raju and family were heavily leveraged at a personal level, struck in property and thus, needed a bail-out. Nobody however, suspected that Satyam itself was a fraud, with no cash and a now- existent margin structure.

Lessons- unethical practices of auditors, accountants, management and credit – rating firms together contributed for the failure of Satyam computer services limited.

#### **2- Failure of Dot.COM**

One of the biggest mistake early Dot.com businesses made was that they were more interested in attracting visitors to their website but not necessarily winning them over to customers.

A dot.com company (or simply a dot.com) does its business on the Internet. Many dot.coms were found to take advantage of the surplus of venture capital funding. Some were launched with very thin business plans. The stated goal was often to “get big fast”, the exit strategy usually included an IPO and a large pay off for the founders with the stock market crash around the year 2000 that ended the dot.com bubble, many failed and failing dot.com



companies were referred to punningly as dot.bombs , many of the surviving firms dropped the suffix from their name.

Lessons- Failure of most of the dot.coms was due to lack of business plans and strategic approach to establishment and growth of business organization and a goal of earning fast money.

Now, we shall study a few strategic failures in case of corporate level strategies and functional levels strategies.

### **Conclusion**

Strategic failure of companies and lessons learnt indicate that corporate governance as well as business ethics play a vital role for preventing failure and help for sustainable growth.

Though the management make all possible efforts with utmost care and formulate and implement strategies with utmost seriousness, companies declare bankruptcy that needs to the laws of all capitals as well as colossal waste of nations economic and other resources.

After developing a number of strategic alternatives, they should be evaluated against the criteria in order to select the best strategy.

**References:** various internet sources & book by P. Subba Rao - Business policy & strategic management

## ANALYSIS OF $m^{\text{th}}$ ROOT METRIC ON THE HYPERSURFACE OF A FINSLER SPACE

**Dr. Anil Kumar Jaiswal\***

### 1. Introduction

The theory of  $m^{\text{th}}$  - root metric has been first developed by H. Shimada ([9]) as an interesting example of Finsler metric, immediately M Mastsumoto and S Numata's theory of cubic metric ([5]). By introducing the regularity of the metric various fundamental quantities as a Finsler metric has been found in 1995 by M. Mastsumoto and K. Okubo ([6]). They have obtained the Cartan's and Berwald's connection of a Finsler space  $m^{\text{th}}$  – root metric.

On the other hand, the theory of hyper surfaces of a Finsler space has been developed in 1985 by M. Matsumoto ([3]). He has obtained the induced Finsler connection, second fundamental h and v-tensors, normal curvature, the torsion and curvature tensors of induced Berwald's and Hashiguchi's connection.

In this paper we have considered the hyper surfaces of a Finsler space with  $m^{\text{th}}$  – root metric and obtained the Finsler connection  $1^* CT$  induced from the Finsler connection  $* CT$  which has been introduced in ([9]) by H. Shimada.

### 2. The $m^{\text{th}}$ – root metric

The  $m^{\text{th}}$  – root metric  $L(x,y)$  of an n-dimensional differentiable manifold  $M^n$  is first defined by H. Shimada ([9])

$$(2.1) \quad L(x, y)^m = a_{i_1 i_2 \dots i_m}(x) y^{i_1} y^{i_2} \dots y^{i_m}$$

where the coefficients  $a_{i_1 i_2 \dots i_m}(x)$  are components of a symmetric tensor field covariant of order m. Consequently the second root metric, is of course, A Riemannian metric and we shall restrict  $m > 2$  throughout this paper. The third and fourth root metric are specially interesting and have the well known names.

$L^3 = a_{ijk}(x) y^i y^j y^k \dots \dots \dots$  cubic metric ([1],[5])

$L^4 = a_{hijk}(x) y^h y^i y^j y^k \dots \dots \dots$  quartic metric ([7])

Let us first define the tensors  $a_i(x, y)$ ,  $a_{ij}(x, y)$ , and  $a_{ijk}(x, y)$  of Finsler space

$F^n = (M^n, L(x, y))$  with  $m^{\text{th}}$  – root metric  $L(x,y)$  as follows :

$$(2.2) \quad \left[ \begin{array}{l} (a) \quad L^{m-1} a_i = a_{i j_1 \dots j_{m-1}} y^{j_1} \dots y^{j_{m-1}}, \\ (b) \quad L^{m-2} a_{ij} = a_{ij k_1 \dots k_{m-2}} y^{k_1} \dots y^{k_{m-2}}, \\ (c) \quad L^{m-3} a_{ijk} = a_{ijk l_1 \dots l_{m-3}} y^{l_1} \dots y^{l_{m-3}} \end{array} \right.$$

Then the normalized supporting element  $l_i = \frac{\partial L}{\partial y^i}$ , the angular metric tensor

$h_{ij} = L(\frac{\partial l_i}{\partial y^j} + \frac{\partial l_j}{\partial y^i})$  the fundamental tensor  $g_{ij} = \frac{\partial^2 L}{\partial y^i \partial y^j}$  ( $L^2/2$ ) and the C- tensor  $g_{ijk} = \frac{\partial^3 L}{\partial y^i \partial y^j \partial y^k}$

( $L^2/2$ ) of  $F^n$  are written as -

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$$(2.3) \begin{cases} (a) \quad 1_i = a_i & (b) \quad h_{ij} = (m-1)(a_{ij} - a_i a_j), \\ (c) \quad g_{ij} = (m-1)a_{ij} - (m-2)a_i a_j, \\ (c) \quad 2L g_{ijk} = (m-1)(m-2)(a_{ijk} - a_{ij} a_k - a_{jk} a_i - a_{ki} a_j + 2a_i a_j a_k) \end{cases}$$

The tensor  $a_{ij}(x,y)$  defined by (2.2) b is called the basic tensor, because this played an important role in the papers ([5],[9]) The metric L is called regular if the basic tensor has the non- vanishing determinant. Throughout this paper we suppose the regularity of the metric. If  $a^{ij}(x,y)$  denote the reciprocal of  $a_{ij}(x,y)$  and define

$$(2.4) \quad a^i = a^{ih} a_h, \quad a^{kij} = a^{kh} a_{hij},$$

Then the reciprocal  $g^{ij}(x,y)$  of the fundamental tensor  $g_{ij}(x,y)$  and  $l^i = y^i/L = g^{ih} l_h$  are written as -

$$(2.5) \quad (m-1) g^{ij} = a^{ij} + (m-2) a^i a^j, \quad l^i = a^i$$

We shall consider the Berwald connection  $B\Gamma = (G_{jk}^i, G_j^i, 0)$  and the Cartan connection  $C\Gamma = (\Gamma_{jk}^{*i}, G_j^i, g_{jk}^i)$  of  $F^n$  ([1], [4]) In the paper ([9]) the following important theorem has been shown.

**Theorem (2.1)** In a Finsler space with regular  $m^{\text{th}}$ - root metric a Finsler connection  $*C\Gamma = (*F_{jk}^i, *G_j^i, *C_{jk}^i)$  is uniquely determined from basic tensor  $a_{ij}(x,y)$  by the four axioms as follows:

1. h- and v-metrical :  $a_{ij|k} = a_{ij} |_{k} = 0,$
2. h- symmetric :  $*T_{jk}^i = *F_{jk}^i - *F_{kj}^i = 0,$
3. v- symmetric :  $*S_{jk}^i = *C_{jk}^i - *C_{kj}^i = 0,$
4. vanishing deflection:  $*D_j^i = *F_{kj}^i y^k - *G_j^i = 0.$

Then  $(*F_{jk}^i, *G_j^i)$  coincide with  $(\Gamma_{jk}^{*i}, G_j^i)$  of  $C\Gamma$ , while we have

$$(2.6) \quad *C_{jk}^i = g_{jk}^i + \frac{(m-2)}{(m-1)L} h_{jk} l^i$$

### 3. Induced Finsler connection

Let  $F^{n-1}$  be a hyper surface of  $F^n$ , given by the equation

$$(3.1) \quad x^i = x^i(u^\alpha)$$

Throughout this paper the Latin indices  $i, j, k, \dots$  varies from 1 to  $n$  whereas the Greek indices  $\alpha, \beta, \gamma, \dots$  Varies from 1 to  $n-1$ .

Suppose that the matrix of the projection factor  $B_\alpha^i = \frac{\partial x^i}{\partial u^\alpha} = \partial_\alpha x^i$  is of rank  $n-1$ . The element of support  $y^i$  of  $F^n$  is to be taken tangential to  $F^{n-1}$  i.e.

$$(3.2) \quad y^i = B_\alpha^i(u) v^\alpha.$$

Thus  $v^\alpha$  is the element of support of  $F^{n-1}$  at a point  $u^\alpha$ . The metric tensor  $g_{\alpha\beta}$  and C-tensor  $g_{\alpha\beta\gamma}$  of  $F^{n-1}$  are given by

$$(3.3) \quad g_{\alpha\beta} = g_{ij} B_\alpha^i B_\beta^j, \quad g_{\alpha\beta\gamma} = g_{ijk} B_\alpha^i B_\beta^j B_\gamma^k.$$

At each point  $u^\alpha$  of  $F^{n-1}$ . a unit normal vector  $N^i(u, v)$  is defined by

$$(3.4) \quad g_{ij}(x(u), y(u, v)) B_\alpha^i N^j = 0, \quad g_{ij}(x(u), y(u, v)) N^i N^j = 1$$

As for the angular metric tensor  $h_{ij}$  we have

$$h_{\alpha\beta} = h_{ij} B_\alpha^i B_\beta^j, \quad h_{ij} B_\alpha^i N^j = 0, \quad h_{ij} N^i N^j = 1.$$

If  $(B_\alpha^i, N_i)$  denote the inverse of  $(B_\alpha^i, N^i)$ , then we have

$$(3.5) \quad \begin{cases} B_i^\alpha = g^{\alpha\beta} g_{ij} B_\beta^j, & B_\alpha^i B_i^\beta = \delta_\alpha^\beta, & B_i^\alpha N^i = 0 \\ B_i^\alpha N_i = 0, & N_i = g_{ij} N_j, & B_\alpha^i B_j^\alpha + N^i N_j = \delta_j^i \end{cases}$$

We introduce important tensors from C-tensor  $g_{ijk}$  :

$$(3.6) \quad M_{\alpha\beta} = g_{ijk} B^i_\alpha B^j_\beta N^k, \quad M_\alpha = g_{ijk} B^i_\alpha N^j N^k, \quad M = g_{ijk} N^i N^j N^k$$

We are concerned with Finsler space  $(F^n, F\Gamma)$  equipped with a Finsler connection  $F\Gamma = (F_{jk}^i, N_j^i, C_{jk}^i)$ . The induced connection  $IF\Gamma = (F_{\beta\gamma}^\alpha, N_\beta^\alpha, C_{\beta\gamma}^\alpha)$  on a hypersurface  $F^{n-1} =$  of the Finsler space  $(F^n, F\Gamma)$  is given by = ([3])

$$(3.7) \quad F_{\beta\gamma}^\alpha = B^{\alpha}_i \{ B_{\beta\gamma}^i + B^j_\beta (F_{jk}^i B_\gamma^k + C_{jk}^i N^k H_\gamma) \},$$

$$(3.8) \quad N_\beta^\alpha = B^{\alpha}_i \{ B_0^i_\beta + N^j_\beta B^i_j \},$$

$$(3.9) \quad C_{\beta\gamma}^\alpha = B^{\alpha}_i C_{jk}^i B_\beta^j B_\gamma^k,$$

where  $B_{\beta\gamma}^i = \partial_\beta \partial_\gamma x^i$ ,  $B_0^i_\beta = B_\gamma^i v^\gamma$  and

$$(3.10) \quad H_\beta = N, (B_0^i_\beta + N^j_\beta B^i_j).$$

The vector whose components are  $H_\beta$  is called normal curvature vector of  $F^{n-1}$ . The h- and v- covariant differentiations to the projection factor  $B^i_\alpha$  are given by

$$(3.11) \quad B^i_{\alpha|\beta} = H_{\alpha\beta} N^i, \quad B^i_\alpha|\beta = K_{\alpha\beta} N^i,$$

where

$$(3.12) \quad H_{\alpha\beta} = N_i \{ B^i_{\alpha\beta} + B^j_\alpha (F_{jk}^i B_\beta^k + C_{jk}^i N^k H_\beta) \},$$

$$(3.13) \quad K_{\alpha\beta} = N_i C_{jk}^i B^j_\alpha B^k_\beta.$$

The tensors  $H_{\alpha\beta}$  and  $K_{\alpha\beta}$  defined by [3.12] are called second fundamental h- and v- tensors, respectively for Finsler connection  $F\Gamma$  ([3]).

#### 4. Induced Finsler connection of hypersurface of $F^n$ with $m^{\text{th}}$ root metric

From equation (2.1) and (3.2) it follows that the induced metric  $\underline{L}(u, v)$  of  $F^{n-1}$  is given by

$$(4.1) \quad \underline{L}(u, v)^m = a_{\alpha_1, \dots, \alpha_m} v^{\alpha_1} \dots v^{\alpha_m}$$

where  $a_{\alpha_1, \dots, \alpha_m}(u) = a_{i_1, \dots, i_m} B^i_{\alpha_1} \dots B^i_{\alpha_m}$

Therefore, we have

**Lemma (4.1).** The hypersurface of a Finsler space with  $m^{\text{th}}$  - root metric is also a Finsler space with  $m^{\text{th}}$  - root metric.

Since  $\underline{L}(u, v) = L(x, y)$ , we have  $l_\alpha = l_i B^i_\alpha$  where  $l_\alpha = \partial_\alpha \underline{L}$ . Thus equations (2.3) and (3.3) give

$$(4.2) \quad a_\alpha = a_i B^i_\alpha, \quad a_{\alpha\beta} = a_{ij} B^i_\alpha B^j_\beta, \quad a_{\alpha\beta\gamma} = a_{ijk} B^i_\alpha B^j_\beta B^k_\gamma$$

where,  $a_\alpha, a_{\alpha\beta}, a_{\alpha\beta\gamma}$  are quantities of  $F^{n-1}$  corresponding to the as defined in (2.2) for  $F^n$ .

Since,  $a_i = l_i$  is tangential to the hypersurface  $F^{n-1}$ . Therefore  $a_i N^i = 0$  which in view of (2.3)c and (3.4) gives

$$(4.3) \quad a_{ij} B^i_\alpha N^j = 0, \quad a_{ij} N^i N^j = 1/(m-1)$$

Using equation (3.11), (3.13), (4.2) and (4.3) in the formula ({3})

$$a_{i|j|\beta} = a_{i|j|k} B^k_\beta + a_{ij|k} N^k H_\beta, \quad a_{ij|\beta} = a_{ij|k} B^k_\beta,$$

We get

$$(4.4) \quad a_{\alpha\beta|\gamma} = a_{i|j|k} B_{\alpha}^i B_{\beta}^j B_{\gamma}^k + a_{i|j|k} B_{\alpha}^i B_{\beta}^j N^k H_{\gamma},$$

$$(4.5) \quad a_{\alpha\beta|\gamma} = a_{i|j|k} B_{\alpha}^i B_{\beta}^j B_{\gamma}^k.$$

From (3.7) it follows that

$$(4.6) \quad T_{\beta\gamma}^{\alpha} = F_{\beta\gamma}^{\alpha} - F_{\gamma\beta}^{\alpha} = B_i^{\alpha} \{ T_{jk}^i B_{\beta}^j B_{\gamma}^k + C_{jk}^i (B_{\beta}^j H_{\gamma} - B_{\gamma}^j H_{\beta}) N^k \}$$

The deflection tensor  $D^{\alpha}_{\gamma} = v^{\beta} F_{\beta\gamma}^{\alpha} - N^{\alpha}_{\gamma}$  of induced Finsler connection  $I\Gamma$  is given by ([3])

$$(4.7) \quad D^{\alpha}_{\gamma} = B_i^{\alpha} (D_{jk}^i B_{\gamma}^k + C_{0k}^i N^k H_{\gamma}).$$

The v- torsion tensor  $S_{\beta\gamma}^{\alpha} = C_{\beta\gamma}^{\alpha} - C_{\gamma\beta}^{\alpha}$  of  $I\Gamma$  obtained from (3.9) and is given by

$$(4.8) \quad S_{\beta\gamma}^{\alpha} = B_i^{\alpha} S_{jk}^i B_{\beta}^j B_{\gamma}^k.$$

Now, we are concerned with enveloping space  $F^n = (M^n, L(x, y))$  which is to be endowed with the Finsler connection  $*C\Gamma = (*F_{jk}^i, *G^1_j, *C_{jk}^i)$  given in theorem (2.1).

Applying axioms of theorem (2.1) to the equations (4.4), (4.5), (4.6), (4.7), (4.8) and using equations (3.6), (2.6) we get

$$(4.9) \quad \begin{aligned} (a) \quad a_{\alpha\beta|\gamma} &= a_{\alpha\beta|\gamma} = 0, & (b) \quad *T_{\beta\gamma}^{\alpha} &= M^{\alpha}_{\beta} H_{\gamma} - M^{\alpha}_{\gamma} H_{\beta}, \\ (c) \quad *D^{\alpha}_{\gamma} &= 0 & (d) \quad *S_{\beta\gamma}^{\alpha} &= 0. \end{aligned}$$

where,  $M^{\alpha}_{\beta} = g^{\alpha\gamma} M_{\beta\gamma}$  and we have used the fact that  $g^i_k = 0, h_0_k = 0, *C_{0k}^i = 0$

Hence, we have the following:

**Theorem (4.1).** The connection  $I*C\Gamma$  of a hypersurface of a Finsler space  $F^n$  induced from the Finsler connection  $*C\Gamma$  of  $F^n$ , is a generalized Finsler connection which is uniquely determined from the induced metric  $L(u, v)$  by the following axioms:

1. h-and v-metrical  $a_{\alpha\beta|\gamma} = a_{\alpha\beta|\gamma} = 0$
2. The (h) h-torsion:  $*T_{\beta\gamma}^{\alpha}$  is given by (4.9)b.
3. v-symmetric:  $*S_{\beta\gamma}^{\alpha} = 0$ .
4. vanishing deflection:  $*D^{\alpha}_{\gamma} = 0$ .

Now, we shall prove the following:

**Theorem (4.2).** The induced connection  $I*C\Gamma$  of  $F^{n-1}$  coincide with the intrinsic Finsler connection  $*C\Gamma$  of  $F^{n-1}$  if and only if  $M_{\alpha\beta} = 0$  or  $H_{\beta} = 0$

**Proof:** It is obvious from theorem (4.1) (that  $I*C\Gamma$  coincide with  $*C\Gamma$  if and only if  $*T_{\beta\gamma}^{\alpha} = 0$  i.e.

$$M^{\alpha}_{\beta} H_{\gamma} - M^{\alpha}_{\gamma} H_{\beta} = 0$$

If  $H_{\beta} \neq 0$ , we have quantities  $h^{\alpha}$  satisfying  $M^{\alpha}_{\beta} = h^{\alpha} H_{\beta}$ . From  $h_{\alpha} H_{\gamma} = h_{\gamma} H_{\alpha}$  we get a quantity  $h$  satisfying  $h_{\alpha} = h H_{\alpha}$ , and so  $M_{\alpha\gamma} = h H_{\alpha} H_{\gamma}$ . Then  $M_{\alpha 0} = 0$  leads to  $h H_0 = 0$ . Since  $H_0 = 0$  implies  $H_{\alpha} = 0$ , we get  $h = 0$  and so  $M_{\alpha\gamma} = 0$ .

H. Rund ([8]) paid attention to great importance of  $M_{\alpha\beta}$ ,  $M_{\alpha}$ , and  $M$  as defined by (3.6) and G.M. Brown ([2]) studied them in detail. As one importance is that vanishing of  $M_{\alpha\beta}$  implies that  $B^{\alpha}_i$  is independent of  $v^{\beta}$  and vanishing of  $M_{\alpha}$  implies that  $N_i$  is independent of directional arguments  $v^{\beta}$ . The importance of  $M_{\alpha\beta}$  has also been stated in theorem (4.2). Therefore we find the values of these tensors in hyper surface of a Finsler space with  $m^{\text{th}}$  – root metric.

From (2.3)d, (3.6), (4.2) and (4.3) it follows that tensors  $M_{\alpha\beta}$ ,  $M_{\alpha}$  and scalar  $M$  are Given by

$$2L M_{\alpha\beta} = (m - 1) (m - 2) a_{i|j|k} B^i_{\alpha} B^j_{\beta} N^k,$$



$$2L M_{\alpha} = (m - 1) (m - 2) [a_{i j k} B^i_{\alpha} N^j N^k - \{1/(m - 1)\} a_{\alpha}],$$
$$2 L M = (m - 1) ( m - 2) a_{i j k} N^i N^j N^k.$$

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## **Demonetization in India**

**Ms. PRIYANKA RANI\***

### **Abstract**

The paper discusses about the move of demonetization taken by central government of India on 8<sup>th</sup> November 2016, with respect to its reasons and effects on different sectors on India. The sectors cover micro-Business, E-wallet businesses, online retail stores and so on. This paper is based on the experience of impact of demonetization in various sectors and to analyze the current and immediate impact of demonetization on Indian economy. The paper is based in secondary data collection methods.

### **Introduction**

Demonetization is a situation where the Central Bank of the country withdraws the currency unit of its status as legal tender. It is a process of eliminate a currency from general usage or circulation of money in a country. It is an act where the old unit of currency gets retired and replaced with a new currency unit. RBI issues new two thousand rupee notes and five hundred rupees notes which were in circulation from 10<sup>th</sup> November 2016. Notes of one Hundred, fifty, twenty, ten, five, and two and also one rupee were remaining unaffected by this decision. It was also being considered as withdrawal of a specific currency from market.

### **How Paper Currency Came In India**

For this, we have to look into history of birth of paper currency on India as how use of paper currency had been started in India.

Until the 18<sup>th</sup> century, people in India used to use silver and gold coins to carry out their day to day transactions. But, and then some European companies established their own banks in the region to carry out their business transactions like the Bank of Hindustan in Calcutta. They introduced the very first versions of Indian paper notes which then boosted the further popularized the use of paper currency. The Bank of Bengal went on to release notes that shows a small image of a female figure meant to represent the ideas of commerce, banks name and denomination in three scripts: Urdu, Bengali and nagri. However, it was only the paper currency after the act of 1861 that the British colonial government involved in generating money establishing the paper currency as we know it today

### **Research Methodology**

The paper is based on secondary data. The data has been collected from internet, books, journals and other research papers.

### **Demonetization in India**

#### **1) BEFORE NOVEMBER 2016**

This act is not happening first time in India, but it has happened twice, first in the year of 1946 and then in the year of 1978. In January, 1946 Rs.1000 and Rs. 10000 bank notes were withdrawn and in the year 1978 Rs.1000, Rs. 500 and Rs. 10000 notes were withdrawn on 16<sup>th</sup> January by the janata party government.

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## **2) IN NOVEMBER 2016**

On Tuesday, 8<sup>th</sup> November Prime Minister of India Narendra Modi announced the demonetization of Rs. 500 and Rs. 1000 notes with effect from midnight, making these notes invalid.

### **Objectives of Demonetization**

According to RBI, the most important reasons for the demonetization of 500 and 1000 rupee were the rise of fake currencies of same notes, and also the higher occurrence of black money. The main objectives are:

- 1) To tackle black money in the economy.
- 2) To lower the cash circulation in the country by which corruption can be reduced.
- 3) To eliminate fake currency and dodgy (unreliable or dishonest) funds which have been used by terror groups to fund terrorism in India

But, it has been taken care by government that the public that a person who changed his higher value cash will get exactly the lower denominations.

### **Procedure for Exchange Old Notes**

The RBI laid down a detailed procedure for the exchange of the denominated bank notes with new Rs. 500 and Rs. 2000 bank notes of the Mahatma Gandhi new series and Rs. 100 bank notes of the preceding Mahatma Gandhi series. Citizens will have until **30 DECEMBER 2016** to tender their old banknotes at any office of the RBI or any bank branch and credit the value into their respective bank accounts. Cash withdrawals from bank accounts will be restricted to Rs. 10000 per day and Rs. 20000 per week from 9<sup>th</sup> November 2016 to 24<sup>th</sup> November 2016.

For immediate cash needs the old bank notes of value up to Rs. 4000 per person can be exchanged for the new Rs. 500 and Rs. 2000 bank notes as well as Rs. 100 bank notes over the counter of bank branches from 10<sup>th</sup> November 2016 by filling up a restriction form along with a valid ID proof. The withdrawals limits were to be restricted to Rs. 2000 per day per card up to 18<sup>th</sup> November 2016 and this was raised to Rs. 4000 per day per card after 18<sup>th</sup> November 2016.

### **Effects of Demonetization**

Demonetization created effect on different sectors in different manners resulting into boom for some sector like E-wallet businesses and somewhere resulting into temporary slowdown like vegetable vendors or small seasonal businesses, where most of the transactions are on cash basis. Some sectors are discussed here:

- 1) **TAX:** Having closed the voluntary disclosure window for undisclosed money, it has been reported that government will keep a close watch on deposit over Rs. 2 lakh in cash. This would mean increased tax net income, higher tax collection and a healthy tax to GDP ratio. As the money gets computed and more taxes are collected, government might be thinking to reduce tax rates going forward.
- 2) **INTEREST RATES:** One of the biggest impacts of demonetization would be high value transactions, especially land and gold. This would result in lower inflation, tempting the central bank to reduce interest rates. But, the bigger impact on interest rates will be the liquidity with which banks will be flushed.
- 3) **LIQUIDITY:** Movement of goods and money will be hit in the short.
- 4) **GST:** Demonetization comes at an important as the country heads to a new tax regime with the implementation of GST. Demonetization would increase the tax net and along

with GST result in reduction of black money generation. Along with GST, demonetization will lead to a higher tax.

**5). EFFECT ON MONEY SUPPLY:** With the older 500 and 1000 rupees notes being scrapped, until the new 500 and 2000 rupees notes get widely circulated in the market, money supply is expected to reduce in the short run. Money supply will decrease permanently to the extent that black money does not re-enter the system. However continuously as the new notes get dispersed in the market and the disproportion gets corrected, money supply will pick up.

**6). EFFECT ON DEMAND:** The overall demand is expected to be affected to an extent. The effect of demonetization on different sectors in different manners resulting into boom for some sector like E-wallet businesses and somewhere resulting into temporary slowdown like vegetable vendors or small seasonal businesses.

**7). EFFECT ON PRICES:** The Price level is expected to be lowered due to moderation from demand side. The demand driven fall in prices could be understood as follows:

a) **CONSUMER GOODS:** Prices are expected to fall only insignificantly due to moderation in demand as use of electronic medium would compensate for some purchases.

b) **REAL ESTATE AND PROPERTY:** Prices in this sector are largely expected for sales of properties where major part of the transaction is cash based, rather than based on banks transfer or cheques transactions. In the medium term, however the prices in this sector could recapture some levels as developers' reliance their prices. The Indian real estate market which is largely disintegrated and messed up has had goodwill of being a safe haven for black money and therefore we expect to see impact on the sector. The impact is same to be seen in secondary markets.

**8). EFFECT ON VARIOUS ECONOMIC ENTITIES:** With cash transactions lowering in the short run, until the new notes are spread widely into circulation, certain sections of the society could face short term disruptions in facilitation of their transactions. These

Sections are:

- Small traders
- SME
- Services sector
- Households
- Political parties
- Retail outlets

**9). EFFECT ON BANKS:** 500 and 1000 rupees notes which now cease to be legal tender are to be deposited or exchanged in banks. This will naturally lead to more and more amounts being deposited in both the accounts of commercial banks which will boost the liquidity position of the banks.

**10). EFFECT ON ONLINE TRANSACTIONS AND ALTERNATIVE MODES OF PAYMENT:** The paper discusses about the move of demonetization taken by central government of India on 8<sup>th</sup> November 2016, with respect to its reasons and effects on different sectors on India. The sectors cover micro-Business, E-wallet businesses, online retail stores and so on. This paper is based on the experience of impact of demonetization in various sectors and to analyze the current and immediate impact of demonetization on Indian economy. The paper is based in secondary data collection methods.

“A digital wallet is an electronic device which allows an individual to make electronic commerce transactions like payment of bills or online bookings etc. An individual bank account can also be linked to the digital wallet.

Example: pay tm, Google pay etc.

**Conclusion:** Demonetization in India is a great effort taken by Indian government to combat with black money and corruption. It is a bold decision taken by government. This move will have major impact on the parallel economy but sudden announcements and failure to prepare in advance has created temporary chaos and discomfort among the general public. The main purpose of demonetization is eradicating the black money and reduces the corruption. But, Indian financial market, real estate market, FMGG sector, auto assets backed loans etc. all are declined for a short time.

Demonetization though it has created some positive and negative impact on different sectors but in long run it definitely will have the impact in controlling black money and fake currency or we can say the move will hence “short-term pain “but growth gains in the long term. Most of the transactions are entertained through electronic means which makes transparency in the system. Hence, it is beneficial for Indian economy and its growth. It may not control the amount of black money in the nation directly, but nonetheless, it is beneficial for the Indian economy in the future. It makes people based on the electronic medium to transfer funds which reduce frauds.

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## **Journey of Corporate Social Responsibility: Voluntary to Mandatory**

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### **Abstract**

The concept of Corporate Social Responsibility is an emerging issue that has gained increased significance in recent years. The growing focus on CSR is because of new Company's Act 2013 that has changed the attitude of businesses all over the world. At present, the phenomenon of Corporate Social Responsibility has been widely discussed in different scientific and practical discourses worldwide. There are diverse points for discussion regarding the voluntary and mandatory provision of CSR with reference to New Companies Act 2013. In today's highly competitive cut-throat market environment, the firms are under pressure to meet the expectations of different stakeholders in order to survive in the market and compete for their reputational status. Globalization, Ethical values, changing market scenario etc are all adding heat to the concept of CSR. Nowadays, organizations are widely showing their interest towards the CSR either for maintaining their image or to be in line of competition. The current paper focuses on the fundamental shift from philanthropic-based model to a multi-stakeholder approach whereby companies are deemed to be responsible for all the stakeholders, including financial stakeholders, employees and community.

**Keywords:** "Corporate Social Responsibility, Ethical values and Globalization"

### **Introduction**

Business is a part of the society and has to follow and operate within the limits of the rules and regulations prescribed by the society. Corporate social responsibility (CSR) is generally understood as a moral obligation that is supposed to be shown by organizations towards the society in lieu of profits generated through customers who are a part of the same society.

The success of modern business is perceptible, but recently there is a much concern on the business-society relationship. Business ethics, Corporate Social Responsibility and Corporate governance movements have been developed in recent decades as responses to a growing sense of corporate wrongdoing. Ethics plays a dynamic role in the development of strategic plan. Business associations are like other organizations whose members have shared beliefs, values, and formal and informal norms, and mechanism for monitoring member behavior, sanctioning non-compliance, and rewarding compliance with norms. Thus, the essence of Corporate Social Responsibility has two fold. As on the one hand corporate behave ethically towards the stakeholders and on the other hand corporate are also fulfilling their responsibility towards the environment in which it operates its business for the growth and development of the nation.

### **Literature Review**

The concept of Corporate Social Responsibility has an age old practice, which at present emerging as a corporate issue. There are numbers of studies conducted on Corporate Social Responsibility and different scholars have defined it in different manner and underlying

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dimensions. In the words of Votaw “*Corporate Social Responsibility means something, but not always the same thing to everybody*”.

The most appropriate and preliminary definition of CSR is coined by Bowen who is known as the ‘Father of Corporate Social Responsibility’. He described CSR in his publication ‘Social Responsibility of Businessmen’ as “*it refers to the obligations of businessmen to pursue those policies, to make those decisions or to follow those lines of action which are desirable in terms of objectives and values of our society*” (Bowen, 1953). The literature expands this definition by emphasizing the social dimension of Corporate Social Responsibility. Again in 1960 the eminent author David gave meaning to CSR as “*businessmen’s decisions and actions taken for reasons at least partially beyond the firm’s direct economic or technical interest*” (David, 1960).

The social dimension of CSR is classified by (Carroll, 1979) into four major responsibilities as economic, legal, ethical and philanthropic. The Carroll’s model of social obligation constitute economic responsibility of profit making for the existence of the business, legal responsibility to comply to laws and play by the rules, ethical responsibility to act on social class, and philanthropic or discretionary responsibility to be a good corporate citizen to promote social welfare of the community. Corporate Social Responsibility integrates social and environmental concerns in their business operation with the rising social consciousness. The period of 1980 to 2000 bring out the contemporary form of CSR like ethical corporate culture, corporate citizenship etc. In the year 2000, the theme of CSR discussion includes the conversation related to sustainability, sustainable development and corporate governance. The gradual changes in the concept of corporate social responsibility took place as three discrete waves which signify the pressure of society on business to accept more responsibility (Moon, 2002). The decisions of an organization have an impact on the society, where it operates its business (Pulliam, 2003). So, the business must fulfill its social obligations as a compensation for undermining the legitimate interest of the society (Navran, 2002) and (Tseng & Fan 2011).

### **Shifting exemplar of Corporate Social Responsibility**

In the pre-independent era, the philanthropic activities were undertaken for the welfare of the community as many big educational institute and charitable trust were made for the upliftment of the society like Banaras Hindu University, Aligarh Muslim University etc. Business tycoons especially spent a lot of money in their particular interested area as Birla group made a heavy contribution towards the construction of temples all over India. At present there is a paradigm shift from corporate philanthropist to being socially responsible business practices which also creates an organizational goodwill and prosperity in the society.

Trusteeship concept of Mahatma Gandhi has the deep roots of the Corporate Social Responsibility as he said ‘you have asked rich men to be trustees. Is it implied that they should give up private ownership in their property and create out of it a trust valid in the eyes of the law and managed democratically? How will the successor of the present incumbent be determined on his demise?’. Gandhiji has a great vision to make Indian industries socially responsible, he always tried to sensitise the heart of the entrepreneurs towards the labour and marginalized section of the society. In his personal interaction with Birla, he always insists him to be a caretaker of the enterprise.

The notion of Corporate Social Responsibility (CSR) is related to ethical and moral issues concerning corporate decision-making and behavior. The evolution of corporate social

responsibility in India refers to changes over time to time as cultural norms of corporate engagement with Corporate Social Responsibility referring to way that businesses are managed to bring about an overall positive impact on the communities, cultures, societies and environments in which they are operating.

The National Voluntary Guidelines on Social, Environmental and Economic Responsibilities of Business (NVGs), the guidelines which are the pre-version of CSR voluntary guidelines 2009, released by Ministry of Corporate Affairs in 2011 as a directives based guidelines which have no bounded framework, it is only a documents for all businesses irrespective of their size, ownership and sector to fulfil the concept of P3 (People, Planet and Profit). After that in 2012, the Security and Exchange Board of India (SEBI) mandate the Annual Business Responsibility Reporting (ABRR), based on NVGs. The NVGs consist of a set of 9 principles, which mainly focuses on the social, economic, environmental, governance issues and development priorities. A growing number of corporate feel that CSR is not just another form of indirect expense but is important for protecting the goodwill and reputation, defending attacks and increasing business competitiveness.

In an effort to encourage socially responsible companies, an act before the Indian legislature would require companies to spend two percent of their net profits annually on Corporate Social Responsibility (CSR) activities. The Companies Act 2013 includes a CSR annual spending requirement, amongst several other requirements that aim to strengthen corporate governance. Corporate Social Responsibility activities are specified in the act and include ensuring environmental sustainability.

Regarding the new Company Act 2013 notified 1 April 2014 as the date on which the provisions of section 135 and schedule VII of the act shall come into force. The CSR spending requirement would apply to companies registered in India with a net worth in excess of Rs 500 Crore , a turnover of Rs 1,000 Crore or more per year or a net profit of Rs 5 Crore or more per year has to spent 2 per cent of the average net profit made during the three immediately preceding financial years on Corporate social Responsibility activities and report the reason for spending or non-expenditure.

Activities given under Schedule VII of Companies Act 2013:-

1. Eradicating hunger, poverty and malnutrition, Promoting health care which includes preventive healthcare and sanitation [including contribution towards Swachh Bharat Kosh set up by the Government for the promotion of Sanitation (inserted by notification dated 24<sup>th</sup> October 2014)] and making available safe drinking water.
2. Promoting education, which includes special education and employment enhancing vocational skill especially for the children, women, elderly and the differently abled people and livelihood enhancement project.
3. Promoting gender equality, empowering women, setting up homes and hostels, day care centres and such other facilities for women, orphans and senior citizens, measures for reducing inequality faced by socially and economically backward groups.
4. Ensuring environmental sustainability, maintaining ecological balance, protection of flora and fauna, animal welfare, agro forestry, conservation of natural resources and maintaining quality of soil, air and water [including contribution to the clean Ganga fund set up by the central government for rejuvenation of river Ganga (24<sup>th</sup> October 2014)]

5. Protection of national heritage, art and culture including restoration of buildings and sites of historical importance and works of art, setting up of public libraries, promotion and development of traditional arts and handicraft.
6. Measures for the benefit of armed forces veterans, war widows and their dependants
7. Training to promote the rural sports, nationally recognized sports, Paralympic sports and Olympic sports
8. Contribution to the Prime Minister's National Relief Fund or any other fund set up by the Central Government for socio-economic development and relief and welfare of SC/ST/OBC, minorities and women.
9. Contribution or funds provided to technology incubators located within academic institutions which are approved by Central Government.
10. Rural development projects
11. Slum area development (inserted by notification 7<sup>th</sup> August 2014)

India perhaps the first country to provide Corporate Social Responsibility in its statute, countries like Indonesia and France have CSR legislations in a very loose format. The interest shared by India and Indonesia in corporate social responsibility evidences a general trend in Asia overall, as countries seek to enhance domestic laws to promote better corporate practices in the global market. Mr. Narayan Murthy firmly underlines the significance of CSR "For benefits of globalization and technology to reach to the poor, the private sector, philanthropic institutes and individuals should cooperate and establish partnership with Government institutes, to promote and support companies who practice environmental stewardship, social justice, social development, human rights, gender equality, good corporate governance and diversity among others." Former Finance Minister P Chidambaram said if corporate spend 2 % of their profit on CSR activities, then it will have a multiplier effect in bringing out much greater inclusiveness. Corporate Affairs Minister Sachin Pilot has said "our assessment is that if every company that is qualified for doing the Corporate Social Responsibility does so, then Rs 15,000-20,000 Crore would be spent in a year in various projects such as environment, skill development, water, sanitation etc." Bhaskar Chatterjee of IICA explained as Corporate Social Responsibility must benefit marginalized and disadvantaged sections.

### **Conclusion**

There is a need to develop a more coherent and ethically – driven discourse on Corporate Social Responsibility. CSR is not a cost center but an effective and efficient management tool with multi-dimensional benefits. In the imperfect world there always exist a gap between the aspiration expressed in codes and their practical operation, and this gap can be reduced by detailed research into their formation, monitoring and reception by their intended beneficiaries. Transparency is the basis of business ethics-companies that want to be moral and ethical must necessarily be up front about their actions and business strategies – and should also seek to emphasize this when it comes to the matter employees and society development. In order to create an ethical climate a right combination of spirit and structure is required. Mood of the nation is highly admiring the vision of development but industrial and service sector will have to take efforts towards sustainable development and a highly responsible business practices in the arena new Corporate Social Responsibility.

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## 'भारत में कैदियों के संवैधानिक अधिकार और स्थिति का समीक्षात्मक अध्ययन'

डॉ० महेन्द्र कुमार\*

अपराध मानव व्यवहार का एक रूप है। सामाजिक मूल्यों के प्रति कार्य जिसमें समाज की हानि होती है 'अपराध' कहलाता है। अपराध को कानून द्वारा वर्जित माना जाता है। अपराध के अनुपात जुर्माना, जेल में कैद, सुधार भारतीय दण्ड संहिता में दण्ड का प्रावधान किया गया है। मानव समाज का इतिहास जितना पुराना है, उतना ही अपराध और दण्ड का सम्बन्ध है। कैदी शब्द अंग्रेजी के 'Prisoner' का हिन्दी रूपान्तर है। प्रिजनर शब्द 'प्रिजन' से बना है, जिसका अर्थ होता है 'बन्दी'। 'बन्दीगृह 1894 के अधिनियम' के अनुसार "बन्दीगृह राज्य सरकार द्वारा परिभाषित वह स्थान है जहाँ कैदियों को स्थायी अथवा अस्थायी रूप से रखा जाता है।" कैदी के लिए मुजरिम, बन्दी, दोषी, अभियुक्त शब्दों का भी प्रयोग किया जाता है। कैदी जिस पर अपराध लगाया गया हो परन्तु उसका निर्णय न हुआ हो। प्रायः कैदी को समाज विरोधी नजरिये से देखा जाता है, उन्हें समाज में घृणा के दृष्टिकोण से देखा जाता है लेकिन कानून की नजर में कैदी भी व्यक्ति है, पशु नहीं। कारागृहों के प्रति नये दृष्टिकोण के अनुसार आजकल उन्हें 'दण्डस्थल' के स्थान पर 'सुधार स्थल' माना जाने लगा है। बन्दीकरण का मुख्य उद्देश्य अपराधिक व्यवहार का निराकरण जिससे कैदी का पुनरोद्धार किया जा सके और उसकी प्रतिष्ठा स्वाभिमान और नागरिकता के गुणों की पुनः स्थापित किया जा सके। न्यायमूर्ति बी०आर० अय्यर के अनुसार – "संरक्षकों को जो कैदियों की प्रतिष्ठा के विरुद्ध कार्य कर मनमाने ढंग से व्यवहार करते हो उन्हें दण्ड देना चाहिए, क्योंकि जब भी कैदियों पर अभिघात किया जाता है, उससे संविधान को प्रघात पहुँचता है।"

भारत में जेल और उसका प्रशासन संविधान सातवीं अनुसूची के अन्तर्गत राज्य सूची का विषय है। जेलों का प्रबन्धन और प्रशासन राज्य सरकारों के अधिकार क्षेत्र में आता है, और यह जेल अधिनियम और सम्बन्धित राज्य सरकारों के जेल नियमावली द्वारा शासित है। भारत में कैदियों का अध्ययन करने से पूर्व कैदियों के अधिकारों का जानना आवश्यक है।

### **कैदियों का अधिकार (Right of Prisoners)**

भारतीय संविधान अनुच्छेद 14, 19 और 21 के अन्तर्गत कैदियों को अधिकार प्राप्त है अनुच्छेद 14, विधि के समक्ष समानता का अधिकार है जिसके अन्तर्गत भारत राज्य क्षेत्र के किसी भी व्यक्ति को विधि के समता या विधियों के समान संरक्षण से वंचित नहीं करेगा। अनुच्छेद 19(क) के अन्तर्गत वाक एवं अभिव्यक्ति की स्वतन्त्रता का अधिकार प्राप्त है। अनुच्छेद 21(क) के अन्तर्गत प्राण एवं दैहिक स्वतन्त्रता का संरक्षण: दैहिक स्वतन्त्रता से विधि द्वारा स्थापित प्रक्रिया के अनुसार ही वंचित किया जायेगा, अन्यथा नहीं।

- **चिकित्सा का अधिकार:** कैदियों को चिकित्सा सुविधा पाने का अधिकार है, अगर इसकी उपेक्षा की जाती है तो सरकार द्वारा उपेक्षा माना जायेगा।
- **केस को जल्दी निपटाने का अधिकार:** अनुच्छेद 21 के द्वारा कैदियों को केस को जल्दी निपटाने का अधिकार है।
- **समय से अधिक बन्दी नहीं:** न्यायालय के बिना किसी परिसीमा निर्णय और देर विचार मौलिक अधिकारों का अतिक्रमण है। केस का जल्दी निपटारा होना चाहिए।
- **कैदियों को वेतन अथवा मजदूरी पाने का अधिकार।**
- **विचाराधीन कैदियों को अधिकार:**
  1. मित्रों एवं परिजनों से पत्र व्यवहार एवं मिलने का अधिकार।
  2. वकील से बातचीत एवं सलाह का अधिकार।
  3. रेडियो, संगीत, टेलीविजन की सुविधा का अधिकार।
  4. अपने घर में होने वाली महत्वपूर्ण घटनाओं में भाग लेने का अधिकार।
  5. व्यक्तित्व विकास के सांस्कृतिक शिक्षा पाने का अधिकार।
- धारा 436 यह प्रावधान करती है कि जमानतीय मामलों में बंद उन आरोपियों को एक सलाह के बाद उनके निजी मुचलके पर रिहा कर दिया जाए, जिनके लिए कोई जमानत के लिए तैयार नहीं है।
- **विचाराधीन कैदियों को जमानत:** जिन कैदियों पर मुकदमा अभी विचाराधीन है, वो दोष सिद्ध होने से पहले जमानत के लिए आवेदन कर सकते हैं। धारा 436ए के अन्तर्गत अगर न्यायालय संतुष्टि हो जाती है कि

\* राजनीति विज्ञान विभाग भदावर विद्या मंदिर (पी.जी.) कॉलेज बाह, आगरा।

अभियोगी पर पारिवारिक उत्तरदायित्व है, और यह संतुष्ट हो कि वह इन सामाजिक सम्बन्धों के कारण पलायन नहीं करेगा, तब उसे एक बंध-पत्र पर रिहा किया जा सकता है।

- **निःशुल्क विधिक सहायता:** ऐसा अभियुक्त जो किसी कानूनी सलाहकार को नियुक्त करने में समक्ष न हो, गरीब हो या कोई अन्य परिस्थिति हो, निःशुल्क सहायता पाने का अधिकारी है। कोर्ट का निर्देश है, कि वह किसी भी व्यक्ति को कारावास की सजा देते समय उसे कॉपी दे। अगर अभियुक्त फैसले की अपील अपना रिवीजन फाइल करना चाहता है, तो जेल प्रशासन उसे सारी सुविधायें प्रदान करें। नियुक्त वकील का खर्च सरकार उठायेगी, जिसने कैदी को अभियुक्त ठहराया है। अभियुक्त को निःशुल्क कानूनी सहायता मजिस्ट्रेट के समक्ष पेश करने के दौरान से ही प्रदान की जानी चाहिए। सर्वोच्च न्यायालय निःशुल्क विधिक सेवा 1980(1) एस.सी. 108 के अन्तर्गत इसका स्पष्टीकरण किया है।
- **वकील से परामर्श का अधिकार:** कैदी को यह अधिकार है कि वह अपने फैसले के कानूनी सलाहकार से भेट कर सके। ऐसा न होने पर संविधान के अनुच्छेद 14 और 21 का उल्लंघन होगा। AIR 1981SC746 सर्वोच्च न्यायालय के अनुसार किसी भी कैदी के लिए है कि वह दिन के उचित समय पर जेल अधीक्षक के अनुमोदन से स्वनियुक्त कानूनी सलाहकार से भेट कर सकता है। जेल अधिकारी को ऐसा अनुमोदन शीघ्र ही बिना किसी देरी के प्रदान करना चाहिए।
- **हथकड़ी के सम्बन्ध में अधिकार:** सर्वोच्च न्यायालय 1980 (GRJ LJ 1930) दैनिक नित्यक्रम हथकड़ी लगाना अवैध है। किसी भी केस में मिलने वाली सजा यदि तीन वर्ष से कम, तो हथकड़ी नहीं लगायी जा सकती। सुनील बत्रा 1978 (4) SCC 494 सर्वोच्च न्यायालय के अनुसार – बेड़ियों का प्रयोग कम से कम होना चाहिए। केवल विशेष आपातकालीन परिस्थितियों में ही प्रयोग करना चाहिए। रात्रि में बेड़ियों का प्रयोग आपत्तिजनक है।
- संविधान में अभियुक्त को स्वयं के विरुद्ध साक्ष्य के लिए वाध्य नहीं किया जा सकता।

#### भारतीय जेलों में कैदियों का अध्ययन

भारतीय जेलों के अध्ययन के सन्दर्भ पहले में जेलों के प्रकार को जानना आवश्यक है। भारत में कुल आठ प्रकार के जेल पाये जाते हैं— 1. केन्द्रीय जेल 2. जिला जेल 3. उप जेल 4. महिला जेल 5. वोस्टल स्कूल 6. खुला जेल 7. विशेष जेल 8. अन्य जेल।

राष्ट्रीय अपराध रिकॉर्ड ब्यूरो (NCRB) के 2014, 2015, 2016 के आंकड़ों का अध्ययन करे तो हम पाते हैं, कि वर्ष 2014 में भारत के कुल जेलों की संख्या 1387 थी कैदियों की कुल क्षमता 3,56,561 वर्ष के अन्त में कैदियों की कुल संख्या 418536 है, जो वास्तविक क्षमता से 61.97 है अधिक है तथा वर्ष के अन्त में अधिग्रहण (Occupancy) दर 114.4 है। वर्ष 2015 में भारत में कुल रहने की वास्तविक क्षमता 3,66,781 थी, वर्ष के अन्त में कुल कैदियों की 419623 जो वास्तविक क्षमता से 52,642 अधिक है। वर्ष के अन्त में अधिग्रहण दर 114.4 थी। वर्ष 2016 भारत में कुल जेलों की संख्या 1412 थी जेल में कैदियों की कुल क्षमता 380876 थी। वर्ष के अन्त में कुल कैदियों की संख्या 433003 थी जो कि वास्तविक क्षमता से 52127 अधिक है तथा अधिग्रहण दर 113.7 थी। वर्ष 2016 में 433003 में पुरुष कैदी 414505 तथा महिला कैदी 18498 थी। महिला कैदियों का प्रतिषत 4.27 है। पुरुष कैदियों का प्रतिषत 95.72।

सारणी-1

वर्ष	कैदियों की संख्या	वास्तविक क्षमता	वर्ष के अन्त में कैदियों की संख्या	अधिग्रहण दर
2014	1387	356561	418536	117.4
2015	1401	366781	419623	114.4
2016	1412	380876	433003	113.7

#### कैदियों के प्रकार और जनसांख्यिकी (Prisoners Types and Demography)

2014, 2015, 2016 के कैदियों के प्रकार एवं जनसांख्यिकी का अध्ययन कर पाते हैं। राष्ट्रीय अपराध रिकॉर्ड ब्यूरो (NCRB) को आंकड़ों के अनुसार 2014 में कुल कैदियों की संख्या: 418536 जिसमें सजायाफता कैदियों की संख्या 131517, विचाराधीन कैदियों की संख्या 2,82,279 वही नजरबंद कैदियों की 3,237 और अन्य कैदियों की 903 है, सजायाफता कैदियों का प्रतिषत 31.42 विचाराधीन कैदियों का प्रतिषत 67.58 नजरबंद कैदियों का प्रतिषत 0.70 और अन्य कैदियों का प्रतिषत 0.21 है। वर्ष 2015 के आंकड़ों के अनुसार कुल कैदियों की संख्या 4,19,623 है जिसमें सजायाफता 134,168 विचाराधीन 282076 नजरबंद 2562 और अन्य कैदियों की संख्या 817 है। कुल कैदियों में सजायाफता 31.97, विचाराधीन 67.22 नजरबंद 0.61 और अन्य कैदियों का प्रतिषत 0.19 है। वर्ष 2016 के आंकड़ों के अनुसार 433003 कुल कैदियों में सजायाफता 135,683, विचाराधीन 293058, नजरबंद 3089 और अन्य कैदियों की

संख्या 1173 है। वर्ष 2016 में कुल सजायाफता कैदियों की संख्या 31.33 विचाराधीन कैदियों का प्रतिषत 68.68 नजरबंद कैदियों का प्रतिषत 0.71 और अन्य कैदियों का प्रतिषत 0.27 है।

**सारणी-2**

**कैदियों के प्रकार और जनसांख्यिकी**

वर्ष	सजायाफता कैदियों की संख्या	विचाराधीन कैदियों की संख्या	नजरबंद अन्य कैदियों की संख्या के फीस	कुल कैदियों की संख्या
2014	1,31,517	2,82,879	3,237	4,18,536
2015	1,34,168	2,82,076	2,562	4,19,623
2016	1,35,683	2,93,058	3,089	4,33,003

वर्ष 2014 से 2016 तक सजायाफता कैदियों में 3.2% की वृद्धि। 2014 से 2016 तक विचाराधीन कैदियों में 3.6% की वृद्धि। राष्ट्रीय अपराध रिकॉर्ड ब्यूरो की रिपोर्ट के अनुसार वर्ष 2016 में उत्तर प्रदेश में कुल विचाराधीन कैदियों की संख्या 68,432 थी जो कि कुल विचाराधीन कैदियों 23.4% है। वर्ष 2016 में महिला कैदियों की संख्या 1649 जो अपने 1942 बच्चों के साथ कैदी के रूप में कैद थी।

**जेल में कैदियों की मृत्यु (Deaths on Prisons)**

राष्ट्रीय अपराध रिकॉर्ड ब्यूरो के कार्यकारिणी सांख्यिकी सारांश के अनुसार वर्ष 2014 भारतीय जेलों में कुल मृत्यु 1702 थी, जिसमें 1507 प्राकृतिक मृत्यु का प्रतिषत 88.54 अप्राकृतिक मृत्यु का प्रतिषत 11.45 वही 2015 में भारतीय जेलों में कैदियों की मृत्यु की संख्या 1584 जिसमें प्राकृतिक मृत्यु 1469 अप्राकृतिक मृत्यु की संख्या 115 थी। प्राकृतिक मृत्यु का प्रतिषत 92.73 अप्राकृतिक मृत्यु का प्रतिषत 7.26 है। वर्ष 2016 में कुल कैदियों की मृत्यु की 1655 थी, जिसमें 1424 प्राकृतिक मृत्यु 231 अप्राकृतिक मृत्यु थी। प्राकृतिक मृत्यु कुल जेल में मृत्यु का 86.04 अप्राकृतिक मृत्यु 13.95 है।

**सारणी-3**

**जेल में मृत्यु**

वर्ष	कुल कैदियों की मृत्यु संख्या	प्राकृतिक मृत्यु की संख्या	अप्राकृतिक मृत्यु की संख्या
2014	1702	1507	195
2015	1584	1469	115
2016	1655	1424	231

वर्ष 2014, 2015 और 2016, जेल में कैदियों का प्रतिषत क्रमशः 11.45, 7.26 और 13.9 जेल की कार्य-प्रणाली और सुचिता पर बहुत बड़ा प्रश्न चिन्ह है?

**कैदियों के लिए सरकारी प्रयास**

उपरोक्त अध्ययन से स्पष्ट है भारत के जेलों में कैदियों की स्थिति बहुत ही निराशाजनक है। विचाराधीन कैदियों का प्रतिषत जो कि 67 से अधिक बहुत सोचनीय बिन्दु है, महिला कैदियों की तथा जेल कर्मियों का उनके प्रति व्यवहार बहुत ही अमानवीय है। जेल में कैदियों के आकस्मिक और अप्राकृतिक जिसमें आत्महत्या भी शामिल है, मानवाधिकार के लिए बहुत बड़ा प्रश्न है? यद्यपि समय-समय पर सर्वोच्च न्यायालय कैदियों के मानव अधिकार के संरक्षण जेल प्रशासन को निर्देश देता रहता है, फिर भी अभी भारत में कैदियों की स्थिति संतोषजनक नहीं है। विचाराधीन कैदियों के लिए धारा 436 औ 436ए को और अधिक प्रभावी बनाने की जरूरत है।

दण्ड प्रक्रिया की धारा 320 पर अधिक जोर देने की जरूरत है, जिसके अन्तर्गत उन अपराधों की सूची दी गयी है, जिसमें पक्षकार आपस में समझौता करके लोक अदालतों के माध्यम से माध्यम से मुकदमों का निपटारा कर सके। भारतीय दण्ड प्रक्रिया संहिता धारा 167(2) और धारा 437(6) में भी तफतीष और न्यायिक कार्यवाही में होने वाली देरी की वजह से विचाराधीन कैदियों पर जमानत पर छोड़ने का प्रावधान उतना प्रभावी नहीं है, जितना कि होना चाहिए। सरकार द्वारा समय-समय विभिन्न समितियों का गठन जैसे- मुल्ला समिति 1983, कपूर समिति 1986, अय्यर समिति 1987।

लेकिन आज भी समितियों की सिफारिश पर विशेष ध्यान नहीं दिया जाता है। 28 जून 2017 को राष्ट्रीय सेवा प्राधिकरण (NASA) ने जेल बंदियों को मुक्त कानूनी सेवायें देने के लिए 'वेब एप्लीकेशन' लॉन्च किया जिसका मुख्य उद्देश्य कानून सेवा प्रणाली को और अधिक पारदर्शी तथा समक्ष पदाधिकारियों को कैदियों को दी जाने वाली कानूनी सहायता की अनुमति से अवगत कराना है, ताकि यह सुनिश्चित हो सके कि अदालत में पेशी के पहले दिन से सभी कैदियों को प्रतिनिधित्व प्राप्त हो सके। सॉफ्टवेयर की अपनी रिपोर्ट में कैदियों के कुल संख्या, बिना वकील वाले कैदियों की संख्या, कानूनी सेवा अधिवक्ताओं द्वारा प्रतिनिधित्व की संख्या को पता लगाना है। सभी सूचनाएँ, राज्यवार,

जिलेवार उपलब्ध होगी। रिपोर्ट में कैदी होने की अवधि की जानकारी मिलेगी, इससे यह सूचना प्राप्त होगी कि दण्ड संहिता प्रक्रिया की धारा 436 (ए) कैदी जमानत का पात्र है कि नहीं।

विगत वर्षों में केन्द्र सरकार की ओर से जारी एक रिपोर्ट के अनुसार 2017 के विभिन्न जेलों में कुल 78739 कैदियों के खून के सैंपल लिये जांच रिपोर्ट में 459 कैदी एचआईवी पॉजिटिव निकले। पेशेवर अपराधी जेल के अधिकारियों की मिली-भगत से जेल परिसर के भीतर, मोबाइल फोन, शराब, हथियार तक मिलने रखने की सूचना समाचार पत्रों में आये दिन प्रकाशित होती है। वही दूसरी तरफ सामाजिक आर्थिक तौर पर पिछड़े हुए विचाराधीन कैदियों को सरकारी तंत्र द्वारा उनके बुनियादी गरिमा एवं मानवाधिकार से वंचित रखा जाता है।

#### **उपसंहार**

मौजूदा आंकड़ों से स्पष्ट होता है कि कैदियों के मानवाधिकारों के प्रति राज्य सरकारों का रवैया सकारात्मक नहीं है। महिला एवं विचाराधीन कैदियों के लिए बनायी गयी समितियां अपनी जिम्मेदारी को गम्भीरता से नहीं निभा रही हैं। बच्चे अपने माता के साथ कैदियों की जिन्दगी जीने के लिए मजबूर हैं। बदहाली, यौन शोषण की घटनायें राष्ट्रीय महिला आयोग के लिए चिन्ता का विषय है। बच्चों के कल्याण, सामाजिक शैक्षणिक और सामाजिक, सांस्कृतिक, स्वास्थ्य सुविधा आदि गम्भीर विषय हैं। एक राष्ट्र की सभ्यता की गुणवत्ता बड़े पैमाने पर कैदियों सम्बन्धित कानून के प्रवर्तन में उपयोग की जाने वाली विधियों के द्वारा मापा जा सकता है।

भौतिकवादी इस युग में आर्थिक प्रतियोगिता, मनुष्य की रातों-रात अमीर होने की प्रवृत्ति के कारण समाज में उचित, अनुचित के विचार को छोड़कर मनुष्य भ्रष्टाचार, मुनाफा खोरी, गबन, जालसाजी, बेईमानी की ओर अग्रसरित होकर गलत कार्य कर बैठता है जो कि अपराधी की श्रेणी में आता है। समाज के बेसहारा और विधवा महिलायें रोजगार न होने के कारण वेष्ठावृत्ति और अन्य ऐसे कार्य करने को मजबूर है जो अपराध की श्रेणी में आता है और बाद में कैदी के रूप में जेल के सलाखों के पीछे चली जाती है। देश की अधिकांश महिला कैदी माँ होती है। एक महिला जो माँ भी है, उसके कैदी का अर्थ कि न उसके अधिकारों का हनन है, बल्कि उनके बच्चों के अधिकारों का भी हनन है। यद्यपि 5 वर्ष की उम्र होने पर बच्चों को महिला कैदी से अलग कर परिवार को सौंप दिया जाता है।

कैदियों को समय पर न्याय मिल सके इसके लिए जरूरी है कि जजों की संख्या बढ़ायी जाए। फास्ट ट्रैक कोर्ट की स्थापना की जाए, कैदियों के लिए अलग से बोर्ड की स्थापना की जाए। मॉडल जेलों की स्थापना की जाए, जिसमें शिक्षा, कौशल विकास, व्यक्तित्व विकास कार्यक्रम संचालित हो। यद्यपि जेलों में साक्षरता कार्यक्रम संचालित किये जाते हैं लेकिन आवश्यकता इस बात की है कि कैदियों व्यावसायिक प्रशिक्षण कार्यक्रम को और सुदृढ़ बनाकर, आत्मनिर्भर और रोजगार परक शिक्षा को प्रोत्साहित किया जाए, जिससे कैदी जेल से छूटने के बाद समाज की मुख्य धारा से जुड़कर एक सामान्य जीवन जी सके। जेलों में पुनर्वास कार्यक्रम चलाये जाएं और विचाराधीन कैदियों की लम्बित मामलों की समीक्षा समितियों को और अधिक कारगर बनाया जाए। स्वयंसेवी संस्थाएँ कैदियों की शिक्षा में महत्वपूर्ण भूमिका निभा सकती हैं। संस्थाओं की सेवा जेलों में शिक्षा कार्यक्रम, स्वास्थ्य, कैम्प, सांस्कृतिक कार्यक्रम, तकनीकी प्रशिक्षण कार्यक्रम आदि में महत्वपूर्ण योगदान कर सकती हैं। दुर्भाग्यवश भारत में अभी तक इन संस्थाओं का इस क्षेत्र में विशेष प्रोत्साहन नहीं प्राप्त है। मुल्ला कमेटी (1983) ने यह प्रस्तावित किया है कि सामुदायिक समूहों को कैदियों के मित्र के रूप में संगठित किया जा सकता है, जो किताबें, मैगजीन अथवा अन्य पत्रिकाएँ जमाकर कैदियों में वितरित कर सकते हैं, जिसे कैदी अपने खाली समय में पढ़ सकते हैं। साथ ही जेलों में कैदियों के हित में सामाजिक शिक्षा पर कुछ कार्यक्रम आयोजित किये जा सकते हैं, जो सामाजिक और नैतिक नियमों पर प्रकाश डाल सकते हैं। जेल के सम्बन्ध में जेल अधिनियम 1894 की धारा 30 में दिये गये उपबंधों का संशोधन अनिवार्य है, और उसके स्थान पर, उन कैदियों को, जिन्हें मृत्युदण्ड दिया गया है। उनके साथ मानवीय और गरिमामय व्यवहार सम्बन्धी नियम बनाने की आवश्यकता है।

#### **सन्दर्भ**

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