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# URBAN ECOSYSTEM SERVICES FOR RESILIENCE PLANNING AND MANAGEMENT IN LOKOJA NIGERIA

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# ABSTRACT

Urbanization increase is however, not without its problems. These problems are manifested through complicated social–ecological complexities with both tightly and loosely connected components interacting dynamically over space and time. The study area, Lokoja city no doubt been going through these problems associated with gradual loss of open space over the years. Satellite images of the city were acquired and processed. Findings show loss of ecosystem services through loss of open spaces in the past years. It was found from the satellite images that in 1987, the area covered by light vegetation was about 44.0% light vegetation, 6.03% for thick vegetation at the Otokiti area. While the Felele area had 8.91% covered by light vegetation, 42.06% was thick vegetation, while the Ganaja area was covered by 53% light vegetation and 6.10% heavy vegetation. However, by 2001, this had been altered by anthropogenic activities, where Otokiti area now has light vegetation covering 2.27%, and thick vegetation covering 3.18%. The Ganaja area is now covered by 21.38% light vegetation, and 14.46% thick vegetation. Strategies of new urbanisms were recommended.

Key words: Urbanisation, Loss of Ecosystem services, Loss of open space, Urbanism, conversion.

# **1:0 INTRODUCTION**

## 1:1 Background of study

Cities are expanding in sizes and in relative importance in many parts of the world due to rapid increase in population. The rapid rate of urban expansion across the world in the past few decades presents increasing challenges to urban planning and management. The United Nations in 2009, estimates that between 2007 and 2025 the annual urban population increase in developing nations is expected to be over 53million which constitutes 2.27 percent. Further predictions put the population of new megacities as over 10 million persons in the next few decades particularly in the developing nations. This rate of urbanization increase is however, not without its problems. These problems have been found to manifest through complicated social–ecological complexities with both tightly and loosely connected components interacting dynamically over space and time (Pickett et al. 2001). One of its interactive components is the interaction of man and land. As the anthropogenic activities on land increase for economic gains, so do its effects on urban open spaces. The benefits associated with agglomeration economies comes with loss of open spaces and the consequences of externalities including congestion, air and water pollution, and the loss of ecosystems on which the city depends, hence the caution by the Organisation for Economic Co-operation and Development, that these problems could exacerbate to reach a point where the city becomes less competitive if mitigating efforts are not immediately applied (OECD, 2006).

Open space in urban areas is key infrastructure to the quality of the urban environment and sustainable livability in cities. An agreed definition for urban open space is still in contention by researchers. Many factors, such as size, shape, diversity, greenness, facilities, and distribution, as well as the design and management of urban open spaces are used in defining urban open space and its function (Rosegrant and Cline, 2003). Definition notwithstanding, the import of this paper is on the importance of open spaces due to its benefits.

Urban open space have been found to provides a plethora of tangible environmental benefits, such as mitigating urban heat island as well as air and water pollution and improving biodiversity (Tzoulas and James, 2004;Yu and Hien, 2006). Sugiyama and Thompson (2008) posit that, it makes social and economic impacts on city dwellers and the city by providing opportunities for recreation and increasing cohesive neighbourliness. It also stabilizes and housing price fluctuations and property values (Geoghegan, 2002).

The study area, Lokoja a city in the central parts of Nigeria had no doubt been going through this problems associated with loss of open space over the years. Open spaces such as water bodies, lakes, forest, grass land, range land and wetlands, are deeply interconnected to a range of urban and suburban environmental, social, and economic issues. These links partly stem from landscapes' provision of ecosystem services including storm water retention, climate moderation, and improved air quality, which in turn affect the people's health and wellbeing. However, there had not been effective sustainability initiatives by the city planning authorities to consider the full range of services potentially derived from managed open spaces. As a result, much of the environmental, social, and economic value of these landscapes remains untapped and ill managed.

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It is increasingly evident that in the 21<sup>st</sup>Century there will be a number of pressing and interrelated problems including large-scale conversion of open spaces to other uses and the subsequent loss of biodiversity as indicated by the Millennium Ecological Assessment, (M A), 2005; thereby increasing poverty, water scarcity and potentially dangerous alteration in the climate system. A plethora of literature have emphasised the global loss in open space mismanagement resulting to global loss in urban ecology. These problems are occurring on an unprecedented scale and are inherently connected to growing societal demands. The mitigation of these problems requires a deeper comprehension of the environmental infrastructure upon which human existence and welfare depends. The services of open spaces in the study area are not being properly harnessed. The open spaces in the city are gradually being lost through anthropogenic activities and lack of appreciation for the economic benefits of the open spaces (ecosystem services). The study area is endowed with large expanse of water bodies and wetlands, yet the city dwellers are still facing the problem scarcity in portable water supply, open spaces and water bodies have been turned to waste dump sites, which has consequences of health issues. There is also the loss of grassland, range land and forest. Most of the inhabitants still utilize fire wood as source of fuel, which had encourage the cutting down of trees and the destruction of the natural vegetation at the city fringes and consequently increase impoverishment of the area. The city fringe vegetation is continually being destroyed, giving room to city sprawl (see satellite images, figure 1 and 2; table 1). This also manifests with its consequences.

These open spaces are known to be key components of sustainable development, since they provide services that could be tangible and intangible. These services offer such benefits as mitigating factors of urban heat islands, air pollution, water pollution, cohesive development, soil protection, carbon sequestration, increase property value and waste absorption (Tsoulas and James, 2004). However, these services have not been well harnessed in the study area, hence the area is passing through challenges of loss of biodiversity, loss of revenue from recreation, lack of cohesive neighbourhood (sprawl), low property value and the problems of waste and carbon absorption.

The aforementioned has been blamed on the inability of urban planners and other actors alike to properly plan, coordinate and manage ecosystem services in the city.

This situation calls for further understanding of what ecosystem services really are. There is therefore a need to understand the meaning of ecosystem services and how they can be packaged (classified) to solve these problems.

# 2.0 METHODOLOGICAL AND THEORETICAL FRAMEWORK

Materials were reviewed from existing literature as secondary source of data. This was achieved through the collection of information from existing documents such as articles, seminars, journals, workshops papers and materials from the internet all in regard to ecosystem services. Also satellite images were acquired, geo referenced and used as base for image registration. These images were traced from land sat Tm 1987, 2001 and 2011. Furthermore, ILWIS 3.3 (Integrated Land and Water Information System) and GIS software were used to confirm the spatio-temporal change in the elements of ecosystem services in the study area.

Images were traced from land sat Tm 1987, 2001 and 2011 and classified. Five major steps were taken in the image editing, which includes; creating of sub map, filtering (2011 cracked image was filtered), map list, creating coordinate system and geo referencing. These five stages are the image pre-processing stage. The image processing includes mainly the creation of color composite and sample set after which the training of the sample pixel is done. In training the sample set, colors such as red, light green, deep green, blue, brown and black were used in the representation of built up areas, light vegetation, thick vegetation, water bodies, bare surfaces and rock outcrops respectively. Cutting of sub map for the selected study area was also done for the areas of Ganaja, Felele and Otokiti respectively.

The concept of ecosystem services have become an important model for the linking the benefits of ecosystem to human needs. Understanding these links have become the nexus for a wide range decision making context. However there have been several attempts by various scholars to define and classify ecosystem services of which there had not been an agreed definition.

One of the most significant of these definitions the work of 1300, scientists recognised as Millennium Ecological Assessment, also known as "M A" in 2005. They found, that globally out of 15 of the 24 ecosystem services investigated are already in the state of decline and that it may take tremendous negative impact on future human welfare (Carpenter et al, 2006).

According to the Millennium Ecological Assessment, ecosystem services are seen as 'the benefits ecosystems provide' (MA, 2005). They identified four categories of eco services as, those that cover the material services, those that cover the way ecosystems regulate other environmental media or processes, those related to the cultural or spiritual needs of people and the supporting services that underpin these other three types (supporting, regulating, provisioning and cultural) services. Even though this categorisation has been widely accepted, recent research shows the difficulty of applying this definition and classification, especially in terms of valuation. This flaw was shown in the works of Boyd and Banzhaf, 2007.

Boyd and Banzhaf (2007) posit that the suggestion of the MA in their classification mixes up notions of 'ecological function' with that of 'service' and 'benefit'. They argued that, services are components of nature that man directly consume and should be differentiated from intermediate ecosystem processes and functions delivering them. Therefore services should not be isolated from people's needs. Thus specific service should give specific benefit. This point was illustrated using water quality in wetlands, that:

"In terms of the benefits arising from recreational angling and drinking water, the quality of a water body plays an important role. However, only in the case of drinking is the water directly consumed, and so only 'the water body's quality' to be regarded as a service".

This argument is in line with Fisher and Turner (2008) who argued that,

"A benefit is more usefully regarded something that directly impacts on the welfare of people, like more or better drinking water or a more satisfying fishing trip".

For them, in contradistinction to the definition given by the MA, service is not a benefit, but rather something that changes the level of well-being or welfare. The findings of Wallace (2008) can be used to conclude this argument here, where he sees service as something that is consumed or experienced by people, he concluded, that all the rest are simply part of the ecological structures and processes that give rise to that benefit. He therefore suggests some key definitions, and proposed an alternative service typology that takes account of the structure and composition of particular ecosystem elements or 'assets' and groups services according to the 'specific human values they support' (Table 1)

| Category of human                   | Ecosystem service experienced                   | Examples of processes and assets that    |
|-------------------------------------|---|--|
| values                              | at the individual human level                   | need to be managed to deliver            |
|                                     |   | ecosystem services                       |
| Adequate resources                  | •Food (for organism energy,                     | Ecosystem processes                      |
|                                     | structure,                                      | •Biological regulation                   |
|                                     | key chemical reactions)                         | •Climate regulation                      |
|                                     | •Oxygen   | •Disturbance regimes, including          |
|                                     | •Water (potable)                                | wildfires, cyclones, flooding            |
|                                     | •Energy (e.g., for cooking –                    | •Gas regulation                          |
|                                     | warming component under                         | •Management of "beauty" at landscape     |
|                                     | physical and chemical                           | and local scales.                        |
|                                     | environment)                                    | •Management of land for recreation       |
|                                     | •Dispersal aids (transport)                     | •Nutrient regulation                     |
| <ul> <li>Protection from</li> </ul> |   | •Pollination                             |
| •predators/disease/parasites        |   | •Production of raw materials for         |
|                                     | <ul> <li>Protection from predation</li> </ul>   | clothing, food, construction, etc.       |
| Benign physical and                 | <ul> <li>Protection from disease and</li> </ul> | •Production of raw materials for energy, |
| chemical environment                | parasites                                       | such as firewood                         |
|                                     |   | •Socio-cultural interactions             |
|                                     | Benign environmental regimes of:                | •Soil formation                          |
|                                     | •Temperature (energy, includes                  | •Soil retention                          |
|                                     | use of fire for warming)                        | •Waste regulation and supply             |
|                                     | •Moisture                                       | •Economic processes                      |
|                                     | •Light (e.g., to establish circadian            |  |
|                                     | rhythms)  |  |
|                                     | •Chemical                                       |  |
|                                     |   |  |

Table 1: Classification of ecosystem services and links to human values, ecosystem processes, and natural

assets.

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| Socio-cultural fulfilment | Access to resources for:                  | Biotic and abiotic elements            |
|---------------------------|---|--|
|                           | •Spiritual/philosophical                  | Processes are managed to provide a     |
|                           | contentment                               | particular                             |
|                           | •A benign social group, including         | Composition and structure of ecosystem |
|                           | access to mates and being loved           | elements.                              |
|                           | •Recreation/leisure                       | Elements may be described as natural   |
|                           | <ul> <li>Meaningful occupation</li> </ul> | resource                               |
|                           | •Aesthetics                               | assets, e.g.:                          |
|                           | •Opportunity values, capacity for         | •Biodiversity assets                   |
|                           | cultural and biological evolution         | •Land (soil/geomorphology) assets      |
|                           | -Knowledge/education resources            | •Water assets                          |
|                           | - Genetic resources                       | •Air assets                            |
|                           |   | •Energy assets                         |

Source: Adapted from Wallace (2007)

In furtherance of these arguments of Wallace (2008) and Costanza (2008) argued that attempts to devise a single, all-encompassing typology and strict definitions are bound to result in a gross oversimplification of the world, although he agreed with the MA definition of services as benefits. He further proposed a multiple classification systems, designed to fulfil different purposes. He therefore put forward that ecosystem services can also be classified according to their spatial characteristics (table 2).He gave examples that 'Local proximal' services are, like pollination, they dependent on the co-location of the ecosystem providing the service and the people receiving the benefit and also that carbon sequestration is a process and since the atmosphere is so 'well-mixed' all localities where carbon is fixed is potentially useful. He also distinguishes services that 'flow' from the point of production to the point of use and those that are enjoyed to the point of where they originate (flood regulation and 'in situ' services respectively).At the end he identifies services like aesthetics and human culture as dependent on the movement of users to specified points.

For the purpose of this research definition adapted is that Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services, such as food and water; regulating services, such as regulation of floods, drought, and disease; supporting services, such as soil formation and nutrient cycling; and cultural services, such as recreational, spiritual, and other nonmaterial benefits (Costanza, et al ,2008).

Fisher and Turner (2008) and Fisher et al. (2009) argued elsewhere, that outlining of intermediate services, final services and benefits is important for ecosystem valuation. These can be seen in many relationships between ecosystem processes and human benefits. However, what is important for valuation exercises is that the endpoints should be accorded importance since they have a direct effect on human welfare.

According to White et al. (2011), the valuation of ecosystem services can be carried out at three levels. That is, qualitative, quantitative and monetary. The Qualitative analysis depends on non-numerical indications of value such as benefits to mental and physical health, social benefits from recreation, benefits related to security and broader well-being. While the Quantitative analysis depends on numerical data, which includes the number of people visiting national parks, number of avoided health impacts, quality of water, or quantity of carbon sequestered. The Monetary analysis depends on converting the qualitative and quantitative aspects into a particular currency. As an example, by calculating the money generated by visitors to a game reserve or water fall, or estimating the amount of avoided costs when maintaining nature's own ability to purify water or Socio-economic importance of ecosystem services mitigate flooding. TEEB (2010) categorised ecosystem benefits into four. These are (1) Supporting services (2) Regulating services (3) Provisioning services and (4) Cultural services.

- I. Provisioning services: In this category, the ecosystem services are the provision of nature in terms of food, fuel wood, fibre, biochemical, fresh water and the attributes here are wild food products.
- II. Regulating services: This category provides services such as water regulation, climate regulation, disease regulation, pollination. Carbon storage, soil carbon content and Nitrogen retention. Their attributes are the regulation of water and climate.
- III. Cultural services: This category provides spiritual and religious services, recreation and tourism services, aesthetics, inspirational, educational, sense of place, cultural heritage with attributes of charismatic species, non-charismatic species and sense of place.
- IV. Supporting services: Supporting services of the ecosystem are those that are necessary for production of all other services. They are similar but differ from the other services in that they impact on people by direct or

indirect and effects occur over a long time while the changes in the other categories have direct but short term impact on the people. Example of services like erosion are categorised as both supporting and regulatory services depending on the time scale and immediate impact. The production of oxygen through photosynthesis is categorised as supporting service since the impact on oxygen in the atmosphere would occur after long period. Other examples of supporting services are primary production, oxygen production in the atmosphere, soil function and retention, nutrient recycling and water recycling.

Having discussed the economic benefits of the ecosystem services, the question now arises that, how can the people benefit? Costanza (1991) suggested economic benefits will get more to the people if deliberate policies are made to bring out the benefits in three main ways. By paying for services, providing incentives and putting economic value on services.

- I. **Paying for services** it was suggested that programmes should be organised where payment is done for ecosystem services provided, this can done through taxes on actions that degrade the environment or by activities regulating activities that affect the ecosystem service. For example the U.S, government pay farmers to take land out of crop production and plant perennial vegetation to reduce soil erosion, improve water quality and provide habitat and other ecosystem services. This is also a similarly programme in china's, called "Grain for green". Countries like Costa Rica have also adapted similar programmes (Pago de Servicio's Ambientes), landowners are payed for carbon sequestration to protect water quality, biodiversity and increase scenic beauty (Polasky, 2011).
- II. **Providing incentives-** suggestions have been made that to incorporate value into the ecosystem services as a policy, there must be incentives provided. This was suggested by Martin Faustmann in the theory of optimal use of natural resources. This was supported by Hotelling (1931), with a similar theory, called theory of optimal use of use of exhaustible resources. In a line with these was Pique notions of 1920, who developed the notion of externalities, "that where actions of individuals impact on the welfare of others, that individual must pay compensation". He recommended that actions generating negative externalities be taxed (called Pigouvian taxes), and actions generating positive externalities be subsidized. Therefore a social cost which is the cost to clean up pollution must be paid by the polluter. This was dubbed "internalising an externality" (Roughgarden, 2001). Hence payment for ecosystem services should be seen as one form of Pigouvian subsidy.
- III. Value services-Hall et al (2000) proposed that value should be ascribed to the services of the ecosystem as this will help in the conservation of the resources. This proposal was however opposed by some environmentalists, because they argued that business men and the powerful in the society might take advantage and high jack the resources (Ehrenfeld, 1988; McCauley, 2006). However there were those who supported the idea. Daily in his work, 1997 supported the idea. the Millennium ecosystem assessment also supported , where they proposed that putting value on the ecosystem services will likely help to control over exploitation of resources, reduce environmental degradation, the renown Economists like Ken Arrow and Sir Partha Dasgupta developed economic tools and methodologies of addressing the value of nature (Arrow et al ,1995,2004;Dasgupta,2001).

# 3.0 LOSS OF OPEN SPACE IN LOKOJA CITY

The area is sandwiched between a water body and a hill i.e. River Niger and Mount Patti respectively which had streamlined the settlement to a linear one and has a modifying effect on the climate. Between latitude  $7^{\circ}$  45'27.56"N and  $7^{\circ}$  51'04.34"N and longitude  $6^{\circ}$  41'55.64E and  $6^{\circ}$  45'36.58E of the national grid system within Kogi state, though a little deflated to the western part, the town has a total landmass of 29,833km<sup>2</sup> as shown in figure 1. There had been series of decentralized growth, in Lokoja in the last 10 years, due to the change in status of the town to a State Capital. This change had encouraged the influx of people from the city core to the fringes. This trend especially for residential purposes had tremendously increased due to explosion in population growth. The annual growth rate of 2.5% gives the rise in population from 43,784 in 1991 to a projection of 82,483 in 2003. However, the 2006 population census was recorded as 195,261 (NPC, 2006).





Figure 1: Lokoja in Kogi State, Nigeria

Recent satellite images of some selected parts of the city, shows the level of open spaces loss in the past years. It was found from the satellites image that in 1987, the area covered by light vegetation was about 44.0% for light vegetation, 6.03% for thick vegetation at the Otokiti area. While Felele area had 8.91% covered by light vegetation, 42.06% was covered by thick vegetation, while in Ganaja area was coved 53% was covered by light vegetation and 6.10% thick vegetation. However by 2001, this had been altered by anthropogenic activities, where Otokiti area now has light vegetation covering 2.27%, and thick vegetation covering 21.54%, and in the Felele area light vegetation have been altered to 21.4% of the area with thick vegetation covering 3.18%. The Ganaja area is covered by 21.38% light vegetation, and 14.46% thick vegetation.

However by 2011 this has been altered to 7.88% light vegetation, 0.2% thick vegetation in Otokiti, in Felele area light vegetation covered 5.8% and thick vegetation covered 0.02%, while Ganaja changed 28.45% for light vegetation and 0.1% for thick vegetation.

# **4.0 FINDINGS**

Recent satellite images of some selected parts of the city, shows the level of open spaces loss in the past years. It was found from the satellites image that in 1987, the area covered by light vegetation was about 44.0% for light vegetation, 6.03% for thick vegetation at the Otokiti area. While Felele area had 8.91% covered by light vegetation, 42.06% was covered by thick vegetation, while in Ganaja area was coved 53% was covered by light vegetation and 6.10% thick vegetation. However by 2001, this had been altered by anthropogenic activities, where Otokiti area now has light vegetation covering 2.27%, and thick vegetation covering 3.18%. The Felele area light vegetation have been altered to 21.4% of the area with thick vegetation covering 3.18%. The Ganaja area is covered by 21.38% light vegetation, and 14.46% thick vegetation.

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Figure 2: Classified 1987, 2001, and 2011 landsat image of Ganaja area. Source: Field survey (2014)

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Figure 3: Classified 1987, 2001, and 2011 landsat image of Felele area. Source: Field survey (2014)



Figure 4: Classified 1987, 2001, and 2011 landsat image of Otokiti area. Source: Field survey (2014)



Figure 5. Land cover change of Lokoja 1987, 2001, and 2011 landsat image of Otokiti area Source: Field survey (2014)

The above charts illustrates how the thick vegetation cover of Ganaja area gradually disappeared by the year 2011, and a gradual reduction in that of Felele area. Only Otokiti area seems to have retained some of its vegetative cover due to the presence a government forestry reserve which is protected by the law, even though gradual encroachment on this area is being observed in the recent time (Figure 2,3,4and 5).

The organ of the government responsible for planning the city is the ministry of lands and physical planning. As had been explained earlier the main problems facing the city of Lokoja, are issues of efficient water

management, environmental challenges in the form of waste management and the depletion of natural vegetation physical planning.

The study area being sited around vast expanse of water bodies still lacks adequate water provision to its dwellers. The water bodies are continually being polluted as waste and other harmful material are still dumped into it. The planners should solve this problem by focusing end use option by encouraging and educating the people of the use that will minimize water losses. Bring in policies on water reuse and the treatment of waste water so that waste water could be use multiple times through return to the supply side of the infrastructure. Conservation reserve programmes (CRP) and the wetland reserve programmes (WRP) recommended to help maintain and enhance ecosystem services, since programs like this support farmer incomes, while fostering ecosystem services with the potential for doing so without distorting trade.

The issue of waste management, destruction of natural vegetation, is a great problem facing the study area. The trend however shows a great correlation of growing income and the increase volume of solid waste generated, it therefore necessary to recognise the strong link between processes of production and consumption in order to develop strategies for waste reduction and to create waste recycling initiatives for consumers and producers.

To solve this problem, the management concept of zero waste should be adopted, this should begin first by educating the people on environmental ethics valuation of resources, human behaviour, individual and social perception on waste and resources. This study advocates five core aspects that must be considered in transforming the city into zero waste cities. The policy makers should develop an affordable regulatory and manageable policy that will consider the socio-political divides within the city and encourage the use of green technologies. The polluter pay principle should be adopted to discourage indiscriminate dumping of waste. Also people should be enlightened on the need to have an organised waste dump which could be a collecting point for recyclers of waste material, hence the buzz word Not In My Backyard or NIMBY.

It can be seen from the satellite images that the area is experiencing sprawl. Evidences of sprawl are found at the city edge in the form of leap frogging and mostly they are found close to highways and major roads (see plate 1). These have increased commuting distance within the city and vast area of land has been exploited. It is recommended that that the strategies of eco cities be adapted. This goes the following principles:

- 1. To revise land use priorities to create a compact, dense and vitally mixed use communities
- 2. Since the area is a transit node between the northern and southern of the country, develop efficient transport network
- 3. Restore damaged urban environment, especially wetlands and the riparian areas.
- 4. Create decent affordable, convenient economically mixed housing.
- 5. Support recycling, innovative appropriate technology and resource conservation while reducing pollution and hazardous waste.
- 6. Work with investors and business enterprises to support ecologically sound economically activity while discouraging pollution waste ad production and the use of hazardous materials.
- 7. Support recycling innovative appropriate technology and resource conservation while reducing pollution of hazardous waste. Promote voluntary simplicity and discourage excessive consumption of material goods.
- 8. Increase awareness of the local environment and bioregion through the awareness of ecological sustainability issues.



Plate 1: Informal settlement at the town fringe, along a major road. it is also a sprawl area. Source: Alabi, (2014)

Application of the sustainable city concept to the study area could be explained further. Since compactness of the city is recommended, it is expected that when the city is compacted, it will reduce sprawl effects such as reduced cost of providing infra-structure, allows co-regeneration, and co-use of energy and reduce the extent of ecological foot print. The area that have been leap frogged can be integrated into the main city form by infilling. Zoning law is also recommended to control and direct growth. This have the advantage of placing compatible land use together, which will increase economies of scale, hence provide more jobs for the people. A compacted city will also decrease transport time, which will reduce the living cost of the people. This however goes with the provision of efficient and effective transport system. In this type of urban form improved transport networks and high tech trams and trains is recommended.

Since the study area is in the tropics, to discourage the use of fossil fuel and fire wood, policies of green energy should be adapted, like passive solar designs should be encouraged to harness the abundant solar energy available. The quality of life of the city dwellers can also be improved by greening the city in terms of tree planting, using green roofs, which will help in absolving pollution and contribute to improve the local micro climate and help to mitigate GHG's.

# 5.0 CONCLUSIONS AND RECOMMENDATIONS

There is no doubt that the concept of new urbanism has moved from Utopian state to that of realism. It is still ongoing development in cities like Rotterdam, Singapore, Leads, Vancouver, Seoul and some form of success have been recorded here and elsewhere. The strategies are implementable in Lokoja with lot of background preparations, like more education for the people and the appealing on the political will of the leaders. It is to be noted however, that none of the new urbanism strategies is mutually exclusive. They all can fit in as a problem fixer (be it sustainable urban form or Eco city) depending on the peculiar situation of the city and materials available at the point in time.

The strategies of green growth theory are recommended for the study area as has been carried out in cities like Seoul in Japan. The city attempted to increase competitiveness by investing in low carbon technology or renewable energy. The city of Vancouver in Canada, in its own case, created low carbon economic development as magnet for low carbon business technologies product. This was to create green jobs for 20000 people, which serves as a way of creating revenue from ecosystem services. The environmental performance of the study area can be enhanced by applying strategies to improve infrastructure as have been done in Leads (U.K). This will improve natural assets and improve environmental performance, economic vitality and enhance health of the people, which in turn city livability.

There is need to expand interdisciplinary research that explores ways to increase diversity of agro ecosystems without sacrificing yield. Also to establish markets through which ecosystem services or their products can be bought and sold (e.g. carbon credits, water quality credits) and incentive to protect the ecosystems (Wagester, 2011).

The foregoing has shown that job creation is the key feature of sustainable development, the green growth plans which increase the dynamics of city economy. Improved health and living standard of people is strongly recommended.

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# A STUDY ON BRAND AWARENESS AMONG CUSTOMERS OF BANGALORE FOR BYJU'S-THE LEARNING APP

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# ABSTRACT

Brand Awareness has essentially emerged as one of the top most management priority over the last few decades because of the growing realizations among the consumers regarding multiple brands housed in different product and service category. Having intensively been driven by the industry interest, various researchers have explored and experimented a number of different factors playing a major role in influencing consumers mind towards a particular brand and how one may recall it. In this particular study the authors have considered six factors which includes Brand awareness of Byju's, consideration, interest, knowledge of the brand through mass media, brand recall and familiar about the brand. The findings reveal that brand awareness is at satisfactory level.

Keywords: Brand awareness, electronic learning, brand recall, Familiarity and Consideration.

# **INTRODUCTION**

Online learning or internet based learning or e-learning or mobile learning is method of learning most commonly used in today's environment. Though online learning may not appeal to everyone, but it is most commonly accepted method of learning. This method of learning gives flexibility to study at convenient time at one's own pace. With the latest technological support, today's e-learning is considered to be practical oriented learning. The online learning platforms may include, live video explanation, discussion boards, record and learn the live discussions, easy to have mentors too, to follow the global standards and methods. A Learning app is nothing but, it is an android based application which could be downloaded through Google Play Store and used with identification (ID) and Password.

Moreover, learning application and other programs are successful at recent times because of awareness, and heavy competition among the people to pursue academic plus activities. At times, today, the school and college students are over loaded with subjects, that many concepts are not ingrained in the minds of students. These kinds of online learning platforms help students to learn and understand the concepts practically through video based programs. The generation Z' has whole gamut of questions which needs to be answered practically. As mentioned earlier, too much of subjects, the students need to study, the school teachers may not be in a position to answer everything for students level of understanding as each of their level may be different. The expectation of this generation is to make learning fun so that, it should not burden them.

Beyond all, this is the idea behind the 'Byju's- The learning app' is to make learning fun based. They have video based learning to support school based curriculum plus extra online tests and challenges to craft the students on the basis of personalized learning abilities. This service also provides training for competitive exams, performance report to parents, worksheets, practical exercises, weekly targets and other completion activities. They also give personal mentors and guides and post the query which will be answered by experts. Think and learn private Ltd was started in the year 2005 by Mr.Byju Raveendran, an engineering graduate who has scored 100 percentile twice in CAT. They are the market leaders for conducting online live classes through satellite enabling a reach to any number of students at any time. They conduct aptitude exams like CAT, CSAT, GS, SAT, IIT-JEE, SAT, GRE and campus recruitment tests though their programs. They are successfully running the training programs in 232 locations including some top engineering colleges like NIT-K, NIT-W, NIT- Surathkal, and NIT- Tirchy, NIT- Calicut, MIT-Manipal and SRM-Chennai. Their latest technology is helping the company to grow exponentially without compromising on quality which helps them to keep up the unique selling proposition (USP).

# LITERATURE REVIEW

The present paper needs to concentrate on the concept called brand awareness, which includes both brand recognition and recall. Brand awareness is the prime factor to influence the growth and development of business. In order to understand, the concept of brand recognition is the probability of consumers who are able to remember the brand when they are questioned or spoken about that. Brand recall is the concept which deals with consumers who are able to correctly recover brand from the memory.

hat brand awareness is an important choice tactic for consumers facing a new decision task; an hat brand awareness is an important choice tactic for consumers facing a new decision task; an Emma and Sharp (2000) brand awareness is an important choice for consumers, it represents the lowest end of the continuum in the brand knowledge (Hover and brown 1990, Mandler 1980) the study presented detailed pattern into brand awareness on the choice, brand sampling etc., Mandrel's Studies contribute by distinguishing the concepts awareness and recognition. Yigang Pan, David K. Tse, and Xiaolian Li (2000) in their research, Evolution of Brands in Transitional Economies: The Case of China in 1993-1998, present that, brand awareness is the first step in the brand knowledge pyramid and it reflects the consumer's ability to identify brands under different conditions. Brand awareness totally relies on the fact that the brand name should come to the mind, when the consumers make their purchase intention or decision or thought.

Erfan Severi & Kwek Choon Ling (2013) bought out the concept and hypothetically tested the relationship between brand awareness and brand equity, which is mediated by brand association. Keller's (1993,1998) paper present the point that brand awareness has an impact over the decision making choice of consumers. In addition to the above mentioned point, the author further puts forth that brand awareness can have a strong influence while making purchase decision through brand association.

Ravi Pappu, Pascale G. Quester, Ray W. Cooksey (2005), state in their findings that Brand awareness and associations are two different dimensions of brand equity as it exists in the marketing literature, and the authors have pointed out the correlation between Brand awareness and brand equity. Pitta and Katsanis (1995) explains about the concept of brand awareness in their empirical study, when consumers can recall the brand. Most of the consumers are exposed to word of mouth buzz, advertisements in radio and television, and other methods of sales promotions so that they can recall the brand. The authors mention about the point on aided recall, many a times consumers are not able get the exact picture until they encounter with the brand.

However, for a particular situation when consumers can thoroughly recall the brand without an aid of awareness, which is called as unaided recall, could be a rare phenomenon. Some consumers, who may have to overcome a problem, scan their minds to recall a brand which is called as internal search, with the set of product choices which they can easily think about. Sometimes, known products also cannot be recalled, during that time marketers use different tactics aided recall for making them remember a brand. The important aspect of marketing, many experts reiterate that, for low involvement products just awareness is enough to make sale. Thus most of the empirical studies present the fact that brand recall is the most important phenomenon associated with brand awareness.

Beyond all, the most important point of brand awareness is registering in the minds of consumers or right brain positioning. The focal point of brand awareness is the brand recognition. In the brand awareness concept, the consumers may also have set of aware products, which they may link to current requirements and based on the information they have restored in the memory. Most importantly brand awareness is the essence of brand presence in the consumers mind set. Brand awareness is the most common selection factor among the consumers. Most of the empirical studies reiterate on the correlation between brand awareness and brand associations. This may be created by the experience in some case.

Farai Chigora and Promise Zvavahera (2015) mention in their empirical study the concept of brand loyalty and its components which includes brand awareness, brand image and perceived brand quality. Their findings state that brand awareness is one most important dominant factor for brand loyalty. Hoyer and Brown, (1990) also argue that the very nature of brand awareness have great effects on the purchase of the products. Emma and Byron Sharp (2000) said "awareness differentials seem to be a powerful influence on brand choice in a purchase consumer product context". Usually consumers show a great affinity to awareness as a trial and error and show a degree of inertia towards it.

Despite all these, brand awareness acts as a mental document, so the result is that, the consumer purchase decision happens more smoothly, when they have heard or seen the brand. Boonghee Yoo and Naveen Donthu (2001) presented three dimensional and four dimensional models through the empirical study which included factors like brand loyalty, perceived quality, brand awareness and brand association. In a nutshell brand awareness the main certificate for any kind of purchase decision.

# **OBJECTIVES**

- To understand the profile of respondents who are the target of Byju's product.
- To understand the familiarity of the brand Byju's.
- To know about the reasons behind their awareness of the brand.
- To identify whether they will consider Byju's when they buy digital learning products.
- To understand about the interest on brand Byju's.

## **RESEARCH METHODOLOGY**

The present study is included both in exploratory research and descriptive research as it completely focuses on a phenomenon called brand awareness, which tries to understand the extent of customer's familiarity towards the particular brand/product (Byju's). The study is completely relying on the primary data. The primary data is collected through structured questionnaire.

Sampling: The sample size taken is 112 respondents. Sampling technique used is convenience sampling. The sample covers students of all ages from school to college, parents and professionals who prefer Byju's to train for competitive and other exams.

Tools used for Analysis: Simple Percentage Analysis, Multiple Correlations and Chi-square tests were used for analyzing the data. The data was fed into IBM SPSS 20 software package for treatment.

#### DATA ANALYSIS AND INTERPRETATION

#### I. Reliability Statistics

Table 1: Case Processing Summary

|       |                       | N   | %     | Table 2: Reliability Statistics |                        |        |
|-------|-----------------------|-----|-------|---------------------------------|------------------------|--------|
|       | Valid                 | 112 | 100.0 | Cronbach's                      | Cronbach's Alpha Based | No. of |
| Cases | Excluded <sup>a</sup> | 0   | 0     | 705                             |                        | 17     |
|       | Total                 | 112 | 100.0 | .793                            | ./93                   | 1/     |

The reliability co-efficient is 0.795 the numbers are close to 1. Usually the coefficients should be above 0.7 which are considered as having good internal consistency. Hence the result of the above table (table -2) shows 0.79 is data is reliable.

| Variables             | Catagories   | No of Respondents | Percentage |
|-----------------------|--|-------------------|------------|
| v ai tables           | Mala   |                   |            |
|                       | Male   | 80                | /6.4       |
| Gender                | Female   | 32                | 28.6       |
|                       | 16-20  | 32                | 28.6       |
|                       | 21-25  | 41                | 36.7       |
|                       | 26-30  | 26                | 23.2       |
| Age                   | 31-35  | 9                 | 8          |
|                       | 36-40  | 4                 | 3.5        |
|                       | 21,000-30,000  | 38                | 33.9       |
| Monthly Income in     | 31,000-40,000  | 24                | 21.4       |
| Indian Currency (Rs)  | 41,000-50,000  | 37                | 33.1       |
|                       | Des         Categories         No of Responde           Male         80           er         Female         32           16-20         32           21-25         41           26-30         26           31-35         9           36-40         4           21,000-30,000         38           come in         31,000-40,000         24           ency (Rs)         41,000-50,000         37           50,000 and above         13         School Student         43           College Student         39         Salaried         16           Business         12         Homemaker         1           Others         1         Married         37           Status         Unmarried         75         0ne Member         42           Two Members         51         Three and more Members         19 | 13                | 11.6       |
|                       | School Student   | 43                | 38.3       |
|                       | College Student  | 39                | 34.8       |
|                       | Salaried   | 16                | 14.3       |
| Occupation            | Business   | 12                | 10.8       |
|                       | Homemaker  | 1                 | 0.9        |
|                       | Others   | 1                 | 0.9        |
|                       | Married  | 37                | 33.1       |
| Marital Status        | Unmarried  | 75                | 66.9       |
|                       | One Member   | 42                | 37.5       |
| No of Members         | Two Members  | 51                | 45.5       |
| Earning in the Family | Three and more Members   | 19                | 17         |

#### **II. Demographic Details of the Respondents**

It is evident from the above table (Table 3) demographic details of the respondents that majority of them belong to (80/112)76.4 percent are males and the rest 28.6 (32/112) percent are females. Based on the age classification of the respondents the highest number representation is from 21-25 with 41 and second highest 32 of them belong to the age group of 16-20. The third highest that is 26 of them belong to the age of 26-30 .This clearly shows that the age groups are taking up coaching classes or digital learning programs for their professional/personal development. The next category is the income, which is very

# Table 3. Profile of the Degnandants

important as it decides on the capacity and spending of individuals. From the above table it is inferred that income classification almost 34 percent belong to group of Rs21000-30000 monthly earnings and 33 percent of them belong to the income group of Rs 41000-50000 monthly earnings. The rest of them distributed among Rs 31, 000-40,000 and Rs 50,000 and above.

Despite all these, it is very important to know about the occupation pattern of the respondents. It is understood from the table-3 that more than 70 percent are students who are attending college and schools take up such kind of additional learning programs. The remaining 30 percent is distributed to salaried, business and other classifications. Now a days in the existing pattern of metropolitan living, the culture is dependent of working, as the cost of living is high in urban areas. In order to understand the phenomenon the authors made a point to understand that number of earning members in the family. It is clearly evident that majority of them are earning couples. The data shows that more than 45 percent are two members earning.

| Table: 4 Chi square tests |                              |                  |         |          |  |  |  |
|---------------------------|------------------------------|------------------|---------|----------|--|--|--|
| Variable 1                | Variable 2                   | Chi square value | P value | Results  |  |  |  |
| Awareness of Byju's       | Familiarity                  | 292.307          | .000    | Accepted |  |  |  |
| Awareness of Byju's       | Knowledge through Mass Media | 159.763          | .000    | Accepted |  |  |  |
| Awareness of Byju's       | Recall                       | 151.093          | .000    | Accepted |  |  |  |
| Awareness of Byju's       | Consideration                | 25.838           | .056    | Rejected |  |  |  |
| Awareness of Byju's       | Interest                     | 41.039           | .001    | Accepted |  |  |  |

III. Chi square Tests

From the above table it is evident that, there are five variables which was being considered to understand the concept of brand awareness. The variables considered includes, familiarity of the brand, became to know through mass media, able to recall the brand, may consider while purchasing and interested at the product. The hypotheses were formulated and tested with the help of SPSS. The alternate hypothesis were accepted in the case of familiarity and awareness of Byju's with the p value of 0.000. Similarly with the case of knowledge of mass media and awareness of Byju's the alternate hypothesis was accepted with the p value of 0.000 followed by recall and interest. The one hypothesis which was rejected was consideration with awareness of Byju's where in the null hypothesis was accepted and the alternate was rejected with the Pearson's chi-square value of 25.838 and p value of .056 which is more than 0.05. It can be interpreted that while buying electronic learning products, even though there is awareness of Byju's, the customers may look at other options in the market and there is an equal chance of tradeoff between Byju's learning app and other products.

|                |                                   | Awareness of Byju's | Familiarity | Knowledge<br>Through<br>Mass Media |
|----------------|-----------------------------------|---------------------|-------------|------------------------------------|
|                | Pearson Correlation               | 1                   | .308**      | 478**                              |
| Awareness      | Sig. (2-tailed)                   |                     | .001        | .000                               |
| of<br>Deriva's | Sum of Squares and Cross-products | 92.420              | 29.455      | -47.214                            |
| Буји s         | Covariance                        | .833                | .265        | 425                                |
|                | N                                 | 112                 | 112         | 112                                |
|                | Pearson Correlation               | .308**              | 1           | 204*                               |
|                | Sig. (2-tailed)                   | .001                |             | .031                               |
| Familiarity    | Sum of Squares and Cross-products | 29.455              | 98.920      | -20.786                            |
|                | Covariance                        | .265                | .891        | 187                                |
|                | N                                 | 112                 | 112         | 112                                |
| Vacual edge    | Pearson Correlation               | 478**               | 204*        | 1                                  |
| Through        | Sig. (2-tailed)                   | .000                | .031        |                                    |
|                | Sum of Squares and Cross-products | -47.214             | -20.786     | 105.429                            |
| Madia          | Covariance                        | 425                 | 187         | .950                               |
| Media          | N                                 | 112                 | 112         | 112                                |

IV. Correlations Correlations Table : 5

Pearson's correlation is run to determine the relationship between awareness of Byju's, familiarity and knowledge through mass media. The above table indicates that there is low correlation between these with the values r- 0.478, -0.204, and respectively and only awareness of Byju's is statistically significant at 0.01 percent level (2- tailed).

| Correlations Table- 6 |                                   |                     |                  |               |  |  |
|-----------------------|-----------------------------------|---------------------|------------------|---------------|--|--|
|                       |                                   | Awareness of Byju's | Recall           | Consideration |  |  |
|                       | Pearson Correlation               | 366                 | $1.000^{**}$     | .123**        |  |  |
| Awareness             | Sig. (2-tailed)                   | .000                | .000             | .195          |  |  |
| of<br>Byiu's          | Sum of Squares and Cross-products | -34.643             | 92.420           | 15.196        |  |  |
| Dyju s                | Covariance                        | 312                 | .833             | .137          |  |  |
|                       | Ν                                 | 112                 | 112              | 112           |  |  |
|                       | Pearson Correlation               | 167**               | .308             | .036*         |  |  |
|                       | Sig. (2-tailed)                   | .078                | .001             | .708          |  |  |
| Recall                | Sum of Squares and Cross-products | -16.357             | 29.455           | 4.554         |  |  |
|                       | Covariance                        | 147                 | .265             | .041          |  |  |
|                       | Ν                                 | 112                 | 112              | 112           |  |  |
|                       | Pearson Correlation               | .656**              | 478 <sup>*</sup> | 001           |  |  |
|                       | Sig. (2-tailed)                   | .000                | .000             | .991          |  |  |
| Consideration         | Sum of Squares and Cross-products | 66.286              | -47.214          | 143           |  |  |
|                       | Covariance                        | .597                | 425              | 001           |  |  |
|                       | Ν                                 | 112                 | 112              | 112           |  |  |

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Pearson's correlation is run to determine the relationship between awareness of Byju's, Recall and Consideration. The above table indicates that there is low correlation between these with the values r 0.123, 0.036, and 0.656 respectively and is statistically significant at 0.01 percent level (2- tailed).

| Correlations Table- 7  |                                   |                      |             |               |  |  |
|------------------------|-----------------------------------|----------------------|-------------|---------------|--|--|
|                        |                                   | Awareness of Byju's. | Familiarity | Consideration |  |  |
|                        | Pearson Correlation               | 366                  | 167**       | .656**        |  |  |
|                        | Sig. (2-tailed)                   | .000                 | .078        | .000          |  |  |
| Awareness<br>of Byin's | Sum of Squares and Cross-products | -34.643              | -16.357     | 66.286        |  |  |
| or Dyju 3.             | Covariance                        | 312                  | 147         | .597          |  |  |
|                        | Ν                                 | 112                  | 112         | 112           |  |  |
|                        | Pearson Correlation               | 1.000**              | .308        | 478*          |  |  |
|                        | Sig. (2-tailed)                   | .000                 | .001        | .000          |  |  |
| Familiarity            | Sum of Squares and Cross-products | 92.420               | 29.455      | -47.214       |  |  |
|                        | Covariance                        | .833                 | .265        | 425           |  |  |
|                        | Ν                                 | 112                  | 112         | 112           |  |  |
|                        | Pearson Correlation               | .123**               | .036*       | 001           |  |  |
| Consideration          | Sig. (2-tailed)                   | .195                 | .708        | .991          |  |  |
| Consideration          | Sum of Squares and Cross-products | 15.196               | 4.554       | 143           |  |  |
|                        | Covariance                        | .137                 | .041        | 001           |  |  |

Pearson's correlation is run to determine the relationship between awareness of Byju's, familiarity and Consideration. The above table indicates that there is low correlation between these with the values r 0.656,1, and 0.123 respectively and is statistically significant at 0.01 percent level (2- tailed).

#### **Correlations Table- 8**

|                         |                                   | Awareness of Byju's. | Interest | Consideration |
|-------------------------|-----------------------------------|----------------------|----------|---------------|
| •                       | Pearson Correlation               | 1                    | 366**    | 027**         |
| Awareness<br>of Byju's. | Sig. (2-tailed)                   |                      | .000     | .776          |
|                         | Sum of Squares and Cross-products | 96.857               | -34.643  | -3.429        |

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|                     | Covariance                        | .873    | 312    | 031     |
|---------------------|-----------------------------------|---------|--------|---------|
|                     | Ν                                 | 112     | 112    | 112     |
| Pearson Correlation |                                   | 366**   | 1      | .123*   |
|                     | Sig. (2-tailed)                   | .000    |        | .195    |
| Interest            | Sum of Squares and Cross-products | -34.643 | 92.420 | 15.196  |
|                     | Covariance                        | 312     | .833   | .137    |
|                     | Ν                                 | 112     | 112    | 112     |
|                     | Pearson Correlation               | 027**   | .123*  | 1       |
| Consideration       | Sig. (2-tailed)                   | .776    | .195   |         |
|                     | Sum of Squares and Cross-products | -3.429  | 15.196 | 163.964 |
|                     | Covariance                        | 031     | .137   | 1.477   |

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

\*. Correlation is significant at the 0.05 level (2-tailed).

Pearson's correlation is run to determine the relationship between awareness of Byju's, interest and Consideration. The above table indicates that there is low correlation between these with the values r -0.366, -0.27 and 1 respectively and is statistically significant at 0.01 percent level (2- tailed).

# FINDINGS

The findings from the study reveal that 70 percent of the respondents belong to the category of students who are studying at schools and colleges. The data also shows that 45percent of the respondents have two members earning in the family. The details of chi square tests are presented in the table- 4 which shows Byju's awareness and consideration are not having any significant relationship that means that the Null hypothesis is accepted in that particular case. With regard to the correlation analysis which is tested on the variables like awareness of Byju's, familiarity, Knowledge through mass media, recall, interest and consideration. It is evident from the correlation tables that except the awareness of Byju's all others showcase low correlations which cannot be considered as satisfactory. As mentioned earlier, the decision is left to the consumers whether they may buy the product or not.

# CONCLUSION

Education system in India has made prominent changes with the time. The ICSE board are ahead than the CBSE board and CBSE are ahead than the state board. With all these things, Byju's classes has developed their own way of educating students and transformed the new method of learning. Hence the Byju's classes have already revolutionized learning through latest learning approach.

However, the consumers mind is a black box, no research can intrude on to the mind and state reason for the decisions made, but the duty of marketer is that they make the brand aware, which is evidently presented through the collected data set and analysis of the data, which emphasizes that brand awareness is at satisfactory level. All marketing efforts of Byju's are successful and the target is well aware about the product's existence and usage. The real big picture also shows that Byju's have a good market share in the competitive and entrance exam categories.

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# A STUDY ON FACTORS GOVERNING ADOPTION OF COMPUTERIZED ACCOUNTING SYSTEM IN SMEs' OF GUJARAT

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# ABSTRACT

Accounts are the performance mirror of any organization and hence they perform a very important role in the providing overview of the organization's position. Earlier accounts were maintained manually in hard bound books but with the passage of time it has changed drastically. Now-a-days even small organizations maintain their accounts in digital format i.e. on computers with the help of various accounting software. There are number of reasons and different motives behind using computerized accounting. The main objective of the study aimed to find out the factors that govern in usage of Computerized Accounting System among the SMEs' of Gujarat.

Key Words: Computerized Accounting System, Factors, Gujarat, Small & Medium Enterprises.

# **INTRODUCTION**

Computerized Accounting System refers to a system wherein the accounts of the enterprise are maintained on a computer. Any accounting system has two aspects; first, it has to work under a set of well-defined accounting concepts and principles and, secondly, it has to maintain record, and generate reports as defined by the user. These aspects can be fulfilled by processing the transactions and events in accordance with the accounting principles and adopting the software which is capable of generating the user defined reports.

A Computerized Accounting System is now a basic necessity and no longer a luxury among businesses of whatever orientation and size. While some firms still do their bookkeeping by hand, most firms generally have too many transactions to sustain a manual accounting system.

Computerized Accounting has a bunch of advantageous features like Automation, Accuracy, Associability of Data, Reliability, It is Scalable, Speedy Access is possible, Security has develop to be sturdy and other such merits are there. Due to these merits there has been a wide adoption of Computerized Accounting System and it has lead to smooth and efficient maintenance of Accounts.

Looking at the above mentioned utility of Computerized Accounting System it is very important to use in business. Therefore, it will be very interesting to know about factors that govern Computerized Accounting System in SMEs' of Gujarat.

# LITERATURE REVIEW

The review of literatures discuss the different studies carried on Computerized Accounting System, which include studies on reasons for adoption of information technology system, impact of implementation of Information Technology for Accounting, applicability of technology models of Information & Communication Technology, identification of positive impact of Computerized Accounting Information Systems' effectiveness in increasing the efficiency of human capital in the financial department, studies on Accounting Information Systems' vendors should strive to provide custom made AISs' packages that suit the requirements of SMEs', work on extent of IT usage, its pattern and determinants, implications for those responsible for accounting or/ and management, study examining e- accounting practices, work on consequences of successful ERP implementation, but no study have been found for SMEs' of Gujarat, so it will be very useful study for the body of knowledge

Dalvadi (2012) highlights that various products are available for computerized accounting like Accounting Software, Inventory Management Software, Pay Roll Software, ERP, Cost Accounting Software and Management Accounting Software. Computerized Accounting technology provides speed, real time access; accuracy, faster and error free data entry that reduces the cost and increase productivity of business. Business can plan and forecast in a better way. However Mr.Ali & Mr.Hojjatallah (2013) found out that the role of Accounting Information System (AIS) is vital during the new challenge in business world. Reliability, comparability and relevance in formation has to make financial statements more trustable to users, hence to reach these factors to setup the aims we need software package to make helpful way to the organizations. Aradhana (2013) examined the e-accounting practices among Indian SMEs. The study revealed that almost all the SMEs sampled attach a lot of importance to financial information by employing at least degree holders and Chartered Accountants to handle their accounting information. The study also showed that majority of the firms

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put in place accounting software's to generate their financial information. This has the tendency to reduce cost, enhance clerical works, and provide sufficient space to store data and process information for management decision in a timely manner. In terms of functionality, the results of the study showed that almost all the SMEs use the software for accounts receivables functions as well as accounts payables, inventory management, payroll, fixed assets management, bank reconciliation and cash management. The results of the study also revealed that majority of the SMEs encounter problems in supply of electricity with the frequent breakdown of their accounting system. They found that almost all the SMEs are generally satisfied with the performance of their accounting software. It is recommended that SMEs in India adhere to good and standard accounting principles in their operations. The adoption of e-accounting would ensure proper accounting practices as good accounting practices have several implications for entrepreneurs and SME managers. Good accounting and control systems could assist in evaluating the performance of the organization and its managers. SMEs with proper books of accounts are often capable of attracting external financing easily. SMEs that maintain good accounting and management information tend to be viewed favourably by finance providers.

Ahmad (2013) conveyed in his study that electronic commerce had a statistically significant influence on the accounting information systems development of Jordanian firms. The results also showed statistically significant between electronic commerce and reliability of the accounting information systems in Jordanian firms, the Impact of electronic commerce has enhanced the reliability which represents one of the qualitative characteristics of accounting information by improving the ability to deal with the data for most Companies, reduce errors, verification of data, security and protection. Electronic commerce had a statistically significant influence for ability to reduce cost, improve operational performance of Jordanian companies through accounting information systems. The use of Electronic commerce in the accounting information systems for Jordanian companies contributed to the improvement of services provided to the clients. Electronic commerce had contributed to increase efficiency and effectiveness of accounting information systems in Jordanian companies.

The above review of literatures discuss the different studies carried on Computerized Accounting System, which include consequences of successful ERP, impact of implementation of Information Technology for Accounting, applicability of technology models of Information & Communication Technology, but no study have been attempted for SMEs' of Gujarat, so it will contribute to the body of knowledge greatly.

## **RESEARCH METHODOLOGY**

The nature of research is descriptive. The study is based on primary data. Survey was conducted for data collection. Structured, close ended questionnaire was the tool for data collection. The universes of the study are all the small & medium scale enterprises of Gujarat State. Total 200 responses from 200 SMEs' were collected from Anand, Vadodara, Borsad and Nadiad city of Gujarat State. The samples were selected on the basis convenient sampling technique. To find out factors governing adoption of CAS, factor analysis was run using SPSS 18 (evaluation version). Total 51 statements were framed to find-out various factors.

# **OBJECTIVE OF THE STUDY**

The objective of the study is to identify factors governing usage of Computerized Accounting System in SMEs' of Gujarat.

| Table: 1 Frome of the Respondents     |               |           |            |  |  |  |  |
|---------------------------------------|---------------|-----------|------------|--|--|--|--|
|                                       | Category      | Frequency | Percentage |  |  |  |  |
|                                       | Anand-VVN     | 157       | 78.5%      |  |  |  |  |
|                                       | Vadodara      | 16        | 8%         |  |  |  |  |
| Area                                  | Borsad        | 14        | 7%         |  |  |  |  |
|                                       | Nadiad        | 13        | 6.5%       |  |  |  |  |
|                                       | Total         | 200       | 100%       |  |  |  |  |
|                                       | Commerce      | 110       | 55%        |  |  |  |  |
|                                       | Science       | 80        | 40%        |  |  |  |  |
| Qualification of Respondents (Stream) | Professional  | 05        | 2.5%       |  |  |  |  |
|                                       | Undergraduate | 05        | 2.5%       |  |  |  |  |
|                                       | Total         | 200       | 100%       |  |  |  |  |
|                                       | 20-40         | 126       | 63%        |  |  |  |  |
| Age Croup                             | 40-50         | 54        | 27.5%      |  |  |  |  |
| Age Group                             | 50 & above    | 19        | 9.5%       |  |  |  |  |
|                                       | Total         | 200       | 100%       |  |  |  |  |

# **PROFILE OF THE RESPONDENTS**

|                       | SSI         | 163 | 81.5% |  |
|-----------------------|-------------|-----|-------|--|
| Type of Industry      | MSI         | 37  | 18.5% |  |
|                       | Total       | 200 | 100%  |  |
|                       | Tally       | 166 | 88%   |  |
|                       | Miracle     | 12  | 6%    |  |
| Software Used         | Busy        | 08  | 4%    |  |
|                       | Oracle      | 04  | 2%    |  |
|                       | Total       | 200 | 100%  |  |
|                       | All Purpose | 14  | 7%    |  |
| Durpose of Software   | Maintenance | 196 | 0.20/ |  |
| i in pose of Software | of Accounts | 180 | 93%   |  |
|                       | Total       | 200 | 100%  |  |

(Source: Primary Data from Field Survey)

We can observe that majority of respondents are from the area of Anand & VVN and least respondents were from Nadiad i.e. 6.57%. Majority respondents were Commerce graduates who were having the ownership of SMEs', followed by Science graduates (40%) only 2.5% respondents were undergraduates. 63% of the respondents were having age below 40 years and 54 respondents were between 40 to 50 years. 81.5% of responses are taken SSIs' and the remaining from MSIs'. 88% of the respondents use Tally software to maintain accounts so it is very popular among SSIs' & MSIs'. Main utilization of the software was to maintain accounts.

# FACTOR ANALYSIS

Factor Analysis is a multivariate statistical technique that is used to abridge the information enclosed in large number of variables into a smaller number of subsets of factors.

For the current study factor analysis is performed on 52 statements of factors that govern usage of Computerized Accounting in SMEs' of Gujarat. The replies of the respondents were measured on a scale ranging from 1 to 5 (1 - Strongly Disagree to 5 - Strongly Agree).

Bartlett's test tells us whether our correlation matrix is significantly different from an identity matrix. Therefore, if it is significant then it means that the correlations between variables are (overall) significantly different from zero. So, if Bartlett's test is significant then it is good news. However, as with any significance test it depends on sample sizes and in factor analysis we typically use very large samples. Therefore, although a non-significant Bartlett's test is certainly a cause for concern; a significant test does not necessarily mean that correlations are big enough to make the analysis meaningful. If you do identify any variables, that seem to have very low correlations with lots of other variables, then exclude them from the factor analysis.

| Kaiser-Meyer-Olkin Mea        | .722               |          |
|-------------------------------|--------------------|----------|
| Bartlett's Test of Sphericity | Approx. Chi-Square | 3519.893 |
|                               | Df                 | 2080     |
|                               | Sig.               | .000     |

## Table 2: KMO and Bartlett's Test

We can observe that Kaiser-Meyer-Olkin Measure of Sampling is 0.722 which is higher than 0.6 so we can run factor Analysis. Secondly Bartlett's Test of Sphericity also significant so we are sure about running factor Analysis. From the above table it can be observed that Bartley's test is significant which further highlights the fact that the variable are correlated and certainly the matrix is not identity matrix.

# COMMUNALITIES

The initial communalities for Principal Component Analysis (PCA) are almost equal to 1. However, the primary concern is the extracted communalities, which are achieved after the extraction of the factors. Here, extraction was done using Principal Component Analysis.

**Table 3: Total Variance Explained** 

| Tuble et Totul vulturiet Emplainea |                                     |                  |              |                                   |               |              |  |
|------------------------------------|-------------------------------------|------------------|--------------|-----------------------------------|---------------|--------------|--|
| Total Variance Explained           |                                     |                  |              |                                   |               |              |  |
|                                    | Extraction Sums of Squared Loadings |                  |              | Rotation Sums of Squared Loadings |               |              |  |
| Component                          | Total                               | % of<br>Variance | Cumulative % | Total                             | % of Variance | Cumulative % |  |

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| 1  | 17.598   | 33.842 | 33.842 | 5.721 | 11.002 | 11.002 |  |  |  |
|----|--|--------|--------|-------|--------|--------|--|--|--|
| 2  | 6.656  | 12.799 | 46.642 | 5.471 | 10.521 | 21.523 |  |  |  |
| 3  | 5.237  | 10.071 | 56.712 | 5.259 | 10.113 | 31.636 |  |  |  |
| 4  | 4.673  | 8.986  | 65.698 | 5.151 | 9.906  | 41.542 |  |  |  |
| 5  | 3.480  | 6.693  | 72.391 | 5.090 | 9.788  | 51.330 |  |  |  |
| 6  | 3.135  | 6.029  | 78.420 | 5.052 | 9.715  | 61.045 |  |  |  |
| 7  | 2.813  | 5.410  | 83.830 | 4.266 | 8.203  | 69.248 |  |  |  |
| 8  | 2.157  | 4.148  | 87.978 | 4.262 | 8.196  | 77.444 |  |  |  |
| 9  | 1.694  | 3.257  | 91.235 | 4.133 | 7.947  | 85.391 |  |  |  |
| 10 | 1.179  | 2.267  | 93.502 | 4.043 | 7.775  | 93.166 |  |  |  |
|    | Extraction Method: Principal Component Analysis. |        |        |       |        |        |  |  |  |

VARIMAX method of rotation was used in the present study to analyze data. The variance explained by each component after the rotation method is shown in the table 3. It is noticeable from the above table that the variance is now evenly distributes in a series of 11.002 to 2.404, which was 33.842 - 2.067 before rotation.

# VARIANCE EXPLAINED

Only those factors are extracted for which the Eigen Value are greater than 1. These factors are 10 in number and jointly contribute 95.569 of the total variances. This is encouraging parentage of variance to be explained and assumes the aptness of the factor analysis. Thus mining out 10 proportions from a total 52 bits and pieces for gauging the Factors Governing usage of Computerized Accounting System in SMEs' is supportive by all means.

Further the table 1.1 shows the extraction sum of square loadings for scale of gauging the Factors Governing Computerized Accounting System in SMEs' of Gujarat. Further it can be noted that from table 1.1 the total variances explained (93.502) is not evenly distributed across all components. The first component is 33.842 which tend to be the highest among all. In order to distribute components equally, a rotation of the components matrix is mandatory. Components matrix is the distribution of various variables to the mined components. Table 4: Rotated Component Matrix

| Rotated Component Matrix <sup>a</sup>  |      |      |      |   |       |      |   |   |   |    |
|--|------|------|------|---|-------|------|---|---|---|----|
|  |      |      |      |   | Compo | nent |   |   |   |    |
|  | 1    | 2    | 3    | 4 | 5     | 6    | 7 | 8 | 9 | 10 |
| I was willing to adopt technology<br>for CAS so I am using it and<br>installed it for my firm. | .976 |      |      |   |       |      |   |   |   |    |
| I have to depend less on my firm's staff for knowing vital business information.               | .972 |      |      |   |       |      |   |   |   |    |
| Technology is best friend of me so I am using it.  | .969 |      |      |   |       |      |   |   |   |    |
| I am using CAS because I want to use it.   | .957 |      |      |   |       |      |   |   |   |    |
| I installed CAS to satisfy my wish.  | .950 |      |      |   |       |      |   |   |   |    |
| I have installed the CAS because I wish to grow my business.                                   | .876 |      |      |   |       |      |   |   |   |    |
| It is very quick to produce all the required accounts.   |      | .912 |      |   |       |      |   |   |   |    |
| Necessary accounts can be prepared without much efforts.                                       |      | .910 |      |   |       |      |   |   |   |    |
| CAS accounting shows the all results of accounting in time.                                    |      | .910 |      |   |       |      |   |   |   |    |
| All accounts can be produce with no time therefore I am using CAS.                             |      | .900 |      |   |       |      |   |   |   |    |
| Results can be generated in time.  |      | .886 |      |   |       |      |   |   |   |    |
| Paper work has reduced like anything.  |      |      | .867 |   |       |      |   |   |   |    |
| Need for maintaining separate  |      |      | .864 |   |       |      |   |   |   |    |

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| book of accounts has reduced.       |   |      |      |      |      |        |  |  |
|-------------------------------------|---|------|------|------|------|--------|--|--|
| Now paper work become very          |   |      |      |      |      |        |  |  |
| less.                               |   | .855 |      |      |      |        |  |  |
| Requirement to maintain books       |   |      |      |      |      |        |  |  |
| has shrunk                          |   | .824 |      |      |      |        |  |  |
| L could get information regarding   |   |      |      |      |      |        |  |  |
| any accounts at real time           |   | .575 |      |      |      |        |  |  |
| Dete of my company become           |   |      |      |      |      |        |  |  |
| Data of my company became           |   | .575 |      |      |      |        |  |  |
| available on my convenience.        |   |      |      |      |      |        |  |  |
| Real-time access to information of  |   | .574 |      |      |      |        |  |  |
| my company data became easy.        |   |      |      | -    |      |        |  |  |
| I can get my firms' required        |   | .546 |      |      |      |        |  |  |
| accounting data at disposal.        |   |      |      |      |      |        |  |  |
| The cost for software used by my    |   |      | .987 |      |      |        |  |  |
| firm is reasonable.                 |   |      |      |      |      |        |  |  |
| Expenditure CAS is affordable.      |   |      | .987 |      |      |        |  |  |
| I am satisfied with the cost as the |   |      |      |      |      |        |  |  |
| price I paid is very reasonable     |   |      | 987  |      |      |        |  |  |
| compared to the benefits available  |   |      | .)07 |      |      |        |  |  |
| from it.                            |   |      |      |      |      |        |  |  |
| I feel cost of computerized         |   |      | 007  |      |      |        |  |  |
| accounting is reasonable.           |   |      | .987 |      |      |        |  |  |
| Benefits are more compare to the    |   |      | 0.40 |      |      |        |  |  |
| price that I have paid.             |   |      | .949 |      |      |        |  |  |
| I can understand the accounting     |   |      |      |      |      |        |  |  |
| software, for me it is easy to      |   |      |      | .965 |      |        |  |  |
| operate.                            |   |      |      |      |      |        |  |  |
| I know the CAS and so I am using    |   |      |      |      |      |        |  |  |
| it                                  |   |      |      | .965 |      |        |  |  |
| I can maintain the accounts and all |   |      |      |      |      |        |  |  |
| details with my own efforts         |   |      |      | .965 |      |        |  |  |
| Dependence on other staff           |   |      |      |      |      |        |  |  |
| members has become low because      |   |      |      | 061  |      |        |  |  |
| of CAS                              |   |      |      | .901 |      |        |  |  |
| I profer the CAS because I have     |   |      |      |      |      |        |  |  |
| knowledge of it                     |   |      |      | .937 |      |        |  |  |
| Rilowiedge of it.                   |   |      |      |      |      |        |  |  |
| Before deadline we can submit the   |   |      |      |      | 964  |        |  |  |
| required information to             |   |      |      |      | .804 |        |  |  |
| government authority.               |   |      |      | -    |      |        |  |  |
| Accounts can be produced and        |   |      |      |      | 0.60 |        |  |  |
| submitted to government             |   |      |      |      | .860 |        |  |  |
| effortlessly.                       |   |      |      |      |      |        |  |  |
| Accounts can be filed to officials  |   |      |      |      | .860 |        |  |  |
| straightforwardly.                  |   |      |      |      |      |        |  |  |
| Submitting online reports has       |   |      |      |      | .849 |        |  |  |
| become simple.                      |   |      |      |      |      |        |  |  |
| All the required information by     |   |      |      |      | .800 |        |  |  |
| law is now easy due to CAS.         |   |      |      |      |      |        |  |  |
| Financial decision of the company   |   |      |      |      |      | 951    |  |  |
| can be executed easily.             |   |      |      |      |      | .,,,,, |  |  |
| Decision making has become          |   |      |      |      |      | 051    |  |  |
| trouble-free and simple.            |   |      |      |      |      | .721   |  |  |
| Financial condition can be          |   |      |      |      |      | 000    |  |  |
| measured at my disposal.            |   |      |      |      |      | .900   |  |  |
| Because of CAS my decision          | 1 |      |      |      |      | 0.0.0  |  |  |
| making time has shorten.            |   |      |      |      |      | .900   |  |  |
| <u> </u>                            |   |      |      |      |      |        |  |  |

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| []                                     |             |       | 1 1 | 1 |      | 1    |      |
|--|-------------|-------|-----|---|------|------|------|
| Keeping track of cash records has      |             |       |     |   | 877  |      |      |
| become less burdensome.                |             |       |     |   | .077 |      |      |
| Misappropriation of cash and           |             |       |     |   | 927  |      |      |
| kinds reduced.                         |             |       |     |   | .037 |      |      |
| It reduced fraud in the firm.          |             |       |     |   | .835 |      |      |
| Recognizing frauds has become          |             |       |     |   | 925  |      |      |
| easy.                                  |             |       |     |   | .035 |      |      |
| Fear of loss of data has become        |             |       |     |   |      | 044  |      |
| little.                                |             |       |     |   |      | .944 |      |
| Preserving data has become easy.       |             |       |     |   |      | .944 |      |
| Safety of data has become easy.        |             |       |     |   |      | .935 |      |
| Records of accounts can be             |             |       |     |   |      | 064  |      |
| maintained permanently.                |             |       |     |   |      | .864 |      |
| Because of knowledge of CAS, I         |             |       |     |   |      |      | 0.45 |
| can manage my business easily.         |             |       |     |   |      |      | .945 |
| I can perform my accountancy           |             |       |     |   |      |      | 024  |
| tasks myself as it is easy.            |             |       |     |   |      |      | .934 |
| Installation of the software has       |             |       |     |   |      |      |      |
| proved to be beneficial compare        |             |       |     |   |      |      | .934 |
| its cost.                              |             |       |     |   |      |      |      |
| After the installation of the CAS, I   |             |       |     |   |      |      |      |
| can do my work independently.          |             |       |     |   |      |      | .932 |
| Extraction Method: Principal Component | nt Analysis | 5.    | 11  |   |      |      |      |
| Rotation Method: Varimax with Kaiser   | Normaliza   | tion. |     |   |      |      |      |
| a. Rotation converged in 8 iterations. |             |       |     |   |      |      |      |

Rotation of the factor matrix, furthermore, shows that 52 statements are broken-down into 10 factors which are named (1) Willingness (2) Quick to Produce Accounts (3) Real-Time Access & Reduction in Paper Work (4) Affordability (5) Knowledge of the Technology (6) Helpful in Online Submission of Reports (7) Benefits are more than cost (8) Reduced Frauds (9) Safety of Data (10) Less Dependency on Others. Under Varimax rotation, all the statements have factor loadings more than or equals to 0.550 in case of all factors.

# **RESULTS AND DISCUSSION FROM THE FACTOR ANALYSIS**

From the above table and observing the component matrix score it can be observed that

- 10 principal component have been extracted
- It can be seen that component 1 explains 33.842% of variance.
- All the 10 components explain 93.502% of total variance and there is still 4.431% of variance which remains unexplained.
- The components based on theoretical background and available factor loadings can be classified as follows

Factor analysis is data reduction tool. It removes duplication from a set of correlated variables. After factor analysis we can conclude the data patterns and reduce many variables to a very small and manageable numbers. A factor analysis was conducted on the 52 questions. The method for factor analysis used is principal component analysis and rotation used was Varimax as it was perceived that the factors might have correlations. Further cases were excluded list wise and initial solution was obtained. The method for extracting number of factors was based on Eigen values and factors were extracted who's Eigen score was greater than 1. The correlation matrix, test for adequacy of sample, observations regarding singularity and multi co linearity were done and it is observed that no singularity is observed which means that no single variable is perfectly correlated to other and hence none of them is omitted and the coefficient of determinant is quite higher than expected value of 0.00001 and hence it can be safely concluded that the problem of multi-co linearity does not exist.

From the above table and observing the component matrix score it can be observed that 10 principal component have been extracted, the component along with their Eigen scores and variance has been explained. It can be seen that component 1 explains 33.842 % of variance. All the 10 components explain 93% of total variance and there is still 07% of variance which remains unexplained. The components based on theoretical background and available factor loadings can be classified as follows.

# WITH THE DUE PROCESS FOLLOWING FACTORS EXTRACTED FROM THE FACTOR ANALYSIS.

- 1. Willingness
- 2. Quick to Produce Accounts
- 3. Real-Time Access & Reduction in Paper Work
- 4. Affordability
- 5. Knowledge of the Technology
- 6. Helpful in Online Submission of Reports
- 7. Benefits are more than cost
- 8. : Reduced Frauds
- 9. Safety of Data
- 10.Less Dependency on Others

Naming of the Factors: 10 factors were derived. We considered the statement for naming which have factor loading more than 0.50.

# FACTOR 1: WILLINGNESS

The statements in this factors focus on willingness which explains 33.842% of the observed variance of the respondents of the SMEs'. The statement shows the degree of willingness of the respondents which include 6 statements. Hence, willingness is the most important for Adoption of Computerized Accounting System in SMEs'. The statements included in the factors are as follows:

- I was willing to adopt technology for CAS so I am using it and installed it for my firm.
- I have to depend less on my firm's staff for knowing vital business information.
- Technology is best friend of me so I am using it.
- I am using CAS because I want to use it.
- I installed CAS to satisfy my wish.
- I have installed the CAS because I wish to grow my business.

# FACTOR 2: QUICK TO PRODUCE ACCOUNTS

The statements in this factor show that quick preparation of accounts is the second most important factor for the respondents. This statement includes following factors:

- It is very quick to produce all the required accounts.
- Necessary accounts can be prepared without much efforts.
- CAS accounting shows the all results of accounting in time.
- All accounts can be produce with no time therefore I am using CAS.
- Results can be generated in time.

## FACTOR 3: REAL-TIME ACCESS & REDUCTION IN PAPER WORK

Eight statements are included in this factor which relate to real-time & reduction in paper work. Following statements are included in this factor:

- Paper work has reduced like anything.
- Need for maintaining separate book of accounts has reduced.
- Now paper work become very less.
- Requirement to maintain books has shrunk.
- I could get information regarding any accounts at real time.
- Data of my company became available on my convenience.
- Real-time access to information of my company data became easy.

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• I can get my firms' required accounting data at disposal.

# **FACTOR 4: AFFORDABILITY**

The statement shows the factor relating to the cost of the software. It includes the following statements under its heading that are:

- The cost for software used by my firm is reasonable.
- Expenditure CAS is affordable.
- I am satisfied with the cost as the price I paid is very reasonable compared to the benefits available from it.
- I feel cost of computerized accounting is reasonable.
- Benefits are more compare to the price that I have paid.

# FACTOR 5: KNOWLEDGE OF THE TECHNOLOGY

In the above factor 5 statements are included that are related to understanding of the software, its knowledge, usage, efforts etc. that has been summed up under one heading. The following statements are included:

- I can understand the accounting software, for me it is easy to operate.
- I know the CAS and so I am using it.
- I can maintain the accounts and all details with my own efforts.
- Dependence on other staff members has become low because of CAS.
- I prefer the CAS because I have knowledge of it.

# FACTOR 6: HELPFUL IN ONLINE SUBMISSION OF REPORTS

The factor includes 5 statements that are related to simple online submission of reports, easy to abide law, effortless submission etc. Hence its sums that the respondents feel that the, online submission of reports has become easy and as per their response following factors can be specified under this heeding:

- Before deadline we can submit the required information to government authority.
- Accounts can be produced and submitted to government effortlessly.
- Accounts can be filed to officials straightforwardly.
- Submitting online reports has become simple.
- All the required information by law is now easy due to CAS.

## FACTOR 7: BENEFITS ARE MORE THAN COST

The above factors mainly focus to the benefits that are available with the use of Computerized Accounting System which include 4 statements. The four statements are as follows:

- Financial decision of the company can be executed easily.
- Decision making has become trouble-free and simple.
- Financial condition can be measured at my disposal.
- Because of CAS my decision making time has shorten.

## **FACTOR 8: REDUCED FRAUDS**

Four statements are included in this factor that relate to identification of frauds, track cash records, reduced frauds and decrease in misappropriation of cash.

- Keeping track of cash records has become less burdensome.
- Misappropriation of cash and kinds reduced.
- It reduced fraud in the firm.
- Recognizing frauds has become easy.

## FACTOR 9: SAFETY OF DATA

Factor 9 focuses on the safety of the data which ensures the data safe keeping, less fear of loss of data, permanent records and its preservation. Hence the four statements included under this title show that the safety of data is also one of the important factor.

- Fear of loss of data has become little.
- Preserving data has become easy.
- Safety of data has become easy.
- Records of accounts can be maintained permanently.

# FACTOR 10: LESS DEPENDENCY ON OTHERS

The last factor includes statements that direct that due to the installation of Computerized Accounting System respondents have to depend less on others. It is equally important factor as the first factor. It includes 4 statements which are stated as follows:

- Because of knowledge of CAS, I can manage my business easily.
- I can perform my accountancy tasks myself as it is easy.
- Installation of the software has proved to be beneficial compare its cost.
- After the installation of the CAS, I can do my work independently.

## CONCLUSION AND IMPLICATION OF THE STUDY

The study shade lights on the factors that governs adoption and usage of computerized accounting systems in Small and Medium Scale units of Gujarat. The study has identified total 10 factors. However research of J.Y.L. Thong, C.S. Yap has found only three factors i.e. innovativeness, attitude towards adoption and IT knowledge out of which last two factors are found similar whereas innovativeness not found in research. Perceived benefits, organizational readiness and external pressure are the factors found by Mehrtens et al. out of which only one factor is similar to our study. Riemenschneider et al. identified six factors which are very similar to our study i.e. Attitude, subjective norm, perceived behavioral control, perceived usefulness, perceived ease of use but the factor like Reduction in frauds, quick to produce accounts, Real-time access and reduction in paper work, cost effectiveness and affordability are the factors emerge in context of Indian Environment. It can be conclude that in Indian Context Reduction in frauds, quick to produce accounts, Real-time access and reduction in paper work, cost effectiveness and affordability are important for adoption in Technology in Accounting.

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#### AN EMPIRICAL ANALYSIS OF THE IMPACT OF ECONOMIC REFORMS ON TOTAL FACTOR PRODUCTIVITY GROWTH, EMPLOYMENT AND WAGES OF THE INDIAN MANUFACTURING INDUSTRIES: 1980-81 TO 2010-11

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#### ABSTRACT

This paper attempts to measure productivity performance of the Indian Manufacturing Industry during the period 1980-81 to 2010-11. To measure total factor productivity growth&various other relatedperformance indicators a non-parametric approach, namely, Malmquist Data Envelopment Analysis has been used. A comparative analysis between the pre (1980-81 to 1990-1991)& post liberalisation (1991-92 to 2010-11) era has also been taken up in this study. The paper also seeks to examine the impact of liberalization on the overall employment scenario of the Indian Manufacturing Industry. The present study shows apositive TFP growth for the entire period. But, again, there is a fall in the TFPG from pre to post-liberalisation period. There is a positive impact of liberalization on employment generation of the Indian Manufacturing Industries.

Key Words: Indian Manufacturing Industry, Total Factor Productivity, Malmquist index, Data Envelopment Analysis, Employment, Real Wage.

#### **INTRODUCTION**

The New Industrial Policy (NIP) introduced in 1991 being outward-oriented abolished licensing of capital goods, reduced number of industries in public sector, increased foreign ownerships in domestic industries, introduced deregulation in small-scale industrial units, reduced trade barriers and induced private investment in infrastructure. These elements of reform program along with others were introduced to enhance productivity and efficiency in Indian industries. The competition and new technologies generally enhance the productivity and reduce the production costs of industries with comparative advantages. While there is a growing volume of literature undertaking an explicit comparison of reform processes, the effect of economic reforms on productivity of Indian industries remained a matter of considerable debate. The traditional industry argument maintains that the removal of protection may result in large number of industries becoming bankrupt. Alternatively, advocates of liberalization claim that the effect should be marginal, as only the inefficient industries exit, providing opportunities to the remaining industries to improve their performance.

In this paper, total factor productivity growth, employment estimates and the causal relationship between real wage rate and total factor productivity growth as well as the relationship between real wage rate and the partial labour productivity are presented for Indian Manufacturing industry at aggregate level over the period 1980-81 to 2010-11. A comparative analysis between the pre & post liberalisation era has also been taken up in this study. The pre-reform period is 1980-81 to 1990-1991 & the post-reform period is 1991-92 to 2010-11. This is a sufficiently large number of years that witnessed highly restricted, partially liberalized and fully liberalized regimes, with a view to compare meaningfully the growth pattern in total factor productivity(TFP) and employment scenario in the pre-reform period with that of the post-reform period.

#### A BRIEF SURVEY OF LITERATURE

The concept of technical efficiency indicates the degree of success in the utilization of productive resources. Technical efficiency is considered to be an important determinant of productivity growth and international competitiveness in any economy (Taymaz and Saatci, 1997). There are different schools of thought in estimating the technical efficiency. Technical efficiency consists of maximizing the level of production that can be obtained from a given combination of factors. In the Indian context, number of studies examined the technical efficiency of the manufacturing industry, e.g., Page (1984), Little et al. (1987), Patibandla (1998), Mitra (1999), Agarwal (2001), and Mitra et al. (2002), Bhandari et al. (2007a, 2007b) and many others. Krishna and Mitra (1998) investigated the effects on competition and productivity of the dramatic 1991 trade liberalization in case of Indian manufacturing industries. Using firm-level data from a variety of industries, they find some evidence of an increase in the growth rate of productivity. Driffield and Kambhampati (2003) estimate frontier production functions for six manufacturing industries. Their findings suggest an increase in overall efficiency in five out of the six manufacturing industries in the post-reform period. Mukherjee and Ray (2005) examined the efficiency dynamics of a 'typical' firm in individual states during the pre and post-reform period. Their findings establish no major change in the efficiency ranking for different states after the reforms was initiated. Using a panel dataset of 121 Indian manufacturing industries from 1981 to 1998, Pattnayak and

Thangavelu (2005) find evidence of total factor productivity improvements for most of the industries after the reform period.

While the 1991 economic reform was radical, India adopted a gradualist approach to reform, meaning a frustratingly slow pace of implementation (Ahluwalia, 2002). It suggests that it is more appropriate to examine the effect of liberalization on manufacturing sectors' efficiency using a longer time span for both pre and post-reform. How did this economic reform program shifted Indian manufacturing into global stage and influencing technical and scale economies of major industries? In answering this question, we employ a nonparametric approach in explaining productivity changes, technical progress and scale efficiencies of industries within the sector. In this paper, we examine the impact of liberalization on the technical efficiency of Indian Manufacturing industry by comparing pre and post economic reform periods.

Analysis of technical efficiency of manufacturing industries in developing countries has received considerable attention in the economic literature in recent years. Recent literature includes Onderet al. (2003) for Turkey, Pham et al. (2009) for Vietnam, Margonoet al. (2010) for Indonesia, and Mastromarco (2008) for developing countries among others. Technical efficiency is concerned with how closely the production unit operates to the frontier for the production possibility set. The historical roots of a rigorous approach to efficiency measurement can be traced to the works of Debreu (1951) and Farrell (1957). Over the past three decades, a variety of approaches, parametric and non-parametric, have been developed to investigate the failure of producers to achieve the same level of efficiency. For a detailed survey on such methodologies, see Kalirajan and Shand (1999). In parametric models, one specifies an explicit functional form for the frontier and econometrically estimates the parameters using sample data for inputs and output, and hence the accuracy of the derived technical efficiency estimates is sensitive to the nature of the functional form specified. In contrast, the method of Data Envelopment Analysis (DEA) introduced by Charneset al. (1978) and further generalized by Banker et al. (1984) offers a non-parametric alternative to parametric frontier production function analysis. A production frontier is empirically constructed using linear programming methods from observed input-output data of sample decision making units (DMUs). In this study, we adopt the output-oriented (OO) DEA that seeks the maximum proportional increase in output production, with input levels held fixed. Lovell (1996) gives a clear description of how the DEA based Malmquist approach implements such decomposition.

The Paper is organized as follows: Section 2 depicts methodology & database. Total Factor Productivity, employment estimates and the causal relationship between real wage rate and total factor productivity growth & real wage rate and partial labour productivity are presented in section 3. Section 4 present concluding remarks.

#### **OBJECTIVES OF OUR STUDY**

Main objectives of our study are as follows:

- 1. To estimate the total factor productivity growth of Indian Manufacturing industries in terms of Malmquist Productivity index.
- 2. To evaluate the impact of liberalization on TFPG of Indian Manufacturing industries.
- 3. To estimate the employment function.
- 4. To examine the impact of liberalization on employment.
- 5. To assess the causal relationship between real wage rate and TFPG
- 6. To evaluate the causal relationship between real wage rate and partial labour productivity.

# METHODOLOGY

#### Model of TFPG Estimation Description of Data & Measurement of Variables

The present study is based on manufacturing industry-level time series data taken from several issues of Annual Survey of Industries, National Accounts Statistics, CMIE and Economic Survey, Statistical Abstracts (several issues), RBI bulletin etc. covering a period of 31 years commencing from 1980-81 to 2010-11. Selection of time period is largely guided by availability of data. The entire period is sub-divided into two phases as 1980-81 to 1990-91, 1991-92 to 2010-11 (Pre-reform phase and Post-reform phase). Sub-divisions of total period is being taken logically as such to assess conveniently the impact of reforms on total factor productivity growth and employment.

Now, output in this context is measured as real gross value added index. The GDP deflator has been used as the deflator of gross value added.

In this study Labour index is formed as a weighted sum of number of heads in two groups (Workers & Other employees), weights being the relative group remunerations. Relevant data is obtained from ASI & Indian Labour Statistics.

So far as capital input is concerned, we have taken into account the perpetual inventory method. In our study, real gross fixed capital stock is taken as the measure of capital input. Deflator used is obtained from data on GFCF at current and constant prices. Data for the above purpose are obtained from various issues of ASI & NAS published by CSO, Govt. of India.

#### ECONOMETRIC SPECIFICATION

The conventional setup of Färe*et al.* (1992) is adopted in modelling the problem as transformation of a vector of inputs  $x^t \in \mathbb{R}^n_+$  into a vector of output  $y^t \in \mathbb{R}^m_+$ . The production technology at each time period *t*, denoted S<sup>t</sup>, is

identified as the set of all technologically feasible input-output combinations at time t (Lovell, 1996). It is constructed from the data as:

$$\mathbf{S}^{t} = \{ (\mathbf{x}^{t}, \mathbf{y}^{t}) | \mathbf{x}^{t} \text{ can produce } \mathbf{y}^{t} \}$$
(1)

Fare, Grosskopf, Noriss& Zhang (1994) followed Shephard (1970) to define the output distance function at time ' $\tau$ ' as:

$$\mathbf{D}_{\mathbf{0}}^{\mathsf{t}}(\mathbf{x}^{\mathsf{t}}, \mathbf{y}^{\mathsf{t}}) = \inf \left\{ \boldsymbol{\theta} \mid (\mathbf{x}^{\mathsf{t}}, \mathbf{y}^{\mathsf{t}}/\boldsymbol{\theta}) \in \mathbf{S}^{\mathsf{t}} \right\} = (\sup \left\{ \boldsymbol{\theta} \mid (\mathbf{x}^{\mathsf{t}}, \boldsymbol{\theta} \mid \mathbf{y}^{\mathsf{t}}) \in \mathbf{S}^{\mathsf{t}} \right\})^{-1}$$
(2)

The subscript  ${}_{0}{}'$  is used to denote the output based distance function. Note that,  $D_{0}^{t}(x^{t}, y^{t}) \leq 1$ ; if and only if

 $(x^t, y^t) \in S^t, \& D_{\hat{U}}^t (x^t, y^t) = 1; \text{ if and only if } (x^t, y^t) \text{ is on the frontier of the technology. In the latter case, Farrell$ 

(1957) argued that the firm is technically efficient.

To define the Malamquist index, Fare et al. (1994) defined distance function with respect to two different time periods:

$$D_{\boldsymbol{\theta}}^{\mathsf{t}}(\mathbf{x}^{t+1}, \mathbf{y}^{t+1}) = \inf \{ \boldsymbol{\theta} \mid (\mathbf{x}^{t+1}, \mathbf{y}^{t+1}/\boldsymbol{\theta}) \in \mathbf{S}^{t} \}$$
(3)  
$$\&$$
$$D_{\boldsymbol{\theta}}^{\mathsf{t+1}}(\mathbf{x}^{t}, \mathbf{y}^{t}) = \inf \{ \boldsymbol{\theta} \mid (\mathbf{x}^{t}, \mathbf{y}^{t}/\boldsymbol{\theta}) \in \mathbf{S}^{t+1} \}$$
(4)

The distance function in (3) measures the maximal proportional change in output required to make  $(x^{t+1}, y^{t+1})$  feasible in relation to technology at time ' $\tau$ '. Similarly, the distance function in (4) measures the maximal

proportional change in output required to make  $(x^t, y^t)$  feasible in relation to technology at time (t+1). The output-based Malamquist TFP productivity index can then be expressed as:

$$M_{0}(x^{t+1}, y^{t+1}, x^{t}, y^{t}) = \frac{D_{0}^{t+1}(x^{t+1}, y^{t+1})}{D_{0}^{t}(x^{t}, y^{t})} \left[ \frac{D_{0}^{t}(x^{t+1}, y^{t+1})}{D_{0}^{t+1}(x^{t+1}, y^{t+1})} \frac{D_{0}^{t}(x^{t}, y^{t})}{D_{0}^{t+1}(x^{t}, y^{t})} \right]^{\frac{1}{2}} (5)$$

The term outside the brackets shows the change in technical efficiency while the geometric mean of the two ratios inside the brackets measures the shift in technology between the two period 't' & 't+1'; this could be called technological progress. So :

Efficiency change = 
$$\frac{\mathbf{D}_{0}^{t+1} \left(\mathbf{x}^{t+2}, \mathbf{y}^{t+1}\right)}{\mathbf{D}_{0}^{t} \left(\mathbf{x}^{t}, \mathbf{y}^{t}\right)}$$
(6)

Technical change= 
$$\left[\frac{D_0^t(x^{t+1}, y^{t+1})}{D_0^{t+1}(x^{t+1}, y^{t+1})} \frac{D_0^t(x^t, y^t)}{D_0^{t+1}(x^t, y^t)}\right]^{\frac{1}{2}}$$
(7)

In each of the formulas i.e., equation(6) & (7), a value greater than one indicates a positive growth of TFP (an improvement) from a period 't' to 't+1' and a value smaller than one represents deteriorations in performance over time.

We can decompose the total factor productivity growth in following way as well:

| I                                   | 8 |                   |
|-------------------------------------|---|-------------------|
| MTFPI = Technical Efficiency change | Х | Technical Change  |
| (Catching up effect)                |   | (Frontier effect) |

MTFPI is the product of measure of efficiency change (catching up effect) at current period 't' and previous period 's' (average geometrically) and a technical change (frontier effect) as measured by shift in a frontier over the same period. The catching up effect measures that a firm is how much close to the frontier by capturing

extent of diffusion of technology or knowledge of technology use. On the other side frontier effect measures the movement of frontier between two periods with regards to rate of technology adoption. In DEA-Malmquist TFP Index does not assume all the firms or sectors are efficient so therefore any firm or sector can be performing less than the efficient frontier. In this methodology we will use the output oriented analysis because most of the firms and sectors have their objective to maximize output in the form of revenue or profit. It is also assumed that there is constant return to scale (CRS) technology to estimate distance function for calculating Malmquist TFP index and if technology exhibits constant return to scale (CRS), the input based and output based Malmquist TFP Index will provide the same measure of productivity change.

#### THE EMPLOYMENT FUNCTION

In this paper, the employment generated in the Indian manufacturing industries is obtained by estimating the employment function which shows the relationship between employment, output and the real wage rate (real cost of labour). The specification of employment function frequently used in empirical studies is given below:

$$\log (L) = a + b \log (w/p) + c \log (Y) + m \log (L_{-1}) + \alpha DT + u$$

Where, 'L' implies labour, 'Y' is the real value added output, '(w/p)' is the real wage rate (nominal wage deflated by the consumer price index), 'L  $_{-1}$ ' is the labour with one year lag and 'u' is the random error term. One period lag of the dependent variable is considered here to capture the impact of past real wages on employment. The coefficient of 'log (w/p)' is expected to be negative since an increase in real wage rate (labour cost)should reduce employment. Again, we may state that the coefficient of 'log (Y)' may be expected to be positive because an increase in output should increase employment. It may further be added that the lagged structure underlying the above model requires the coefficients of 'log (L  $_{-1}$ )' to lie between '0' and '1'. The short run elasticity of employment with regard to the real wage rate is given by 'b' and the long run elasticity by '[b/ (1-m)]'. Again the short run elasticity of employment with regard to output is given by 'c' and the long run elasticity by '[c/ (1-m)]'. DT is the intercept dummy which is time variant and it is used to catch the impact of liberalization on employment of the Indian Manufacturing industry.

# TIME SERIES ECONOMETRIC TESTS TO ASSESS THE NATURE OF THE RELATIONSHIP BETWEEN VARIABLES

#### Step – I: The Stationarity Test (Unit Root Test)

It is suggested that when dealing with time series data, a number of econometric issues can influence the estimation of parameters using OLS. By regressing a time series variable on other time series variables using OLS estimation can result in a very high  $R^2$ , although there is no meaningful relationship between the variables. This situation reflects the problem of spurious regression between totally unrelated variables generated by a non-stationary process. Therefore, prior to testing Cointegration and implementing the Granger Causality test, econometric methodology needs to examine the stationarity; for each individual time series. Most macroeconomic data are non-stationary, i.e., they tend to exhibit a deterministic and/or stochastic trend. Therefore, it is recommended that a stationarity (unit root) test be carried out to test for the order of integration. A series  $(X_t)$  is said to be stationary if the mean and variance are time-invariant. A non-stationary time series will have a time dependent mean or make sure that the variables are stationary, because if they are not, the standard assumptions for asymptotic analysis in the Granger test will not be valid. Therefore, a stochastic process that is said to be stationary simply implies that the mean  $[E(X_t)]$  and the variance  $[var(X_t)]$  of X remain constant over time for all t, and the covariance  $[cov(X_t, X_s)]$  i.e., the correlation between any two values of X taken from different time periods depends on the difference apart in time between the two values for all  $t \neq s$ . Since standard regression analysis requires that data series be stationary, it is obviously important that we first test for this requirement to determine whether the series used in the regression process is a difference stationary or trend stationary.

# To test the stationary of the variables, we use the Augmented Dickey Fuller (ADF)test, Phillips-Perron Unit Root Test&Dickey Fuller test with GLS detrending.

#### 1) Augmented Dickey Fuller (ADF) test

ADF test is mostly used to test for unit root. Following equation checks the stationarity of time series data used in this study:

$$\Delta X_{t} = \beta_{1} + \beta_{2}t + \alpha X_{t-1} + \gamma \Sigma \Delta X_{t-1} + \varepsilon_{t}$$

Where,  $\varepsilon_t$  is white noise error term in the model of unit root test, with a null hypothesis that variable has unit root. The test for unit root is conducted on the coefficient of X<sub>t-1</sub> in the regression. If the coefficient is significantly different from zero (less than zero) then the hypothesis that X contains a unit root is rejected. The null & alternative hypothesis for the existence of unit root in variable X<sub>t</sub> is H<sub>0</sub>:  $\alpha = 0$  versus H<sub>1</sub>:  $\alpha < 0$ . Rejection of the null hypothesis denotes stationarity in the series.

If the ADF test-statistics (t-statistics) is less (in the absolute value) then the Mackinnon critical t-values, the null hypothesis of a unit root cannot be rejected for the time series and hence, one can conclude that the series is non-stationary at their levels. The unit root test, tests for the existence of a unit root in two cases: with intercept only and with intercept and trend. The case of Intercept & trend takes into account the impact of the trend on the series.

#### 2) Phillips-Perron Unit Root Test

Phillips and Perron (1988) developed a number of unit root tests that have become popular in the analysis of financial time series. The Phillips-Perron (PP) unit root tests differ from the ADF tests mainly in how they deal with serial correlation and heteroskedasticity in the errors. In particular, where the ADF tests use a parametric autoregression to approximate the ARMA structure of the errors in the test regression, the PP tests ignore any serial correlation in the test regression. The test regression for the PP tests is

#### $\Delta X_t = \beta' D_t + \pi X_{t-1} + u_t$

Where,  $u_t$  is I(0) and may be heteroskedastic. Under the null hypothesis that  $\pi = 0$ , the PP test-statistics have the same asymptotic distributions as the ADF t-statistic and normalized bias statistics. One advantage of the PP tests over the ADF tests is that the PP tests are robust to general forms of heteroskedasticity in the error term  $u_t$ . Another advantage is that the user does not have to specify a lag length for the test regression.

#### 3) Dickey Fuller test with GLS detrending (DF-GLS detrending test)

An improved test over ADF and PP-test to test the stationarity of a time series data was given by Elliott, Rothenberg and Stock (ERS) in 1996. They proposed an efficient test, modifying the Dickey-Fuller test statistic using a generalized least squares (GLS) rationale. They demonstrate that this modified test has the best overall performance in terms of small-sample size and power, conclusively dominating the ordinary Dickey-Fuller test. In particular, Elliott et al. find that their "DF-GLS" test has substantially improved power when an unknown mean or trend is present." (1996, pp-813). In our study, we used the DF-GLS detrending test to test the stationarity of the time series data. With GLS detrending, the series to be tested is regressed on a constant and linear trend, and the residual series is used in a standard Dickey-Fuller regression.

Now, once the number of unit roots in the series is decided, the next step before applying Johansen's (1988) cointegration test is to determine an appropriate number of lags to be used in estimation since the choice of lag length is crucial in the Johansen procedure. In selection of appropriate lag length, standard literature follows either Akaike Information Criteria (AIC) or Bayesian Information Criteria (BIC) which is also known as Schwarz Information Criteria (SIC) or both. In our study, the appropriate lag length is selected on the basis of Schwarz Information Criteria (SIC) as we are more interested to identify the true model rather than to find out the best approximating model to the unknown data generating process which AIC actually gives (Henry de-Graft Acquah, 2009). Another reason is that, AIC does not depend directly on sample size. Bozdogan (1987) noted that because of this, AIC lacks certain properties of asymptotic consistency. Although BIC takes a similar form like AIC, it is derived within a Bayesian framework, reflects sample size and have properties of asymptotic consistency. For reasonable sample sizes, BIC apply a larger penalty than AIC, thus other factors being equal it tend to select simple models than does AIC. From a Bayesian view point this motivates the adoption of the Bayesian information criteria. Bickel & Zhang (1992) & Zhang (1993) demonstrate that BIC is consistent whilst in contrast AIC is not.

#### **Step – II: The Cointegration Test**

Regression on nonstationary variables is permitted if their linear combination is stationary. It has been recognized in recent literature that if a linear combination of integrated variables is stationary then such variables are said to be cointegrated. Although Engle and Granger (1987) was the first to introduce the cointegration test, the tests propounded by Stock and Watson (1988), Johanson, 1991 and Johansen and Juselius (1990) are more useful in testing the long run equilibrium relationships in multivariate setting. The estimation part of Johansen and Juselius method involves the following steps.

Let  $X_t$  be an  $(n \times 1)$  vector of variables with a sample of T. Assuming  $X_t$  followsI(1) process, identifying the number of cointegrating vector involves estimation of the vector error correction representation:

$$\Delta X_{t} = A_{0} + \prod X_{t-p} + \sum_{i=1}^{p-1} A_{i} \Delta X_{t-i} + \varepsilon_{t}$$

$$\tag{1}$$

In the above equation, the vectors  $\Delta \mathbf{X}_{tand} \Delta \mathbf{X}_{tand}$  are I(0) while the vector  $\mathbf{X}_{tand}$  I(1) variables. Therefore, the long run equilibrium relationship among  $\mathbf{X}_{t}$  is determined by the rank of  $\Pi$  matrix. If the rank of  $\Pi$ , say *r*, is

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zero, then Eq. (1)reduces to a VAR model of *p*th order and the variables in level do not have any cointegrating relationship. Instead, if 0 < r < nthen there are n × rmatrices of  $\alpha$  and  $\beta$  such that

$$\prod = \alpha \beta' \tag{2}$$

Where  $\beta$  is cointegrating vector; hence,  $\beta' X_t$  is I(0) although  $X_t$  are I(1) and the strength of cointegration relationship is measured by  $\alpha$ 's. In this framework, we have to estimate  $(A0, A1, \ldots, A_{p-1}, \Pi, \Omega)$  through maximum likelihood procedures, such that ' $\Pi$ ' can be written as in (2). To estimate all these parameters, we have to follow two-step procedures. In the first step, regress  $\Delta X_t$  on  $\Delta X_{t-1}, \ldots, \Delta X_{t-p+1}$  and obtain the residuals  $u_t$ .

In the second step, regress  $X_{t-1}$  on  $\Delta X_{t-1}$ ,  $\Delta X_{t-2}$ , ...,  $\Delta X_{t-p+1}$  and obtain the residuals  $e_t$ . From the obtained residuals  $u_t$ , and  $e_t$ , find the variance–covariance matrices.

$$\hat{\Sigma}_{uu} = \left(\frac{1}{T}\right)_{t=1}^{T} \hat{u}_t \hat{u}_t' \qquad (3)$$

$$\hat{-} \qquad \left(1\right)_{T=1}^{T} \hat{u}_t \hat{u}_t'$$

$$\hat{\Sigma}_{ee} = \left(\frac{1}{T}\right) \sum_{t=1}^{r} \hat{e}_t \hat{e}_t' \tag{4}$$

$$\hat{\Sigma}_{ue} = \left(\frac{1}{T}\right) \sum_{t=1}^{T} \hat{u}_t \hat{e}'_t \tag{5}$$

The maximum likelihood estimator of  $\beta$  can be obtained by solving:

$$\lambda \hat{\Sigma}_{ee} - \hat{\Sigma}_{eu} INV(\hat{\Sigma}_{uu}) \hat{\Sigma}_{ue} \models 0$$
 (6)

With the eigenvalues  $\hat{\lambda}_1 > \hat{\lambda}_2 > \dots > \hat{\lambda}n$ . The normalized cointegrating vectors are:

$$\hat{\beta} = (\hat{\beta}_1, \hat{\beta}_2, \dots, \hat{\beta}_n)$$
, such that  $\hat{\beta}' \hat{\Sigma}_{ee} \hat{\beta} = I$ 

Now we can test the null hypothesis that r = h,  $0 \le h < n$  against the alternative of r = n by obtaining the following statistics:  $\lambda_{trace} = L_A - L_O$ Where

$$L_{o} = -\left(\frac{Tn}{2}\right)\log(2\Pi) - \left(\frac{Tn}{2}\right) - \left(\frac{T}{2}\right)\log\left|\hat{\Sigma}_{uu}\right| - \left(\frac{T}{2}\right)\sum_{i=1}^{h}\log(1-\hat{\lambda}_{i})$$
(7)  
and

$$L_{A} = -\left(\frac{Tn}{2}\right)\log(2\Pi) - \left(\frac{Tn}{2}\right) - \left(\frac{T}{2}\right)\log\left|\hat{\Sigma}_{uu}\right| - \left(\frac{T}{2}\right)\sum_{i=1}^{n}\log(1-\hat{\lambda}_{i})$$
(8)

Hence,  $L_A - L_O = -(T/2) \sum_{i=h+1}^{n} \log(1 - \hat{\lambda}_i)$ 

$$2(L_{\rm A} - L_{\rm O}) = -T \sum_{i=r+1}^{n} \log(1 - \hat{\lambda}_{i})$$
(9)

Equation (9) follows  $\chi^2$  distribution and called as trace statistics. Further, the null hypothesis that there are r against r + 1 cointegrating vectors can be tested by obtaining the following statistic:

$$\lambda_{\max} = -T \log \left(1 - \hat{\lambda}_{r+1}\right) \tag{10}$$

#### **EMPIRICAL RESULTS OF MTFP GROWTH**

In this section, we have calculated total factor productivity growth and its component using Malmquist Productivity Index under two inputs- labour & capital and one output framework. Estimation of annual TFP growth rate of Indian manufacturing industries for the pre as well as post-reform period at aggregate level are presented in Table: 1, Table: 2 & Table: 3 respectively

Table: 1 - Malmquist Index Summary of Annual Means for the Entire Period

| Year    | EFFCH | TECHCH | PECH  | SECH  | TFPCH |
|---------|-------|--------|-------|-------|-------|
| 1980-81 | -     | -      | -     | -     | -     |
| 1981-82 | 1.000 | 1.177  | 1.000 | 1.000 | 1.177 |
| 1982-83 | 1.000 | 0.974  | 1.000 | 1.000 | 0.974 |
| 1983-84 | 1.000 | 1.088  | 1.000 | 1.000 | 1.088 |

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|---|------------------------|-------|
|   | 0000                   | 0000  |
|   | / /</td <td>IIXYY</td> | IIXYY |
|   | LJLL -                 | 00//  |
|   |                        |       |

| 1.000 | 0.923  | 1.000  | 1.000   | 0.923   |
|-------|--|--|---|---|
| 1.000 | 1.017  | 1.000  | 1.000   | 1.017   |
| 1.000 | 0.947  | 1.000  | 1.000   | 0.947   |
| 1.000 | 1.083  | 1.000  | 1.000   | 1.083   |
| 1.000 | 1.004  | 1.000  | 1.000   | 1.004   |
| 1.000 | 1.146  | 1.000  | 1.000   | 1.146   |
| 1.000 | 1.039  | 1.000  | 1.000   | 1.039   |
| 1.000 | 1.110  | 1.000  | 1.000   | 1.110   |
| 1.000 | 1.038  | 1.000  | 1.000   | 1.038   |
| 1.000 | 0.918  | 1.000  | 1.000   | 0.918   |
| 1.000 | 1.361  | 1.000  | 1.000   | 1.361   |
| 1.000 | 1.014  | 1.000  | 1.000   | 1.014   |
| 1.000 | 0.973  | 1.000  | 1.000   | 0.973   |
| 1.000 | 0.917  | 1.000  | 1.000   | 0.917   |
| 1.000 | 0.954  | 1.000  | 1.000   | 0.954   |
| 1.000 | 0.798  | 1.000  | 1.000   | 0.798   |
| 1.000 | 0.871  | 1.000  | 1.000   | 0.871   |
| 1.000 | 1.149  | 1.000  | 1.000   | 1.149   |
| 1.000 | 0.879  | 1.000  | 1.000   | 0.879   |
| 1.000 | 1.112  | 1.000  | 1.000   | 1.112   |
| 1.000 | 1.211  | 1.000  | 1.000   | 1.211   |
| 1.000 | 1.197  | 1.000  | 1.000   | 1.197   |
| 1.000 | 1.040  | 1.000  | 1.000   | 1.040   |
| 1.000 | 1.024  | 1.000  | 1.000   | 1.024   |
| 1.000 | 0.996  | 1.000  | 1.000   | 0.996   |
| 1.000 | 0.949  | 1.000  | 1.000   | 0.949   |
| 1.000 | 0.902  | 1.000  | 1.000   | 0.902   |
| 1.000 | 1.020  | 1.000  | 1.000   | 1.020   |
|       | 1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000<br>1.000 | $\begin{array}{c ccccc} 1.000 & 0.923 \\ \hline 1.000 & 1.017 \\ \hline 1.000 & 0.947 \\ \hline 1.000 & 1.083 \\ \hline 1.000 & 1.004 \\ \hline 1.000 & 1.004 \\ \hline 1.000 & 1.146 \\ \hline 1.000 & 1.039 \\ \hline 1.000 & 1.038 \\ \hline 1.000 & 1.038 \\ \hline 1.000 & 0.918 \\ \hline 1.000 & 0.918 \\ \hline 1.000 & 0.917 \\ \hline 1.000 & 0.973 \\ \hline 1.000 & 0.973 \\ \hline 1.000 & 0.954 \\ \hline 1.000 & 0.954 \\ \hline 1.000 & 0.798 \\ \hline 1.000 & 0.871 \\ \hline 1.000 & 0.871 \\ \hline 1.000 & 0.879 \\ \hline 1.000 & 0.879 \\ \hline 1.000 & 0.112 \\ \hline 1.000 & 1.121 \\ \hline 1.000 & 1.197 \\ \hline 1.000 & 1.024 \\ \hline 1.000 & 0.949 \\ \hline 1.000 & 0.902 \\ \hline 1.000 & 0.902 \\ \hline 1.000 & 1.020 \\ \hline \end{array}$ | 1.000 $0.923$ $1.000$ $1.000$ $1.017$ $1.000$ $1.000$ $0.947$ $1.000$ $1.000$ $1.083$ $1.000$ $1.000$ $1.004$ $1.000$ $1.000$ $1.146$ $1.000$ $1.000$ $1.146$ $1.000$ $1.000$ $1.039$ $1.000$ $1.000$ $1.039$ $1.000$ $1.000$ $1.038$ $1.000$ $1.000$ $1.038$ $1.000$ $1.000$ $0.918$ $1.000$ $1.000$ $0.918$ $1.000$ $1.000$ $0.973$ $1.000$ $1.000$ $0.973$ $1.000$ $1.000$ $0.917$ $1.000$ $1.000$ $0.954$ $1.000$ $1.000$ $0.871$ $1.000$ $1.000$ $0.879$ $1.000$ $1.000$ $1.112$ $1.000$ $1.000$ $1.197$ $1.000$ $1.000$ $1.024$ $1.000$ $1.000$ $0.996$ $1.000$ $1.000$ $0.949$ $1.000$ $1.000$ $0.949$ $1.000$ $1.000$ $0.902$ $1.000$ | 1.000 $0.923$ $1.000$ $1.000$ $1.000$ $1.017$ $1.000$ $1.000$ $1.000$ $0.947$ $1.000$ $1.000$ $1.000$ $1.083$ $1.000$ $1.000$ $1.000$ $1.004$ $1.000$ $1.000$ $1.000$ $1.146$ $1.000$ $1.000$ $1.000$ $1.146$ $1.000$ $1.000$ $1.000$ $1.039$ $1.000$ $1.000$ $1.000$ $1.110$ $1.000$ $1.000$ $1.000$ $1.038$ $1.000$ $1.000$ $1.000$ $1.361$ $1.000$ $1.000$ $1.000$ $1.361$ $1.000$ $1.000$ $1.000$ $0.913$ $1.000$ $1.000$ $1.000$ $0.973$ $1.000$ $1.000$ $1.000$ $0.973$ $1.000$ $1.000$ $1.000$ $0.954$ $1.000$ $1.000$ $1.000$ $0.871$ $1.000$ $1.000$ $1.000$ $1.149$ $1.000$ $1.000$ $1.000$ $1.112$ $1.000$ $1.000$ $1.000$ $1.112$ $1.000$ $1.000$ $1.000$ $1.197$ $1.000$ $1.000$ $1.000$ $1.024$ $1.000$ $1.000$ $1.000$ $0.996$ $1.000$ $1.000$ $1.000$ $0.996$ $1.000$ $1.000$ $1.000$ $0.992$ $1.000$ $1.000$ $1.000$ $1.020$ $1.000$ $1.000$ |

Source: Authors own estimates by using DEAP software, version 2.1

From Table-1, we find that the annual average TFPG for the Indian manufacturing sector for the entire period under study (1980-81 to 2010-11) is positive and it is 2.0. From Table-2, for the pre-reform period (1980-81 to 1990-91) the annual average TFPG is also positive and it is 3.70.

| Table: 2 – | - Malmquist | Index Summa | ry of Annua | l Means for | r the P | Pre-reform | Period |
|------------|-------------|-------------|-------------|-------------|---------|------------|--------|
|            | 1           |             |             |             |         |            |        |

| YEAR      | EFFCH         | TECHCH          | PECH      | SECH        | TFPCH    |
|-----------|---------------|-----------------|-----------|-------------|----------|
| 1980-81   | -             | -               | -         | -           | -        |
| 1981-82   | 1.000         | 1.177           | 1.000     | 1.000       | 1.177    |
| 1982-83   | 1.000         | 0.974           | 1.000     | 1.000       | 0.974    |
| 1983-84   | 1.000         | 1.088           | 1.000     | 1.000       | 1.088    |
| 1984-85   | 1.000         | 0.923           | 1.000     | 1.000       | 0.923    |
| 1985-86   | 1.000         | 1.017           | 1.000     | 1.000       | 1.017    |
| 1986-87   | 1.000         | 0.947           | 1.000     | 1.000       | 0.947    |
| 1987-88   | 1.000         | 1.083           | 1.000     | 1.000       | 1.083    |
| 1988-89   | 1.000         | 1.004           | 1.000     | 1.000       | 1.004    |
| 1989-90   | 1.000         | 1.146           | 1.000     | 1.000       | 1.146    |
| 1990-91   | 1.000         | 1.039           | 1.000     | 1.000       | 1.039    |
| Mean      | 1.000         | 1.037           | 1.000     | 1.000       | 1.037    |
| Source: A | Authors own e | stimates by usi | o DEAP so | ftware vers | sion 2.1 |

Source: Authors own estimates by using DEAP software, version 2.1

Table: 3 - Malmquist Index Summary of Annual Means for the Post-reform Period

| YEAR    | EFFCH | TECHCH | PECH  | SECH  | TFPCH |
|---------|-------|--------|-------|-------|-------|
| 1991-92 | 1.000 | 1.110  | 1.000 | 1.000 | 1.110 |
| 1992-93 | 1.000 | 1.038  | 1.000 | 1.000 | 1.038 |
| 1993-94 | 1.000 | 0.918  | 1.000 | 1.000 | 0.918 |
| 1994-95 | 1.000 | 1.361  | 1.000 | 1.000 | 1.361 |

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|           | r     |       |       |       |       |
|-----------|-------|-------|-------|-------|-------|
| 1995-96   | 1.000 | 1.014 | 1.000 | 1.000 | 1.014 |
| 1996-97   | 1.000 | 0.973 | 1.000 | 1.000 | 0.973 |
| 1997-98   | 1.000 | 0.917 | 1.000 | 1.000 | 0.917 |
| 1998-99   | 1.000 | 0.954 | 1.000 | 1.000 | 0.954 |
| 1999-2000 | 1.000 | 0.798 | 1.000 | 1.000 | 0.798 |
| 2000-01   | 1.000 | 0.871 | 1.000 | 1.000 | 0.871 |
| 2001-02   | 1.000 | 1.149 | 1.000 | 1.000 | 1.149 |
| 2002-03   | 1.000 | 0.879 | 1.000 | 1.000 | 0.879 |
| 2003-04   | 1.000 | 1.112 | 1.000 | 1.000 | 1.112 |
| 2004-05   | 1.000 | 1.211 | 1.000 | 1.000 | 1.211 |
| 2005-06   | 1.000 | 1.197 | 1.000 | 1.000 | 1.197 |
| 2006-07   | 1.000 | 1.040 | 1.000 | 1.000 | 1.040 |
| 2007-08   | 1.000 | 1.024 | 1.000 | 1.000 | 1.024 |
| 2008-09   | 1.000 | 0.996 | 1.000 | 1.000 | 0.996 |
| 2009-10   | 1.000 | 0.949 | 1.000 | 1.000 | 0.949 |
| 2010-11   | 1.000 | 0.902 | 1.000 | 1.000 | 0.902 |
| Mean      | 1.000 | 1.012 | 1.000 | 1.000 | 1.012 |

Source: Authors own estimates by using DEAP software, version 2.1

Table-3 represents the annual average TFPG of the Indian Manufacturing industries and it is 1.2. Therefore we can say that there is a fall in the TFPG from pre to post reform period. This results reveals that decline in the industry's TFPG is due to its productivity based frontier capability.

# EMPIRICAL RESULTS FROM ESTIMATED EMPLOYMENT FUNCTION FOR THE INDIAN MANUFACTURINGINDUSTRIES AS A WHOLE

Now, as stated in Methodology, the employment function is given by,

 $Log L = a + b Log (w/p) + c Log (Y) + m Log (L_{-1}) + \alpha DT + u$ 

So far as Indian Manufacturingindustry is concerned, the estimated employment function is given by,

 $Log L = 0.62- 0.473 Log (w/p) + 0.046 Log (Y) + 0.692 Log (L_{-1}) + 0.009DT$ (2.861)\* (-6.497)\* (5.041) (11.530)\* (3.045)\*

Here, t-statistics are given in the parenthesis and the model is summarised as,  $R^2 = 0.998$  and  $\overline{R}^2 = 0.997$ ,

F=3071.192. The coefficient of 'Log (w/p)' is expected to be negative since an increase in total wage rate should reduce the employment. Here, the coefficient of 'Log (w/p)' is negative, as it is expected. The coefficient of 'Log (Y)' is positive as is expected and it is 0.046 implies that increase in output should increase the employment. The coefficient of 'Log (L<sub>-1</sub>)' also lies between '0' and '1' as is expected and it is highly significant, indicating a significant lag in the adjustment of actual employment to its desired level. The Coefficient of 'DT' is positive and it is also highly significant implying a positive impact of liberalization on employment generation of the Indian Manufacturing industry. Here, the short run elasticity of employment with respect to real wage rate is 0.473 and that of the long run elasticity is 1.54. Similarly, the short run elasticity of employment with regard to output is 0.046 and that of the long run it is 0.149.

EMPIRICAL RESULTS FROM THE CAUSAL RELATIONSHIP BETWEEN REAL WAGE RATE AND PARTIAL LABOUR PRODUCTIVITY GROWTH FOR THE INDIAN MANUFACTURING INDUSTRY

The results of unit root testing are presented in Table 4, 5 and 6

| Table 4: Results from ADF Unit Root Test |                |                            |                            |                   |                            |                            |  |
|--|----------------|----------------------------|----------------------------|-------------------|----------------------------|----------------------------|--|
| Variables                                | Intercept Only |                            |                            | Trend & Intercept |                            |                            |  |
|  | Level          | 1 <sup>st</sup> Difference | 2 <sup>nd</sup> Difference | Level             | 1 <sup>st</sup> Difference | 2 <sup>nd</sup> Difference |  |
| Y/L                                      | -              | -6.517747*                 | -12.317370*                | -2.416631         | -6.396060*                 | -12.10505*                 |  |
|  | 0.315497       |                            |                            |                   |                            |                            |  |
| W/P                                      | 0.876761       | -4.789098*                 | -9.815923*                 | -0.635908         | -4.993979*                 | -9.658201*                 |  |

 Table 4: Results from ADF Unit Root Test

Source: Authors own estimate. (\*, \*\*, \*\*\* represents the significance level at 1%, 5% & 10% respectively)

The result of ADF unit root tests is presented in Table-4. Each variable is tested in their level, first difference and second difference with intercept only as well as trend & intercept. It is found that the null hypothesis of unit roots cannot be rejected at conventional significance levels for both the variables and therefore it can be

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concluded that all series are stationary at first difference i.e., all the series are I(1). Now as all the series are stationary after first difference we can proceed to the granger causality test to check the causal relation between the variables.For the ADF test, the optimum lag selection is based on Schwartz Information Criterion. Table 5 suggest that the appropriate lag length is 2 for the partial labour productivity and for real wages the appropriate lag length is 1.

#### Table 5: Selection of Appropriate Lag Length by SIC

| Lags | SIC            |                   |                |                   |  |  |
|------|----------------|-------------------|----------------|-------------------|--|--|
|      | Y/L            |                   | W              | / <b>P</b>        |  |  |
|      | Intercept Only | Trend & Intercept | Intercept Only | Trend & Intercept |  |  |
| 1    | 0.594739       | 0.479411          | 4.745224*      | 4.803730*         |  |  |
| 2    | 0.472002*      | 0.350986*         | 4.904462       | 4.969009          |  |  |

Source: Authors own estimate

The asterisks (\*) in the table :5 indicates the best (that is, minimized) values of the SIC.

#### Table 6: Results from Phillips-Perron Unit Root Test

| Variables | Intercept Only |                            |                            | Trend & Intercept |                            |                            |
|-----------|----------------|----------------------------|----------------------------|-------------------|----------------------------|----------------------------|
|           | Level          | 1 <sup>st</sup> Difference | 2 <sup>nd</sup> Difference | Level             | 1 <sup>st</sup> Difference | 2 <sup>nd</sup> Difference |
| Y/L       | -0.197181      | -6.517747*                 | -32.80946*                 | -2.385429         | -6.396060*                 | -40.24006*                 |
| W/P       | 0.797198       | -4.926941*                 | -14.43530*                 | -1.031262         | -5.041484*                 | -21.03606*                 |

Source: Authors own estimate. (\*, \*\*, \*\*\* represents the significance level at 1%, 5% & 10% respectively)

The result of Phillips-Perron unit root testsis presented in Table-5. Each variable is tested in their level, first difference and second difference with intercept only and trend & intercept. It is found that the null hypothesis of unit roots cannot be rejected at conventional significance levels for both real wage rate (W/P) and partial labour productivity (Y/L). Therefore it can be concluded that all series are stationary at first difference i.e., all the series are I(1).

| Table 7. Results from DT- GES detrending Omt Root Test |                |                            |                            |           |                            |                            |  |
|--|----------------|----------------------------|----------------------------|-----------|----------------------------|----------------------------|--|
| Variables  | Intercept Only |                            |                            |           | Trend & Inter              | cept                       |  |
|  | Level          | 1 <sup>st</sup> Difference | 2 <sup>nd</sup> Difference | Level     | 1 <sup>st</sup> Difference | 2 <sup>nd</sup> Difference |  |
| Y/L  | 0.599435       | -6.099637*                 | -8.237036*                 | -2.524265 | -6.295104*                 | -11.08196*                 |  |
| W/P  | 1.126654       | -4.890368*                 | -8.489991*                 | -1.124991 | -5.137870*                 | -9.672068*                 |  |

#### Table 7: Results from DF- GLS detrending Unit Root Test

Source: Authors own estimate. (\*, \*\*, \*\*\* represents the significance level at 1%, 5% & 10% respectively)

The result of DF-GLS detrending unit root tests presented in Table-7. Each variable is tested in their level, first difference and second difference with intercept only and trend & intercept. It is found that the null hypothesis of unit roots cannot be rejected at conventional significance levels for both the variables. Therefore it can be concluded that all series are stationary at first difference i.e., all the series are I(1).

#### **RESULTS FROM COINTEGRATION TEST**

Having established the time series properties of the data, the test for presence of long-run relationship between the variables using the Johansen Cointegration test is conducted. The Johansen approach can determine the number of cointigration vectors for any given number of non-stationary variables of the same order. The results reported in Table-7.suggests that the null hypothesis of no cointegrating vectors can be rejected at 1% level of significance. It can be seen from the trace statistics that we have one co-integration equation at both 1% and 5% level.

#### Table8: Johansen Cointegration Test Results

| Hypothesized<br>No. of CE(s) | Eigenvalue | Trace<br>Statistic | 5 Percent<br>Critical Value | 1 Percent<br>Critical Value |  |
|------------------------------|------------|--------------------|-----------------------------|-----------------------------|--|
| None **                      | 0.623142   | 30.98047           | 25.32                       | 30.45                       |  |
| At most 1                    | 0.218507   | 10.658024          | 12.25                       | 16.26                       |  |

Trace test indicates 1 cointegrating equation (s) at both 5% and 1% levels \*(\*\*) denotes rejection of the hypothesis at the 5%(1%) level

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From Johansen Cointegration test result the normalized cointegration equation can be written as:

$$W/P = 2.768683 + 4.419896 (Y/L)$$

(3.12\*) (2.91\*)

From the above normalized cointegration equation we can say that one unit change in (Y/L) leads to 4.42 unit change in real wage rate for the Indian Manufacturing industry. t-statistics are given in the parenthesis which are also significant at 1% (\*) level of significance. Thus we can say that there is a long-run relationship between real wage rate and partial labour productivity.

#### FINDINGS FROM GRANGER CAUSALITY TEST

The results of Pairwise Granger Causality between real wage rate (W/P) and partial labour productivity for the Indian Manufacturing industry are presented in Table-9. The results reveal that there is a unidirectional causal relationship between partial and real wage rate (W/P). Our result confirms that partial labour productivity is the Granger cause of (W/P) at lag 1, 2, 3 & 4.

| Table 7. Granger Causality test Results             |     |              |                     |             |          |  |  |  |  |
|---|-----|--------------|---------------------|-------------|----------|--|--|--|--|
| Null Hypothesis                                     | Lag | Observations | <b>F-Statistics</b> | Probability | Decision |  |  |  |  |
| Partial labour                                      | 1   | 30           | 1.1007              | 0.1590      | Accept   |  |  |  |  |
| productivity does not                               | 2   | 29           | 4.8999              | 0.0216      | Reject   |  |  |  |  |
| Granger Cause Real                                  | 3   | 28           | 4.20891             | 0.0281      | Reject   |  |  |  |  |
| wage fale   | 4   | 27           | 4.10091             | 0.0298      | Reject   |  |  |  |  |
| Real wage rate does                                 | 1   | 30           | 0.08902             | 0.7270      | Accept   |  |  |  |  |
| not Granger Cause<br>Partial labour<br>productivity | 2   | 29           | 0.40231             | 0.6501      | Accept   |  |  |  |  |
|   | 3   | 28           | 0.37881             | 0.8289      | Accept   |  |  |  |  |
| productivity  | 4   | 27           | 0.91890             | 0.1771      | Accept   |  |  |  |  |

Table 9: Granger Causality test Results

Source: Authors own estimate.

This result is also the conformity of the study made by Klein (2012) & Kumar (2012).

# EMPIRICAL RESULTS FROM THE CAUSAL RELATIONSHIP BETWEEN CHANGE IN REAL WAGE RATE AND CHANGE IN TOTAL FACTOR PRODUCTIVITY GROWTH FOR THE INDIAN MANUFACTURING INDUSTRY

From unit root testing, we have the following results as presented in Table 10,11 &12

Table 10: Results from ADF Unit Root Test

| Variables     |            | Intercept Onl              | У                          | Trend & Intercept |                            |                            |  |
|---------------|------------|----------------------------|----------------------------|-------------------|----------------------------|----------------------------|--|
|               | Level      | 1 <sup>st</sup> Difference | 2 <sup>nd</sup> Difference | Level             | 1 <sup>st</sup> Difference | 2 <sup>nd</sup> Difference |  |
| ΔTFP          | -5.031369* | -9.610398*                 | -6.609315*                 | -4.944927*        | -9.432294*                 | -6.501000*                 |  |
| $\Delta(W/P)$ | -4.789098* | -9.815923*                 | -8.668208*                 | -4.993970*        | -9.658201*                 | -8.463924*                 |  |

Source: Authors own estimate. (\*, \*\*, \*\*\* represents the significance level at 1%, 5% & 10% respectively)

The result of ADF unit root tests presented in Table-10. Each variable is tested in their level, first difference and second difference with intercept only and trend & intercept. It is found that the null hypothesis of unit roots can be rejected at conventional significance levels for both the variable. Therefore it can be concluded that all series are stationary at leveli.e., all the series are I(0).

| Variables     |            | Intercept Onl              | y I                        |            | Trend & Intero             | cept                       |
|---------------|------------|----------------------------|----------------------------|------------|----------------------------|----------------------------|
|               | Level      | 1 <sup>st</sup> Difference | 2 <sup>nd</sup> Difference | Level      | 1 <sup>st</sup> Difference | 2 <sup>nd</sup> Difference |
| ΔTFP          | -5.052008* | -9.610398*                 | -36.92822*                 | -4.971133* | -9.432214*                 | -36.99208*                 |
| $\Delta(W/P)$ | -4.926941* | -14.43530*                 | -47.81432*                 | -5.041484* | -21.03606*                 | -52.49945*                 |

#### Table 11: Results from Phillips-Perron Unit Root Test

Source: Authors own estimate. (\*, \*\*, \*\*\* represents the significance level at 1%, 5% & 10% respectively)

The result of Phillips -Perron unit root tests presented in Table-11. Each variable is tested in their level, first difference and second difference with intercept only and trend & intercept. It is found that the null hypothesis of unit roots can be rejected at conventional significance levels for both the variables & thus it can be concluded that all series are stationary at leveli.e., all the series are I(0).

| Table 12: Results from DF- GLS detrending Unit Root Test |            |                            |                            |            |                            |                            |  |  |  |  |
|--|------------|----------------------------|----------------------------|------------|----------------------------|----------------------------|--|--|--|--|
| Variables  |            | Intercept Onl              | У                          |            | Trend & Interc             | ept                        |  |  |  |  |
|  | Level      | 1 <sup>st</sup> Difference | 2 <sup>nd</sup> Difference | Level      | 1 <sup>st</sup> Difference | 2 <sup>nd</sup> Difference |  |  |  |  |
| ΔTFP   | -4.598083* | -7.565914*                 | -0.469174                  | -4.862391* | -9.102501*                 | -6.742886*                 |  |  |  |  |
| $\Delta(W/P)$  | -4.890368* | -8.489991*                 | -8.409301*                 | -5.137870* | -9.672068*                 | -6.619083*                 |  |  |  |  |

Source: Authors own estimate. (\*, \*\*, \*\*\* represents the significance level at 1%, 5% & 10% respectively)

The result of DF-GLS detrending unit root tests presented in Table-12. Each variable is tested in their level, first difference and second difference with intercept only and trend & intercept. It is found that the null hypothesis of unit roots can be rejected at conventional significance levels for the considering variables [i.e., $\Delta$ TFP & $\Delta$ (W/P)]. Therefore it can be concluded that all series are stationary at their level i.e., all the series are I(0).

Now, as all the three tests shows the variables are stationary at their level so we can use OLS to estimate the regression model where change in real wage rate is dependent and that of the change in TFP is independent. The model can be written as,

|                                    | 1       | $\Delta(W/P) = \alpha$ | $+ \beta \Delta$ ] | $\Gamma FP + u_t$ |
|------------------------------------|---------|------------------------|--------------------|-------------------|
| Now, by estimating the above model | we ha   | ve,                    |                    |                   |
| $\Delta(W)$                        | /P) =   | 0.858015               | +                  | 1.987717 ∆TFP     |
|                                    | (2.055) | 5254)**                |                    | (3.433178)*       |

The t-statistics are given in the parenthesis. (\*) & (\*\*) implies the variables are significant at 1% and 5% level of significance. The model has  $R^2 = 0.67$  and  $\overline{R}^2 = 0.65$ . The overall model is also highly significant as

F=335.209. From the above model we can say that one unit change in TFP leads to 1.99 unit change in real wage rate for the Indian Manufacturing industry.

The finding from our study, is quite natural and is in conformity with the studies made by Rath. B. N and Madheswaran. S (2007).

#### CONCLUSION

The following are the major findings of our study:

- First, the result on the overall productivity displays a declining trend of MTFPG in post reform period as compared to pre reform period for the Indian Manufacturing industry.
- Second, the result from estimated employment function depicts significant negative relationship between employment and real wage rate.
- Third, from employment function estimation for the Indian Manufacturing industry, we observe a positive relation between output growth and employment.
- Fourth, there is an increase in employment, for the Indian Manufacturing industry due to liberalization policies.
- Fifth,our result also confirms a significant causal and long-run relationship between real wage rate and partial labour productivity for the Indian Manufacturing industry. The direction of causality is from partial labour productivity to real wage rate.
- Last, but not the least, there is a positive and long-run causal relationship between change in real wage and change total factor productivity growth for the Indian Manufacturing industry.

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#### ENVIRONMENTAL POLLUTION CAUSED BY HUMAN ACTIVITIES AND THE NEED FOR SUSTAINABLE DEVELOPMENT

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#### ABSTRACT

Human being needs unpolluted air to breath, uncontaminated water to drink, nutritious food to eat and hygienic condition to live in. But the human being rarely pays due attention for these necessities. Due to progress in industrial and agricultural revolution environment is being affected day by day. Protection of environment is a matter of constitutional priority under Article 21 which deals with protection of life and personal liberty in relation to the protection from environmental pollution. At the same time it shall be the fundamental duty of every citizen to protect and improve natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures. But the human activities like agriculture, industrialization, urbanization, mining and transportation causes severe imbalances in ecosystem and pollution of environment. Therefore the concept of sustainable development bears more importance in this field. In this context Central and State Governments are becoming more vigilant. The Indian judiciary has also applied the principle of sustainable development while deciding the cases. Thus in a democratic setup, community participation bears great importance for environmental protection.

Key words: - Environment, Protection, Ecosystem, Pollution, Development.

Right from mother's womb, one needs unpolluted air to breathe, uncontaminated water to drink, nutrious food to eat and hygienic condition to live in. These elements are necessary for sound development of human personality. But the man, in order to survive adopts itself to its environment, but he rarely pays due attention for its environment. This is due to his ability to improve or change it. The governmental organizations also do not pay much attention for it. And the other hand in the name of development and progress through industrial and agricultural revolution, environment is being affected day by day<sup>1</sup>. It is important to note that the protection of environment is a matter of constitutional priority. Environmental problem is the concern of every citizen. Neglect of it is an invitation of disaster. Out of all fundamental rights, Article 21 which deals with protection of life and personal liberty is the most important in relation to the protection from environment pollution. In the case of Subhash Kumar V. State of Bihar<sup>2</sup>, the Supreme Court held that the right to live is a fundamental right under Article 21 of the constitution and includes the right to enjoyment of pollution free water and air for full enjoyment of life. It was also held that pollution free water and air is a fundamental right under Article 21 of the constitution.<sup>3</sup> Article 48-A of the Constitution directs the State endeavor to protect and improve the environment, the forest and wild life of the country. Stockholm Declaration on Human Environment proclaims that man has the fundamental right to freedom, equality and adequate conditions of life in an environment of quality that permits a life of dignity and well being and bear a responsibility to protect and improve the environment for present and future generations<sup>4</sup>.

Besides fundamental right to enjoyment of pollution free environment, man has also fundamental duty towards protection of environment. Therefore it shall be the duty of every citizen to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures<sup>5</sup>. Prevention of the environment and keeping ecological balance unaffected is a task which not only government but also every citizen must undertake. In the case of *Rural litigation and Entitlement Kendra V State of Uttar Pradesh*<sup>6</sup>, it has been held that it is a social obligation to protect environment and let us remind every Indian that it is the fundamental duty as enshrined in Article 51 A (g) of the constitution.

Human activities and technological advancements which help to enjoy luxurious life have caused severe environmental imbalances. The various human activities that cause severe alterations in the ecosystems and pollution of the environment are categorized into the following<sup>7</sup>.

**AGRICULTURE:** With the development and increase in human population, the agriculture on more and more land has been practiced to grow only the food crops to eat and quench their hunger. But later on they have started growing several kinds of cash crops. They have brought a large part of the forest land under agriculture and they have also started using fertilizers and pesticides to increase crop production. The present mode of agriculture is highly mechanized as the modern technology is inventing new and newer machines for agriculture. Such industrialized agriculture is consuming tremendous amount of energy, particularly the fossil fuels like oil (diesel) etc. These products are seriously polluting our environment. For example the pesticides

used for killing pests do not kill the pests alone but also kill some useful organisms like the honeybee, lady bird, beetles etc.

Besides killing useful organisms, they even kill the micro- organisms present in the soil. As a matter of fact, the pesticides poison the whole terrestrial food chain as well as the terrinal elements of the food chain. Even the milk given by the cows and buffaloes is now found to contain pesticides since the vegetation eaten by these animals do contain pesticides sprayed by humans on the vegetation.

Another environmental problem created by the agriculture is the continuous increasing use of land for agriculture. As human population is increasing, the developing countries are forced to convert many of their forest areas, wet lands and other productive areas to agricultural land. In fact man has converted major portions of the forestland to the agricultural land and damaged the ecosystem and the environment.

**INDUSTRIALIZATION**: The industrial revolution brought by science and technology plays a very vital role on environmental pollution. Following the industrial revolution, the non-agricultural impacts on the ecosystems have started becoming prominent. With more and more powerful machinery, we are altering the earth's surface significantly in a very short span of time. All of our natural resources like air water, minerals etc. are going to become short if we continue today, without keeping for future generation.

The rapid uncontrolled growth of the industries, throwing their waste-waters into our precious water sources like rivers and lakes are contaminating and spoiling them, which will ultimately make clean drinking water totally unavailable to us. The industries are also releasing several poisonous gases and substances in our atmosphere polluting the air. We should well imagine that, what will happen, if the two basic necessities of life, i. e. water and air become unavailable to us.

**URBANIZATION**: The urbanization is the process of urban development under which mass migration of people from rural areas to the industrialized urban areas take place due to the increased job opportunities. For such urbanization it can be easily imagined as to how much of land must have been consumed to build such giant urban centers. Precious farming lands in river areas and elsewhere has been lost for urbanization. Thousands of hectares are still being lost every year in all the countries of the developing world damaging the environment.

Secondly, the urbanized area produce enormous quantities of sewage and domestic waste waters which on being discharged into the rivers, pollute the rivers and can totally modify the aquatic ecosystem. Even when urbanization is in process, the nearby areas undergo considerable modifications. For example, large amount of sand is removed from the river beds for being used in the construction activity. This makes the riverine ecosystem unstable due to abnormal large pits created in the river bed.Similarly hills are destroyed due to mine stone builders and stone aggregates required for construction works.The removal of hills may change and modify the climate, not only locally but even regionally over vast areas as rainfall in plains becomes difficult to occur. This is what has happened in and around Delhi, the Capital city of India, where large scale removal of Aravali hills, have reduced the rainfall over Delhi and adjoining areas giving rise to the extension of Rajasthan desert towards Delhi. Hence Delhi may one day become a desert, if things continue in this way.

Another major requirement of urbanization is wood which is required in large quantities for furniture, doors, windows and even for floors, almirahs and cup-boards. This demand is met by destroying the forests, causing serious consequences for forest ecosystems.

**MINING**: Mining is the extraction of minerals and ores from the Earth's crust. The large scale industrial and urban growths havebecome possible due to the increased output of our mineral resources. Mining provides us coal for our energy requirements, minerals for making machines and engines, ores for making chemicals and fertilizers, clays for making crockery, rocks and stones for making buildings, bridges and dams, the gold, diamond and other precious stones for jewellery making. Thus the mining alters the whole landscape and the ecosystem existing at the place of mining which cannot be shifted elsewhere even if we find the existing ecosystem as highly valuable. Therefore the water in these areas have become very acidic. No plant grows and no animal survives in such areas. It will take thousands of years for coal mine areas of the present century to become repopulated with vegetation and animals. Therefore the ecosystems have been badly altered in UK, USA, India and several other countries of the world.

**TRANSPORTATION**: In olden days, people used to travel largely on foot or on bullock or horse carts or on bicycles etc. For long overseas journeys water transport through boats or ships was being used on a very small scale and mostly unmechanised. However with advancing human life, the trains started plying, using wood and coal to generate heat for producing stream to run them along with smoke to accuse air pollution and noise.

Gradually the use of petrol and diesel became more and more prominent in rail transport, besides the advent of buses and trucks playing on roads for public transport. The advent of cars for individual transportation also started creating adverse impacts on our environment. The excessive developments of road transport, using diesel and petrol, have created a number of adverse impacts on the environment. Thus vehicle emissions are the biggest source of air pollution in all the large and medium cities of India as well as in several other countries of the world.

#### SUSTAINABLE DEVELOPMENT

The definition of sustainable development was in fact promulgated for the first time in the U.N, report titled "Our Common Future, presented in 1987 by the world commission on Environment and Development." This document has created a consciousness of the need to harmonize environmental protection with economic development on a global scale. Sustainable development has been defined as "that development, which meets the needs of the present without compromising the ability of the future generations to meet theirown needs." It is free from environmental degradation, poverty and depletion of natural resource base. The sustainable development thus requires economic and social upliftment of a society without causing several adverse impacts on the environment or on our available resources. Hence the present generation should exploit and develop its available resources particularly non-renewable resources like forests, minerals, fossil fuels etc., in a conservative manner, so as to leave enough stocks for our future generations. Although we should develop our naturally available resources for our economic growth, we must not exhaust all our stocks, without leaving sufficient resources for our future generations. Therefore the necessity of sustainable development will compel the industrialists and the government Agencies to consider all aspects of their development proposal as to minimize the use of natural resources and adverse environmental impacts by adopting recycling and modern technologies. The concepts will also force the scientists and engineers to not only develop technologies which are efficient productive and profitable but also to keep into consideration their impacts on health and environment, resource and energy conservation, waste management and the social impacts such as the public inconveniences, unemployment, crime etc.

#### STATUS OF SUSTAINABLE DEVELOPMENT IN INDIA

India has made substantial progress in various spheres of development over the last 60 years of its independence, particular only in the last two decades. Indian economy has been growing, making it as one of the best performing economics of the world Social upliftment is also quite visible in the country. Literacy and use of modern technologies have risen. Such large scale development has however caused a lot of environment degradation which has resulted from increasing population pressures, large scale industrialization and commercialization use of forests for urbanization, fire wood and timber extraction etc. Large scale industrial growth, commercialization and urbanization has polluted our water, air and land to a large extent. Most of our rivers are now highly polluted and unfit even for bathing. What to talk of drinking. The economic growth and changing lifestyles, such as increasing use of automobiles and large scale use of non biodegradable plastics are also putting great stress on our resources and the environment. All such degradations and environment damages have made the idea of sustainable development as being the most important one for India. With increasing awareness of environmental necessities, the elite and educated people are becoming more and more environment oriented and eco-friendly. The Central as well as State governments are also becoming more conscious and vigilant. The Central Government has also made it compulsory to carry out detailed environmental impact study and submit Environmental Impact Assessment (EIA) to obtain environmental clearance from the state/Central Govts, before taking up execution of any major project or developmental activity in any state of the country.

#### JUDICIAL RESPONSE

The judiciary in India has played a very important role in the environmental protection and has applied the principle of sustainable development while deciding the cases. It has fulfilled its obligation with all sincerity and seriousness towards this global problem.

In the case of *People United for Better living in Calcutta Vrs. State of West Bengal*<sup>8</sup>, the court observed that in a developing country there shall have to be developments, but that envelopment shall have to be in closest possible harmony with environment, as otherwise, there would be development but no environment which would result in total devastation, though however may not be felt in present but at some future point of time but then it would be too late in the day to control and improve the environment. In fact there has to be proper balance between the development and environment so that both can co exist without affecting the other.

In A.R,C cement Ltd Vrs. state of  $U.P^9$  the supreme court did not permit the cement factory to run in the Doon valley area where the mining operation had been stopped and in order to restore the Doon Valley to its original

character, it was directed to be declared as non industrial. However the Government was asked to provide an alternative site for shifting the cement factory of the petitioner.

In H- Acid case<sup>10</sup> a PIL was filed alleging environmental pollution caused by private industrial units. The case was filed against union of India, State Government and State Pollution Control Board concerned to compel them to perform their statutory duties and that their failure to carry out their duties violated the right to life of citizens under Article-21 of the constitution. The Supreme Court applied one of the most important Principles of sustainable development i.e, polluter pays principle. Under this principle the offending industries were directed to compensate for losses due damage and to pay towards the cost of restoration of environmental quality.

#### CONCLUSION

Environmental Protection and sustainable development is both a challenge and an opportunity. The basic objectives of the sustainable development may be attained through more responsible national development and planning according to its own conditions. The sustainability of development will be achieved gradually but not just stopping the process of development in favour of sustainable development. It may be concluded that in a democratic set up community participation bears great importance and is expected for environmental protection. Thus the educational institutions, Pollution control boards, NGOs and Gram Panchayats can play vital role in imparting environmental education and awareness a campaigning programme for achieving the goal.

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# GENDER DISCRIMINATION AGAINST WOMEN: A SOCIOLOGICAL STUDY IN TWO "MISING" VILLAGES OF DHEMAJI DISTRICT OF ASSAM

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#### ABSTRACT

Discrimination is meant the contradict action of basic principle of human rights. To discriminate someone means to exclude that person from the full enjoyment of their socio-economic, political and cultural rights and freedom. This study is conducted in two Mising villages of Dhemaji district. In this study survey method is used along with some tools and techniques such as Interview schedule, Observation, Case study and Focus group discussion. There are two objectives of this work as to see the women status and gender discrimination of Mising women in this study area. The finding reveals that the Mising women of this study area are discriminated in their socio-economic life. In taking of decision, expense of earning money, represent of their social sphere they are discriminated. The male people are not only responsible factors for discrimination against them but also misconception of their ideology. Spread of awareness camp and modern education and new mode of attitude is very essential for reduce the discrimination against women. Finally it can be concluded that still the gender discrimination is prevailing among the Mising community within their folk culture and traditional beliefs and value.

Key Words: Discrimination, gender, Mising, tradition, women.

#### **INTRODUCTION**

Discrimination is a most important discourse of sociology to study about gender. To discriminate against someone is to exclude that person from the full enjoyment of his political, civic, economic, social or cultural rights and freedoms. Discrimination contradicts a basic principle of human rights: that all people are equal in dignity and entitled to the same fundamental rights. Discrimination is often based on ignorance of someone, prejudices towards weaker section and negative stereotypes. In some times Attitudes, actions or institutional practices that subordinate or marginalize anyone and it can be considered as discrimination. Discrimination includes sexism, ageism, homophobia, anti-Semitism and religious intolerance and xenophobia, a fear or hatred of foreigners or foreign countries. Segregation, a form of separation of ethnical groups imposed by law or by custom, is an extreme form of discrimination. Discrimination may be practiced overtly as direct discrimination and indirect discrimination focuses on the effect of a policy or measure, which may appear neutral but in fact systematically puts people of a particular minority at a disadvantage compared with others. There are various bases of discrimination such as base on race, ethnicity and culture, xenophobia, gender, religion, sexual orientation and discrimination based on disability etc (Marimuthu, 2008).

Among the discrimination aspect gender discrimination is also an important aspect which is very popular topic for studies. Gender is a socio-cultural concept, a social phenomenon and it is socially constructed. Simply the gender refers to personality traits and behaviour in distinction from the body as male and female. As per as the gender differences the role of males and females are different in nature. Basically gender is determined by the conception of tasks, functions and roles attribute to women and men in society, in public and private life. Due to this difference, women are considered as weaker section in most of the Indian society. Due to this perception the women are facing discrimination in their sphere of life. Although, we are talking about male and female both are equal in twenty first century but it is not a strong position to deny the coexisting of the gender discrimination on various levels in our societies. Discrimination based on gender (or sex) is a common civil rights violation that takes many forms, including sexual harassment, pregnancy discrimination and unequal pay for (Saikia, 2014).

In India, although the constitution has granted men and women equal rights, gender disparity still remains in India. Indian laws on rape, dowry and adultery have women's safety at heart, but these highly discriminatory practices are still taking place at an alarming rate and the laws are keeping just in name. Very much incidents such like rape case, sexual harassment against women, physical violence regarding dowry are found in news which bring a lot of obstacles against the women's life. Day by day the violence case against women is increasing in India. The value of traditional Indian culture was fully defined and determined by male. Women has always been playing subordinate role. Women are regarded as weaker section and comparatively weak than men in all spheres. The status of women is still lower in the patriarchal society. In patriarchal society the head of household or eldest male member rule over the family member in their every kind of family activity. The

every decision is taken by the Male member. It is looking like male authority or dominated society. Discrimination has been seen in some context among the patriarchic dominated society of India.

- 1. Discrimination against girls in distribution of property. In the name of property distribution women are excluded.
- 2. Preference to male child by parents to continue family lineage. Because of what the son are considered as future torch of the family.
- 3. Burden of household work on women and young girls.
- 4. Male control over the women's body, labour, property sexuality etc. The earning money and their property not freely used by the women.
- 5. Lack of educational opportunities and other exposure for girls
- 6. Women were tortured and killed in the name of witch hunting
- 7. Domestic violence against women (Saikia, 2014).

Marimuthu (2008) also mention some aspects of discrimination against women. Such like (i) Abortion of female gravida with the help of scanning (ii) Feoticide (By giving liquid extract from cactus / opuntia, giving raw paddy to new born female baby, by pressing the face by pillow or by breaking the female baby's neck) (iii) Not giving enough and nutritious food (iv) Not allowing to go to school (v) Not giving needy health care while in ill health (vi) Early marriage (vii) Eve teasing, rape and sexual harassment (viii) Dowry (ix)Divorce, destitution even for silly or without any reason. Indian society is still under the pressure of traditional perception, ideas, practices and sanctions which consider women as lower than men. Attaining gender justice is not an easy task in India. From time immemorial, a girl child has been considered as an unwanted entity and a burden that the parents would not mind doing away with. Discrimination against women begins before her birth. Traditional value system, low level of literacy, more household responsibilities, lack of awareness, non availability of proper counsels or guidance, low mobility, lack of self confidence, family discouragement and advanced science and technology are some responsible factors to create gender disparity in our society. The most important causes of gender disparity such as poverty, illiteracy or educational backwardness, unemployment, low income, society, caste, social customs, religious beliefs and practice, culture, on the name of family history and family situation, races, and anti-female attitude etc (Shuani, 2016; Marimuthu, 2008). Gender bias is strikingly apparent in educational access, employment avenues and representation in the field of politics. In fact violation of the rights of a girl child is rampant and this extends to the whole spectrum from foeticide to neglect to labour to trafficking, rape and eventually ends with her death (Patel et al, 2014). The women marginalized and discrimination is seen both tribal and non-tribal society. Dunn (1993) focuses the situation of women in scheduled castes and tribes groups which are referred to as weaker sections of people. Women in these underprivileged groups are doubly disadvantaged: their minority group status interacts with India's patriarchal culture to produce deplorable living conditions. His findings indicate that relative to men, women in these groups have far more limited access to both educational and employment resources. Tribal women are still marginalized and deprived group in tribal society. Gender equality among tribal groups is a complex phenomenon that's needs to be addressed in the context of various issues of tribal life (Ali et al, 2015).

The condition of undervaluation and ignorance the activities and existing of women is visible in terms of lower status of the girl child; their unwantedness; practices as dowry payments or bride price; lower social status of parents of brides; lifelong responsibility of parents even after marriage; fear of sexual exploitation and abuse; disdain upon arrival of girl child (Patel *et al*, 2014; Kumari, 1995; Hesketh & Xing, 2006). The Social factors, such as, illiteracy, ignorance, the economic factors such as low wage, unemployment under employment and political factors such as, low participation of women in the elections and other elected bodies are also equally responsible for gender inequality in the country (Raju, 2014). Therefore, the gender discrimination is being exists as unavoidable condition of Indian society which is intimately correlate with the cultural traits, beliefs and with their tradition. Therefore, this study is conducted on Mising tribe to see the gender discrimination among the Mising community.

#### **OBJECTIVES**

This study is conducted to examine the following objectives.

- To know the status of women in the particular research area.
- To know the gender discrimination among the Mising women in their socio-economic life.

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#### THE PEOPLE AND THE STUDY AREA

The present study is conducted in two Mising villages namly as Borlung Botuamiri and Borbauli village located at Dhemaji district. The two villages are located at Amghuri panchayat under the Sissiborgaon development block. There are 2 lower primary schools, 2 upper primary schools, 1 high school and 1 junior college available in the study area. The two villages located in remote area which is almost 15 km distance from the Dhemaji town. Transport and communication facilities are not much develop. Therefore, the two villages are selected purposively as research area for this study. The study area is dominated by only Mising community.

#### METHODOLOGY

The present study is based on both primary and secondary data. The primary data were collected from the field with the help of field visit. Primary data were collected with the help of some tools and techniques such as Interview schedule, Observation, Case study and Focus group discussion. In this study the researcher has used the descriptive method and the survey method also used for selection of the respondent. The researcher purposively selected 50 married women as respondent from the two villages. The secondary sources were collected from internet sources, books, journal articles, research papers etc. In this study the researcher used the simple frequency table and cross tables. Through the descriptive method the logical and statistical analyzed have done. The case study method also used the researcher by which the researcher has done the in-depth interpretation of discrimination. This field visit has done in May 2017.

#### FINDINGS AND DISCUSSION

The total 50 respondent's socio-demographic background is different in nature. Therefore, we mention here the distribution of respondents according to socio-demographic characteristics.

| SI. | Characteristic       |                                     | No of respondent each      | Percentage out of 100% |
|-----|----------------------|-------------------------------------|----------------------------|------------------------|
| No  |                      |                                     | character out of total 50) |                        |
| 1   | Age                  | 20 - 29                             | 12                         | 24%                    |
|     |                      | 30 - 39                             | 20                         | 40%                    |
|     |                      | 40 - 49                             | 11                         | 22%                    |
|     |                      | 50 - 59                             | 7                          | 14%                    |
|     |                      | Total                               | 50                         | 100%                   |
| 2   | Educational          | Illiterate                          | 14                         | 28%                    |
|     | qualification of the | $1^{st}$ to $5^{th}$                | 10                         | 20%                    |
|     | respondents          | $6^{th}$ to $8^{th}$                | 7                          | 14%                    |
|     |                      | $9^{\text{th}}$ to $10^{\text{th}}$ | 3                          | 6%                     |
|     |                      | HSLC                                | 7                          | 14%                    |
|     |                      | HS                                  | 7                          | 14%                    |
|     | BA                   |                                     | 2                          | 4%                     |
|     |                      | Total                               | 50                         | 100%                   |
| 3   | Types of family      | Joint family                        | 40                         | 80%                    |
|     |                      | Nuclear family                      | 10                         | 20%                    |
|     |                      | Total                               | 50                         | 100%                   |
| 4   | Religion             | Hindu                               | 42                         | 84%                    |
|     |                      | Christian                           | 8                          | 16%                    |
|     |                      | Total                               | 50%                        | 100%                   |
| 5   | Occupation           | Agriculture                         | 26                         | 52%                    |
|     |                      | Weaving                             | 23                         | 46%                    |
|     |                      | Govt. job                           | 1                          | 2%                     |
|     |                      | Total                               | 50                         | 100%                   |
| 6   | Average income of    | 1000 - 5000                         | 22                         | 44%                    |
|     | the respondent in    | 5000 - 10000                        | 10                         | 20%                    |
|     | per month            | 10000 - 15000                       | 7                          | 14%                    |
|     |                      | Above - 15000                       | 11                         | 22%                    |
|     |                      | Total                               | 50                         | 100%                   |

#### Table No: 1 Distribution of respondents according to socio demographic characteristics

Source: Field study

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The table no 1 reveals the socio-demographic distribution of respondents in various characteristic. In the case of age classification of respondents it is seen that out of 50 respondents most of respondents belongs to age group of 30 - 39 (40%). It is followed by 20 - 29(24%), 40 - 49(22%), and 50 - 59 (14%). Most of respondent belongs to Illiterate group (28%) and it is followed by  $1^{st}$  to  $5^{th}$  (20%) of educational group. 14% belongs to the educational group of  $6^{th}$  to  $8^{th}$ , HSLC, HS equally and 6% under  $9^{th}$  to  $10^{th}$ , 4% in BA category. Out of 50 respondents, 80% belongs to Joint family which is most popular than 20% of nuclear family. It is found that majority of respondents i.e.80% belongs to Hindu religious group, which 16% belongs to Christianity. In the context of their occupation it is seen that agriculture is most popular occupation than other which is 52%. But only 2% belongs to govt. job and 46% belongs to weaving. Out of 50 respondents most of respondents most of respondents most of 20% and 20% respondents most 5000 - 10000 and 14% are 10000 - 15000.

#### DISCUSSION

The status of women is still lower in the patriarchal society. If we observe the role of a woman in traditional society, it gives us a very pliable picture. The Mising tribe also patriarchal society so in this study it is seen that the Mising women face discrimination in their social and individual life. There are various prescribed and proscribed rules and norms existing among the Mising tribe. In some socio-economy, polity and religious activities women are excluded. They are control under the male member of the society. Although in contemporary society the spread of modern education and impact of globalization with new mode of attitude and acculturation with other culture lead to change society but its effectiveness is not much familiar with the Mising community of this particular study area. Through the observation method it was found that still the villagers follow their great traditional value, religious belief and practices and cultural aspect. The women are not much confidence. Still they are shaping and teaching around the family as per as designed by their traditional social value which are very rigid in nature among themselves. It is starting from the socialization process. They are socialized as women. That means they have to follow, play role and live as women under some limitation. If they outing over the limit then society will punish them, insult them etc. women should do it, should not do it as per as prescribed by the society. Therefore, the women are not more aware regarding the taking of decision in their day to life. They depend upon their husband or male member of the family to taking some decisions.

#### DISCRIMINATION IN TAKING OF DECISION AND EXPENSE OF MONEY

In the name of decision making and expense of money women are dominated under male authority. It is their folk tradition that after present of husband why the women. So male are authorized to do.

| Sl.   | Educational qualification | Do you particip | Total number |               |
|-------|---------------------------|-----------------|--------------|---------------|
| No    | of the respondents        | Yes             | No           | of respondent |
| 1     | Illiterate                | 0               | 14           | 14            |
| 2     | $1^{st}$ to $5^{th}$      | 1               | 9            | 10            |
| 3     | $6^{th}$ to $8^{th}$      | 1               | 6            | 7             |
| 4     | $9^{th}$ to $10^{th}$     | 1               | 2            | 3             |
| 5     | HSLC                      | 5               | 2            | 7             |
| 6     | HS                        | 5               | 2            | 7             |
| 7     | BA                        | 1               | 1            | 2             |
| Total |                           | 14 (38%)        | 36(62%)      | 50 (100%)     |

| Т | able No | 2: | Women | partici | pation | in | decision | making | process |
|---|---------|----|-------|---------|--------|----|----------|--------|---------|
|   |         |    |       |         |        |    |          |        | 1       |

#### Source: Field study

The table no 2 reveals that out of 50 respondents 14(38%) respondent participate in the taking of decision in their family. But 36(62%) are not. There are various reasons stands against their not participate of decision making process which are mentioned bellow with the help of a case study.

The respondent of household no 20 said "We women are not decision taker. So the male are not interested to participate of us in decision making process. In this context, decision should be taken only by the husband. If decision is taken by the male member of head of the household then it helps to solve against any problem. It helps to direct a proper way in the taking of any step. So in this context if women participate then the decision will be puzzling. On the other hand if women lead it then socially recognized them as bad women".

Therefore, it is clear that due to the none interested of male people and the misconception of women should have or haven't do and lack of awareness is responsible factors regarding the not participate of women in the decision making process. The women are not only exploited in decision making process but also in the economic life. It is very noticeable matter that Mising women are physically strong as men. They play a vital role in agricultural productive activity and money earning process which is reflecting in their culture i.e. weaving. Their traditional dress is weaved by themselves which is very much preserving their traditional culture. Mising women are participated in both external and internal work. They enable to earn money from weaving. Their weaving cloths are taking place in global market. In the group discussion women were mentioned that a women able to complete 2 clothes during one weak. Per cloth may be selling in 14 hundred rupees (depend on quality of the cloth). But the economy is controlled under male member. It is expense as guided by the husband. (The figure no 1).



Source: Field study

The figure no 1 reveals that out of 50 respondents 40(80%) support the husband control regarding the expense of money but 10(20%) are not.

#### DISCRIMINATION IN CHILD BIRTH

The discrimination is starting from the birth. It is prevailing that during the delivery time they practice a duration which is called "*Oboyotnam*" (the adopting of traditional food items and avoiding of some foods). In this time when boy child is born then a male chicken has killed to take the "*Jaal*"(which is a food item consisting of chicken meat, *Jaluk* (papper), *Pimpoli* (jaborandi pepper), *Ombita* (papaya), *Rugji* (fern), *Marsang* (spilanthes acmella) etc.). But if girl child is born then a female chicken is given to eat with *Poro Apong* (black and chocolate colour of rich bear). Due to importance of boy, the reproduction system is not stop till not getting of boy child. In the study area it was found that two and three respondents have born three or four female kids but still they don't stop child birth because they want at least one boy child for the family so they are continuing their child birth. Boy child are considered as future torch of their family. So the discrimination is started from the child birth.

#### DISCRIMINATION AGAINST WOMEN WITHIN PHYSICAL VIOLENCE OR HARASSMENT

Violence against women is called as gender based violence which are the acts of violence are committed against women expressly because they are women. It is one of the crucial social mechanisms by which women are forced into a subordinate position compared with men. Domestic violence and physical harassment are crucial example of gender violence. In this study it was observed that the husband deals the women as subordinate and sometimes when starts controversial condition and fight both of them then the husband physically harass women.

| Sl. No | Age of the respondents | Are you getting p<br>husband i | Total   |          |  |  |  |  |  |  |
|--------|------------------------|--------------------------------|---------|----------|--|--|--|--|--|--|
|        |                        | Yes                            | No      |          |  |  |  |  |  |  |
| 1      | 20 - 29                | 8                              | 4       | 12 (24%) |  |  |  |  |  |  |
| 2      | 30 - 39                | 15                             | 5       | 20 (40%) |  |  |  |  |  |  |
| 3      | 40 - 49                | 9                              | 2       | 11(22%)  |  |  |  |  |  |  |
| 4      | 50 - 59                | 3                              | 4       | 7(14%)   |  |  |  |  |  |  |
| Total  |                        | 35(70%)                        | 15(30%) | 50(100%) |  |  |  |  |  |  |
|        |                        | Source: Field stud             | dy      |          |  |  |  |  |  |  |

| Table No | 3:  | Physical | violence | against | women |
|----------|-----|----------|----------|---------|-------|
|          | ••• |          |          |         |       |

The table no 3 reveals that out of 50 respondents 35 (70%) respondents get physical harassment and 15 (30%) are not. It is also observed that the wife not taking the food before taking of her husband. In the focus group discussion the women informants were said that according to their folk tradition and traditional value the wife has to take food after giving of all family members. When husband come in later then she has to stay there to carry any require of her husband. Then women are regarded as socialize women. In the taking of interview it was cleared that women are discriminate during their menstruation time, during this time the women are considered as sinful, not allowed to touch any eatable things (which are actually cooked) and not allowed to enter in the household garden. If they entrance there then the garden may not be available of fruits. These are their traditional common practice.

#### DISCRIMINATION AGAINST THE ADOPTING OF QUALITY EDUCATION

The Mising people of this study area unknowingly discriminate upon the women. The mothers are also not aware about it. Although they don't know that their activities treat the girl as subordinate but they do it. This case is seen in their giving preference of taking education.

| Table 10 4. I reference of taking education according to sex |                                     |   |       |         |           |  |  |  |  |
|--|-------------------------------------|---|-------|---------|-----------|--|--|--|--|
| Sl. No   | Educational qualification of the    | To whom do you given preference to taking quality<br>education in distance area |       |         |           |  |  |  |  |
|  | respondents                         | Boy   | Girl  | Both    | Total     |  |  |  |  |
| 1  | Illiterate                          | 12  | 1     | 1       | 14        |  |  |  |  |
| 2  | $1^{\text{st}}$ to $5^{\text{th}}$  | 7   | 1     | 2       | 10        |  |  |  |  |
| 3  | $6^{th}$ to $8^{th}$                | 5   | 1     | 1       | 7         |  |  |  |  |
| 4  | $9^{\text{th}}$ to $10^{\text{th}}$ | 2   | 0     | 1       | 3         |  |  |  |  |
| 5  | HSLC                                | 1   | 1     | 5       | 7         |  |  |  |  |
| 6  | HS                                  | 0   | 0     | 7       | 7         |  |  |  |  |
| 7  | BA                                  | 0   | 0     | 2       | 2         |  |  |  |  |
| Total  |                                     | 27(54%)   | 4(8%) | 19(38%) | 50 (100%) |  |  |  |  |

#### Table No 4: Preference of taking education according to sex

Source: Field study

The table no 4 refers that out of 50 respondents the educated respondent are more interested to given preference both boy and girl in taking of quality education then the other educational group. 19(38%) respondent given preference both boy and girl but 27(54%) are given preference only boy and 4(8%) are given girl. They think that after marriage girls leave all. She will be outing member from the family. So son is important for them. Because of what, they enable to long serve the family and considered them as future torch and able to continue the inheritance practices. They think that girl as their respect. If something happening wrong with their girl then it may be reduce the prestige and respect of their family. In some cases the women are considered as weak. They are not able to handling all obstacles that's why not interested to women to read outside.

#### DISCRIMINATION AGAINST WOMEN TO OWNER OF PROPERTY

In the Mising community women are not giving family property. They able to earn money from husbandry i.e. pig or pork, duck, hen and goat etc. weaving is now a prime source of earning money. But all things are not given to women after her marriage.

Through the objectivity point of view their performing of common practice is not looking like discrimination because of what it is coming from folk tradition, people considered it as traditional value and which lady perform the role as guided by the folk tradition then the lady is considered as ideal lady or woman. But with subjectivity point of view these are discriminate activity and a lot of obstacles for the life of Mising women.

Therefore, it may be mentioned that the Mising women are exploited and discriminated in their life. Their folk tradition, culture influence the people to practice these whole. Although they do the practice unknowingly but the attested meaning also meant the discrimination acts. From the birth to taking decision, expense of money, to taking higher education women are discriminated. Therefore, the spread of modern education and govt. initiatives are most essential steps for reduce gender discrimination. Most of the rural people don't know about the laws of Indian constitution. Therefore, modern education should be spread all over the country specially focus in grass root level. Because education develops the skills, imparts knowledge, changes the attitude and improves the self confidence. It provides employment opportunity and increases income. Hence educating women is the prime factor to reduce gender discrimination and for the upliftment of women. Not only the female, the society must be educated to give equal right for female.

CONCLUSION

From the above discussion it can be concluded that still the Mising community practice the gender discrimination knowingly or unknowingly. In this context the cultural and traditional value, religious belief and practices and male domination stands as factors of gender discrimination. Mising women of this study area are discriminated in their socio-economic life. In taking of decision, expense of earning money, represent of their social sphere they are discriminated. The male people are not only responsible factors for discrimination against them but also misconception of their ideology. Although the modern education and law taking initiatives for equality of both male and female but still not a strong position to deny the coexisting of the gender discrimination in India. Spread of awareness camp and modern education and new mode of attitude is very essential for reduce the discrimination against women. Finally, it can be concluded that still the gender discrimination is prevailing among the Mising community within their folk culture and value of traditional beliefs and practices.

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#### GENDER DISCRIMINATION AT WORKPLACE: A PSYCHOLOGICAL PHENOMENON

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#### ABSTRACT

India is a unique featured country whose glory lies in its enormous Cultural heritage, Unity in Diversity, Value based Family system etc. In India, the Socio, Economic aspects of human life have direct proportion with its robust cultured base system. It is the place where women are prayed as Goddess and as well as humiliated as slaves. Till 1980s, women empowerment and employment was only 20% and it has increased enormously by 2010 by 40%. But various researches states that still women have been harassed, humiliated and discriminated at home, work place as well as in the society. In this paper researcher has tried to find the various causes for the discrimination of women at workplace and attributes of discrimination. This study also tried to find solutions to degenerate the problem of gender discrimination at workplace.

Keywords: Discrimination, Bias, Gender, Women, Humiliation, Equality, Employment, Empowerment.

"Equity is Ensuring that individuals or groups of individuals are treated fairly and equally and no less favorably, specific to their needs, including areas of race, gender, disability, religion or belief, sexual orientation and age." (University of Edinburg, Equality & Diversity)

#### INTRODCUTION

The term "gender inequality" refers to the perceived or actual unequal treatment of individuals based on their gender. Gender inequality arises out of cultural differences in gender roles, which are socially constructed systems. While there are inherent biological sex-based differences between men and women, gender inequality is a form of social discrimination. Gender discrimination in employment and at workplace will be noted as violation of fundamental rights of a particular group. Wayne (1995) says that no law has ever attempted to define precisely the term' discrimination', in the context of workforce, it can be defined as the giving of an unfair advantage (or disadvantage) to the members of the particular group in comparison to the members of other group.

Although the world community recognizes the necessity of eliminating gender bias and establishing gender equity and equality in employment, it still could not be addressed satisfactorily. Despite much has been achieved by women these days, most of their contribution remained officially unrecognized and undervalued. Gender discrimination continues to take place in all the sectors of a state's economy. In particular, gender bias has become a common occurrence everywhere in most of the developing countries.

Susan et al (1998) have focused on the work place gender discrimination rational bias theory. According to this theory, decision makers may choose to discriminate if they believe that their superiors or others having power over their careers expect or prefer it. The findings of their research showed that businessmen discriminated women and people at the top of the organization are most biased against women than people at the bottom. Their study has also confirmed that management support discrimination, though those discriminations were less than the findings of earlier research, reflecting increasing equal opportunity.

Main Causes for Gender Discrimination at Work place:

- Pre dominance of male gender since early stage
- > The group physically unfit always treated as vulnerable.
- > Not accepting the capture of financial phases at family level by women
- Insecurity and intolerance towards women empowerment
- Social and Psychological prejudices
- > Not Accepting the wealth distribution by male gender etc.

#### CONSEQUENCES OF GENDER DISCRIMINATION AT WORKPLACE

The general consequences observed in workplace:

**High Turnover:** If the discrimination is widespread throughout the organization, employees may view it as something so ingrained in the corporate culture they can't get around it. In this case, they may not even try to make the situation work and the rate of attrition may increase. **Low Morale:** Discriminatory behavior gradually

erodes the workplace environment, creating an atmosphere where employees feel undervalued and psychologically dissatisfaction may bring down the morale of the employee.

**Employee Conflict:** Workplace discrimination can fuel jealousy and pit employees against one another if they feel they aren't judged solely on their merits and accomplishments. Widespread or obvious discrimination also creates an atmosphere where employees don't trust each other and don't trust company leadership.

**Legal Action:** If an employee can prove discrimination, she can bring legal action against the company in the form of a lawsuit or a complaint to the government.

#### THE GENDER PAY GAP

According to *The Guardian* article, "Economic inequality for Women Costs", gender inequality in the workplace, especially having a gender pay gap has influenced poverty. The article through UN reports and studies, stated that "women comprise 60% of the world's working poor, and that only about half of them participate in the labor force. To compound the problem, <u>a 2014 World Bank report</u> shows that, on average, women earn 10%-30% less than men for comparable work."

According to the International Labor Organization, "the gender pay gaps persist around the world, including in the United States. According to public information collected by the International Trade Union Confederation (ITUC 2009), the global gender pay gap ranges from 3 % to 51% with a global average of 17 %.

| he table shows the contribution of women in country's GDI |                |                       |  |
|---|----------------|-----------------------|--|
| S.No  | Country Name   | % contribution to GDP |  |
| 1   | China          | 41%                   |  |
| 2   | Africa         | 39%                   |  |
| 3   | America        | 37%                   |  |
| 4   | India          | 17%                   |  |
|   | Global Average | 37%                   |  |
|   |                | 1 1 1 (2012)          |  |

### The table shows the contribution of women in country's GDP

Source: MC Kinsey Global institute (2012)

In India, 17% of GDP is contributed by Women and 83% of GDP by men. This shows the need of women employment and empowerment to observe the equal opportunities of men in various fields.

#### **OBJECTIVES OF THE STUDY**

- > To understand the various reasons for gender discrimination
- > To identify the various variables where women are facing discrimination
- > To observe the possible solution to degenerate the gender discrimination at workplace

SAMPLE: 50 working women employees within the city of Hyderabad are selected for sample.

#### METHODOLOGY

Researcher had an interaction with 50 women employees of different levels and identified around 8 major variables where they are facing discrimination. The Statistical method used for the study is "Mean" and then the outcomes of mean were ranked accordingly. The given ranks show at which state the women are being discriminated more.

#### **OBSERVATIONS**

The 8 confirmed variables were identified after thorough interaction with the respondents. Those variables were ranked by using Mean and tried to establish a valid justification.

| S.No | variable                                |                               | Mean | Ranks |
|------|---|-------------------------------|------|-------|
| 1    | Superior considers gender in            | 1*19+2*19+3*6+4*4+5*2=101/50  | 2.02 | VIII  |
|      | delegating job assignment though my     |                               |      |       |
|      | nature of job is common                 |                               |      |       |
| 2    | There is salary gap among the same      | 1*3+2*15+3*8+4*23=154/50      | 3.08 | IV    |
|      | level of employees                      |                               |      |       |
| 3    | Unfairly denied a salary increase in my | 1*0+2*35+3*9+4*6+5*0=121/50   | 2.42 | VI    |
|      | firm                                    |                               |      |       |
| 4    | Not receiving the same sort of respect  | 1*3+2*12+3*9+4*15+5*11=169/50 | 3.38 | III   |
|      | and response from other employees       |                               |      |       |
| 5    | My subordinates shows discrimination    | 1*4+2*5+3*0+4*30+5*11=189/50  | 3.78 | Ι     |
|      | to assist due to gender bias            |                               |      |       |

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| 6 | Discrimination in increments/<br>promotions etc.                                    | 1*9+2*32+3*4+4*5+5*0=105/50  | 2.10 | VII |
|---|---|------------------------------|------|-----|
| 7 | Flexible environment for male employees rather Female                               | 1*0+2*10+3*4+4*29+5*7=183/50 | 3.66 | II  |
| 8 | Women employees are facing different<br>kinds of molestation in our<br>organization | 1*2+2*27+3*4+4*14+5*3=139/50 | 2.78 | V   |

**Rank I**: It is observed that the women employees not only facing the problem of gender bias from superiors, but they are facing problem even with subordinators. Respondents stated that subordinates will be more alert when they get instructions from male rather than women employees. Women employees are even more embarrassed if the subordinates are male as the superiority complex of male employees are predominated.

Rank II: Respondents opined that the male employees have flexible environment than Female.

Superiors feels that male got more foredoom to move out of the firm in working hours and do their personal work. But this facility is restricted to women and rather questioned if they persist to go even in unavoidable circumstances.

**Rank III**: Respondent opined that they are not receiving the same sort of respect and response from the superiors or other employees.

Other variables like salary gap between the male and female employees, molestation problems, Unfair treatment while increasing the salary, Discrimination in increments and allocation of work are given IV, V, VI, VII and VIII ranks accordingly.

It is also observed that women are more conscious about their Psychological attributes rather than Financial Attributes. The researcher has come to this conclusion as all the psychological factors have ranked in first III positions and Financial Factors from 4<sup>th</sup> rank.

#### CONCLUSION

The results of the study take us to the different dimension of gender discrimination. In order to bring legitimate women empowerment in the Indian society, we need to understand and eliminate the main cause of the ill practices against women which are patriarchal and male dominated system of the society. One has need to be open- minded and change the old mindset against women together with the constitutional and other provisions. It is the duty of every organization to frame and practice a women friendly environment as the stress less, Secured and Confident climate will definitely bring higher productivity and ultimately it will show a positive effect on Country's GDP.

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#### ISSUES AND CHALLENGES FOR THE 14<sup>TH</sup> FINANCE COMMISSION

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#### INTRODUCTION

The Finance Commission of India came into existence in 1951. It was established under Article 280 of the Indian Constitution by the president of India. It was formed to define the financial relations between the Center and the State. The Financial Commission Act of 1951 states the terms of qualification, appointment and disqualification, the term, eligibility and power of the Finance Commission. As per the Constitution, the commission is appointed every five years and consists of a chairman and four other members since the institution of the first finance commission, stark changes occurred in the Indian economy causing changes in the macroeconomic scenario. This has led to major changes in the finance Commission's recommendations over the years. Till date, the Finance Commissions appointed so far fourteen Finance Commissions have been appointed. Details of Finance Commissions listed below table -1.

| Table -1, Details of Finance Commissions in India |                          |                       |                         |  |
|---|--------------------------|-----------------------|-------------------------|--|
| Finance<br>Commission                             | Year of<br>Establishment | Chairman              | Operational<br>Duration |  |
| 1   | 1951                     | K.C. Neogy            | 1952-57                 |  |
| 2   | 1956                     | K . Santhanam         | 1957-62                 |  |
| 3   | 1960                     | A .K. Chanda          | 1962-66                 |  |
| 4   | 1964                     | P . V. Rajamannar     | 1966-69                 |  |
| 5   | 1968                     | Mahaveer Tyagi        | 1969-74                 |  |
| 6   | 1972                     | K . Brahmananda Reddy | 1974-79                 |  |
| 7   | 1977                     | J .M. Shelat          | 1979-84                 |  |
| 8   | 1983                     | Y .B. Chavan          | 1984-89                 |  |
| 9   | 1987                     | N . K. P. Salve       | 1989-95                 |  |
| 10  | 1992                     | K .C. Pant            | 1995-2000               |  |
| 11  | 1998                     | A .M. Khusro          | 2000-2005               |  |
| 12  | 2002                     | C .Rangarajan         | 2005-2010               |  |
| 13  | 2007                     | Dr. Vijay L.Kelkar    | 2010-2015               |  |
| 14  | 2013                     | Dr. Y.V. Reddy        | 2015-2020               |  |

#### Table -1: Details of Finance Commissions in India

Table – 2: Horizontal Devolution Formula in the 13<sup>th</sup> And 14<sup>th</sup> Finance Commissions

| Variabla                         | Weights accorded |                  |
|----------------------------------|------------------|------------------|
| v ar lable                       | 13 <sup>th</sup> | 14 <sup>th</sup> |
| Population (1971)                | 25.0             | 17.5             |
| Population (2011)                | 0.0              | 10.0             |
| Fiscal capacity/ Income distance | 47.5             | 50.0             |
| Area                             | 10.0             | 15.0             |
| Forest cover                     | 0.0              | 7.5              |
| Fiscal discipline                | 17.5             | 0.0              |
| Total                            | 100              | 100              |

Source: Report of 13<sup>th</sup> and 14<sup>th</sup> Finance Commission

#### Major Recommendations of 14th Finance Commission headed by Prof. Y V Reddy

- 1. The share of states in the net proceeds of the shareable Central taxes should be 42%. This is 10% higher thathe recommendation of 13th Finance Commission.
- 2. Revenue deficit to be progressively reduced and eliminated.
- 3. Fiscal deficit to be reduced to 3% of the GDP by 2017–18.
- 4. A target of 62% of GDP for the combined debt of centre and states.
- 5. The Medium Term Fiscal Plan (MTFP) should be reformed and made the statement of commitment rather than a statement of intent.
- 6. FRBM Act need to be amended to mention the nature of shocks which shall require targets relaxation.

- 7. Both centre and states should conclude 'Grand Bargain' to implement the model Goods and Services Act (GST).
- 8. Initiatives to reduce the number of Central Sponsored Schemes (CSS) and to restore the predominance of formula based plan grants.
- 9. States need to address the problem of losses in the power sector in time bound manner.

Major Recommendations of 13th Finance Commission headed by shri Vijay Kelkar. The share of states in the net proceeds of the shareable Central taxes should be 32%. This is 1.5% higher than the recommendation of 12th Finance commission.

- 1. Revenue deficit to be progressively reduced and eliminated, followed by revenue surplus by 2013–14.
- 2. Fiscal deficit to be reduced to 3% of the GDP by 2014–15.
- 3. A target of 68% of GDP for the combined debt of centre and states.
- 4. The Medium Term Fiscal Plan (MTFP) should be reformed and made the statement of commitment rather than a statement of intent.
- 5. FRBM Act need to be amended to mention the nature of shocks which shall require targets relaxation.
- 6. Both centre and states should conclude 'Grand Bargain' to implement the model Goods and Services Act(GST). To incentivize the states, the commission recommended a sanction of the grant of Rs500 billion.
- 7. Initiatives to reduce the number of Central Sponsored Schemes (CSS) and to restore the predominance of formula based plan grants.
- 8. States need to address the problem of losses in the power sector in time bound manner.

The government has accepted its far-reaching, indeed radical, recommendations that have the potential to redefine Indian federalism in a long overdue and desirable manner. This piece describes the key recommendations and highlights some of their major implications. It is based on updating assumptions in the FFC report, which is the only source of data used in the numbers presented below. The discussion below, especially the estimates, should be seen as illustrative at best. An attempt is made to examine this article to examine the key recommendations and highlights some of their major implications.

#### Major recommendations of Fourteenth Finance Commission with special reference to Andhra Pradesh:

- 1. States Share in the net proceeds of Union tax revenues increased to 42% from 32% earlier. This is the largest ever jump in percentage of devolution. In the past, changes have ranged between 1-2% increases.
- 2. Eight Centrally Sponsored Schemes (CSS) delinked from support from the Center. Finance Commission has identified over 30 CSS Schemes to be delinked from Centre's support but all have not yet been delinked considering the national priorities and legal obligations.
- 3. Sharing pattern under various CSS to undergo a change, with States sharing higher fiscal responsibility for scheme implementation.
- 4. Distribution of grants to states for local bodies based on 2011 population data (90% weight) and area (10% weight)
- 5. Revenue compensation to sates under GST should be for five years; 100% in first three years, 75% in fourth year and 50% in fifth year.
- 6. Create an autonomous and independent 'GST COMPENSATION FUND' through legislative actions to facilitate the compensation process.
- 7. Suggesting a fiscal consolidation roadmap, FFC puts a ceiling on fiscal deficit at 3% of GDP from 2016-17 on words. Some flexible provisions for State's borrowing over and above the annual limit of fiscal deficit at 3% of GSDP.
- 8. Establish an independent **Fiscal Council** to undertake ex-ante assignment of fiscal policy implications of budget proposals and their consistency with fiscal policy and rules.
- 9. Suitable amid Electricity Act 2003 to facilitate levy of penalties for delays in payment of subsidies by the state Governments.

10. Have independent regulators for road sector for tariff setting, quality regulation, among other functions.

11.Several recommendations made for evaluating government's ownership, disinvestment in Central Public Sector Enterprises.

Andhra Pradesh government accused the commission of not awarding Rs 1.41 lakh crore sought as grants-in-aid to create a level playing field and build an ecosystem for catching up with other states. The eighth largest state by population, Andhra Pradesh is looking for investments to build a new capital city and growth engines for its economy .Andhra Pradesh funds of Rs 2.06 lakh crore recommended by the commission from 2015-16 to 2019-20 would only enable the state to address revenue expenditure needs such as administration and maintenance costs of governance. He urged the Centre to take up comprehensive measures to enable his state to "catch up with the national development momentum in the spirit of cooperative federalism", people and government of A.P felt "it is the responsibility of the government of India to address the development needs of Andhra Pradesh, which have been grievously damaged by the reorganization". Finding lapses in the commission's recommendations, AP was treated on a par with other states both for the purpose of tax devolution and revenue deficit grant. As a result, AP would become the only state in the country, other than special-category states, to remain a revenue-deficit state even in the last year of the commission's award of 2019-20."While the state faces a resource gap of more than Rs 15,000 crore in the current financial year, it was sanctioned Rs 500 crore. Andhra Pradesh will have a gross revenue deficit of Rs 1.92 lakh crore during the next five years, while Telangana will have Rs 21,972 crore of surplus revenue prior to the devolution of the states' share of Central tax revenue collections, which has been pegged at 42 per cent. "Even after 42 per cent devolution, AP would have a net deficit of Rs 22,112 crore over the next five years, whereas Telangana would have a surplus of Rs 1.18 lakh crore," . Andhra Pradesh can now have some solace, with the 14 th Finance Commission increasing the over-all allocation of funds to the State for the next five years in addition to the Rs. 22,113-crore grants-in-aid to cover the revenue deficit (Table-one). The Commission recommended revenue deficit grant for 11 States, including Andhra Pradesh, which became a revenue deficit State post-bifurcation. The grant of Rs. 22, 113 crore will be spread over the next five years. Owing to the 10 per cent increase in the devolution of the Central divisible pool of taxes to States from 32 per cent to 42 per cent based on tax growth projections, the share of AP is estimated at Rs. 1,69,969 crore during 2015-20 in the total Central divisible pool of Rs. 39,48,187 crore. Under the previous Commission, the devolution to States was Rs. 14,48,096 crore, and the united AP's share was Rs. 1,14,642 crore at 6.94 percent. There will be transitional challenges, notably how the Centre will meet its multiple objectives given the shrunken fiscal envelope. But there will be offsetting benefits moving from CAS to FFC transfers will increase the overall progressivity of resource transfers to the states. It is clear that the far-reaching recommendations of the FFC, along with the creation of the NITI Aayog, will radically after Centre-State fiscal relations and further the government's vision of cooperative and healthy competitive fiscal federalism.

| States            | Share (%) | States         | Share (%) |
|-------------------|-----------|----------------|-----------|
| Andhra Pradesh    | 4.305     | Odisha         | 4.642     |
| Arunachal Pradesh | 1.370     | Punjad         | 1.577     |
| Assam             | 3.311     | Rajastan       | 5.495     |
| Bihar             | 9.665     | Sikkim         | 0.367     |
| Chhattisgarh      | 3.080     | Tamil Nadu     | 4.023     |
| Goa               | 0.378     | Telangana      | 2.437     |
| Gujarat           | 3.084     | Tripura        | 0.642     |
| Haryana           | 1.084     | Uttar Pradesh  | 17.959    |
| Himachal Pradesh  | 0.713     | Uttarakhand    | 1.052     |
| Jammu and Kashmir | 1.854     | West Bengal    | 7.324     |
| Jarkhand          | 3.139     | Karnataka      | 4.713     |
| kerala            | 2.500     | Madhya Pradesh | 7.548     |
| Maharastra        | 5.521     | Manipur        | 0.617     |
| Meghalaya         | 0.642     | Nagaland       | 0.498     |
| Mizoram           | 0.460     |                |           |
| All states        |           |                | 100       |

 Table-3: State-Wise share in divisible pool of Union taxes

| States            | 2015-20 (Rs Crores) |
|-------------------|---------------------|
| Andhra Pradesh    | 22,113              |
| Assam             | 33,79               |
| Himachal Pradesh  | 40,625              |
| Jammu and kashmir | 59,666              |
| Kerala            | 9,519               |
| Manipur           | 10,227              |
| Meghalaya         | 1,770               |
| Mizoram           | 12,183              |
| Nagaland          | 18,475              |
| Tripura           | 5,103               |
| West Besngal      | 11,760              |
| Total States      | 1,94,821            |
|                   | •                   |

## Table – 4: Grant-in-aid for Revenue Deficit States (2015-2020)

#### VERTICAL AND HORIZONTAL DEVOLUTION

The FFC has increased the amount that the Centre has to transfer to the states from the divisible pool of taxes by 10 percentage points, from 32 per cent to 42 per cent. Its radical nature is indicated by the comparison with the previous two Finance Commissions (FCs) that increased the share going to the states by 1 and 1.5 percentage points, respectively. So, the FFC recommendations represent a ten and six-and-a-half fold increase, respectively relative to the previous two FCs. Had the new share been implemented in 2014-15, the Centre's fiscal resources would have shrunk by about 1.20 lakh crore (0.9 per cent of gross domestic product or GDP). If the comparison were to be in terms of overall (tax plus non-plan grants) devolution, the increase would be roughly comparable to that in tax devolution.

In addition, the FFC has significantly changed the sharing of resources between the states is called as horizontal devolution. The FFC has proposed a new formula for the distribution of the divisible tax pool among the states. There are changes both in the variables included/excluded as well as the weights assigned to them. Relative to the Thirteenth Finance Commission, the FFC has incorporated two new variables: 2011 population and forest cover; and excluded the fiscal discipline variable. Several other types of transfers have been proposed, including grants to rural and urban local bodies, a performance grant, and grants for disaster relief and reducing the revenue deficit of eleven states. These transfers total approximately 5.3 lakh crore for the period 2015-20.

#### UNIFORMLY LARGE ADDITION TO STATES' RESOURCES

The impact of FFC transfers to the states needs to be assessed in two ways: gross and "net" FFC transfers will clearly add to the resources of all the states in absolute terms and substantially. They will also increase resources when scaled by states' population, net state domestic product, or own tax revenues, with the latter Connoting the addition to fiscal spending power. Implementing the FFC recommendations alone would undermine the centre's fiscal position substantially. The philosophy of the FFC report is that there should be some corresponding reduction in the central assistance to states (CAS, the so-called plan transfers). Thus, greater fiscal autonomy to the states would be achieved both on the revenue side (on account of states now having more resources and more untied resources) and on the expenditure side because of reduced CAS transfers. The exact mechanism for implementation will be discussed in the months ahead but the legally backed schemes as well as flagship schemes that meet core objectives, such as rural livelihoods and poverty alleviation, will be, and need to be, preserved. The net impact on the states will depend not just on the transfers effected via the FFC, but also the consequential alteration of CAS. Under some simple assumptions about how the latter will be distributed, we find that all states will end up better off than before, although there will be some variation amongst the states.

#### INCREASE IN PROGRESSIVITY OF OVERALL TRANSFERS

The FFC transfers have a more favorable impact on the states that are relatively less developed, which is an indication that they are progressive, that is, states with lower per capita net state domestic product (NSDP) are likely to receive on average much larger transfers per capita. The correlation between per capita NSDP and FFC transfers per capita is -0.72 based on some broad assumptions about FFC transfers indicates that the FFC recommendations do go in the direction of equalizing the income and fiscal disparities between the major states. In contrast, CAS transfers are only mildly progressive: the correlation coefficient with state per capita GDP

(over the last three years) is -0.29. This is a consequence of plan transfers moving away from being formulabased (Gadgil Mukherjee formula) to being more discretionary in the last few years. Greater central discretion evidently reduced progressivity. A corollary is that implementing the FFC recommendations would help address inter-state resource inequality: progressive tax transfers would increase, while discretionary and less progressive plan transfers would decline.

#### WEAKENING FISCAL DISCIPLINE?

Will FFC transfers lead to less fiscal discipline? There are two reasons to be optimistic. First, in the last few years the overall deficit of the states has been about half of that of the Centre in 2014-15 for example, the combined fiscal deficit of the states was estimated at 2.4 per cent of GDP com-pared to 4.1 per cent for the Centre. So, on average, states, if anything, are more disciplined than the Centre. Based on analyzing recent state finances, we find that additional transfers toward the states as a result of the FFC will improve the overall fiscal deficit of the combined central and state governments by about 0.3-0.4 per cent of GDP. Huge tax devolution could put some strain on Central finances, especially until major centrally sponsored schemes get delinked and GST is implemented. With a greater discretionary funds with States there is a risk of wastage of funds by some States towards populist and non-productive ends. Moreover, nearly all the state governments have enacted fiscal responsibility legislations (FRLs), which requires them to observe high standards of fiscal discipline such as keeping the deficit low. Further, as part of the new Centre-state fiscal relations, for example, under the NITI Aayog, mechanisms for peer assessments and mutual accountability could be created, and incentives could be provided for maintaining fiscal discipline. This is becoming routine practice in many federal structures where sovereignty is shared between the members. The FFC recommendations and the consequences they entail offer an opportune time for instituting such mechanisms.

Andhra Pradesh government accused the commission of not awarding Rs 1.41 lakh crore sought as grants-in-aid to create a level playing field and build an ecosystem for catching up with other states. The eighth largest state by population, Andhra Pradesh is looking for investments to build a new capital city and growth engines for its economy .Andhra Pradesh funds of Rs 2.06 lakh crore recommended by the commission from 2015-16 to 2019-20 would only enable the state to address revenue expenditure needs such as administration and maintenance costs of governance. He urged the Centre to take up comprehensive measures to enable his state to "catch up with the national development momentum in the spirit of cooperative federalism". people and government of A.P felt "it is the responsibility of the government of India to address the development needs of Andhra Pradesh, which have been grievously damaged by the reorganization". Finding lapses in the commission's recommendations, the chief minister said, "AP was treated on a par with other states both for the purpose of tax devolution and revenue deficit grant. As a result, AP would become the only state in the country, other than special-category states, to remain a revenue-deficit state even in the last year of the commission's award of 2019-20."While the state faces a resource gap of more than Rs 15,000 crore in the current financial year, it was sanctioned Rs 500 crore, he said. Andhra Pradesh will have a gross revenue deficit of Rs 1.92 lakh crore during the next five years, while Telangana will have Rs 21,972 crore of surplus revenue prior to the devolution of the states' share of Central tax revenue collections, which has been pegged at 42 per cent. "Even after 42 per cent devolution, AP would have a net deficit of Rs 22,112 crore over the next five years, whereas Telangana would have a surplus of Rs 1.18 lakh crore,"

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first installment are Bihar (3,624.37 crore), West Bengal (2,746.91 crore), Madhya Pradesh (2,835.75 crore), Maharashtra (2,075.59 crore) and Rajasthan (2,065.79 crore). The YV Reddy-headed 14th Finance Commission had earlier this year recommended a 10 percentage point hike in the States' share of the tax divisible pool to 42 per cent for each of the award years 2015-20. This would translate into States getting an additional 1.78 lakh crore in 2015-16. The total devolution to States in 2015-16 is expected to be 5.26 lakh crore, against 3.48 lakh crore in 2014-15.

#### **GRANT-IN-AID**

For 2015-16, the 14th Finance Commission had also recommended a grant-in-aid of 48,906 crore for 11 revenue-deficit States, such as West Bengal, Andhra Pradesh and Jammu & Kashmir. In the first installment of devolution for 2015-16, the States with low share are Sikkim (137.46 crore), Goa (Rs.141.51 crore), Mizoram (Rs.172.40 crore), Manipur (Rs.231.27 crore), Meghalaya (Rs.240.75 crore) Nagaland (Rs.186.68 crore) and Tripura (Rs.240.62 crore). While Andhra Pradesh has got Rs.1,616.78 crore, Telangana has got Rs.915.85 crore. Tamil Nadu has been allocated Rs.1,510.51 crore towards the first instalment. Kerala has got Rs.937.15 crore and Karnataka has been allocated Rs.1,770.46 crore. Odisha has got Rs.1,743.46 crore and Gujarat has been allocated Rs.1,159.56 crore.

#### CONCLUSIONS

With the caveats noted earlier, the main conclusions are that the FFC has made far-reaching changes in tax devolution that will move the country toward greater fiscal federalism, conferring more fiscal autonomy on the states. This will be enhanced by the FFC-induced imperative of having to reduce the scale of other central transfers to the states. In other words, states will now have greater autonomy both on the revenue and expenditure fronts this, of course, is in addition to the benefits that will accrue from addressing all the governance and incentive problems that have arisen from programmes being dictated and managed by the distant central government rather than by the proximate state governments.

To be sure, there will be transition-al challenges, notably how the Centre will meet its multiple objectives given the shrunken fiscal envelope. But there will be offsetting benefits: moving from CAS to FFC transfers will increase the overall progressivity of resource transfers to the states. Another is that over-all public finances might actually improve by more than suggested by looking at the central government finances alone. In sum, it is clear that the far-reaching recommendations of the FFC, along with the creation of the NITI Aayog, will radically alter Centre-state fiscal relations, and further the government's vision of cooperative and competitive federalism. The necessary, indeed vital, encompassing of cities and other local bodies within the embrace of this new federalism is the next policy challenge.

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#### OCCUPATIONAL COMPLEXITY INCREASING HEALTH PROBLEM AND STRESS IN IT INDUSTRY

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#### ABSTRACT

The study attempts to explore factors influencing occupational stress and health problem in IT Industry. Employees working in IT industry are prone to develop a lot of health problems due to continuous physical and mental stress of their work. Diseases are induced, sustained or exacerbated by stress. The common health problem due to stress is acid peptic disease, alcoholism, diabetes, fatigue, tension headache, hypertension, etc. Globalization and privatization have brought new work relationships, job insecurity, insecurity regarding future working conditions and rapid obsolescence of skills are causes of stress. Structured interview were schedules were used to collect first hand data. The reason for choosing particularly IT and ITES employees is that the level of stress these employees face is comparatively higher than other employees. Any kind of a job has targets, and an employee becomes stressed when they are allotted with unachievable targets and are unable to manage a given situation. Moreover, the purpose of this review is also to attract human factors which highlight lake of control at workplace, role conflict, and inadequate awareness about the profession, extra workload, and work pressure and to recognize the problem. An integrated approach aimed at improving the working posture, reduction in static load and positive interventions to reduce the influence of job-stress resulting in poor work performance.

Keywords: Workplace stress, Mental Stress, IT Industry, Work performance, Health Problems.

#### INTRODUCTION TO STUDY

Is "Workplace stress" is the harmful physical and emotional responses that can happen when there is a conflict between job demands on the employee and the amount of control an employee has over meeting these demands. In general, the combination of high demands in a job and a low amount of control over the situation can lead to stress. Occupational stress has become a major area of concern in the field of human resource Management in today's competitive era. Stress in the workplace can have many origins or come from one single event. It can impact on both employees and employers alike According to, three broad perspectives can be chosen when studying stress: (a) the response-based perspective, (b) the stimulus-based perspective, and (c) the cognitive transactional process perspective Occupational stress, hence, is found to be a mental and physical condition that calls in a detrimental effect on the individual's productivity, effectiveness, personal health and quality of work (Comish and Swindle, 1994). Main components of this work-stress process are potential sources of stress (stressors), factors of individual differences moderators/mediators) and consequences of stress. Stressors (jobrelated and extra-organizational) are objective events; stress is the subjective aspect. Thus the concept of stress can best be understood by saying that some environmental variables (stressors) when interpreted by the individual (cognitive interpretation) may lead to stress (Dua, 1994). Stress in the workplace can have many origins or come from one single event. It can impact on both employees and employees alike. Employees who start to feel the "pressure to perform" can get caught in a downward spiral of increasing effort to meet rising expectations with no increase in job satisfaction. The relentless requirement to work at optimum performance takes its toll in job dissatisfaction, employee turnover, reduced efficiency, illness and even death.

Work is a central part of almost everyone's life. Most adults devote weekdays to work (Landy & Conte, 2004) as career development makes up almost 70% of all human developmental tasks. Work and the workplace emphasizes many issues related to industrial and organizational psychology including personnel selection and training, job satisfaction, quality of work life, human factors, work conditions, performance appraisal, motivation and leadership, and the physical and mental health of workers. Perceived satisfaction on the job is reflected by the needs of sense of fulfillment and expectation for the job to be interesting, challenging and personally satisfying (Smither, 1994). Job satisfaction is also an achievement indicator in career developmental tasks (Sidek, 2002) and is associated with the psychological (Limbert, 2004) and individual well-being (Nassab, 2008).

Apart from the stressor outside the organization ,such as family related stressors and individual stressors, there are various stressor effecting an employee, which are associate with the organization itself(Luthans,2002).Occupational stressors are various job related stressors which negatively influence the performance and well-being of the employees(kang,2005),since they exist in every organization, through their degree may vary from occupation to occupation and individual to individual(Gignac & Appelbaum,1997).Some

stressors are common to all occupations whereas some are unique to a specific occupation: thus specific stressors must be explored to manage stress in any occupation(Kang,2005). Among the carious dimensions of occupational stress, the most important of them are characteristics, organizational environment and psychological of an individual (Zeffane & Mcloughlin, 2006). The present article is concerned with how the Information technology and the consequent change in job culture affect work stress, mental health IT professionals. This is particularly relevant because jobs in Information technology are the most coveted one in modern India, and the most brilliant section of the youth are going for it. Some indentified that the key factors at the workplace which generate stress among IT personnel in Singapore. It was suggested that factors which generate stress be grouped into 4 broad categories as Lack of career advancement related to the problem of high rate of employee turnover, Work overload resulting in spillover of workload at home and guilt and dissatisfaction for being less attentive to family, Risk taking and decision making consisting of fear of making mistakes and Employee morale and organizational culture related to a lack of participation in decisions affecting their work, undue blame for machine failure and difficulty in team work considering the fluid and noninvolved nature of work.

In a study on Work Stress among Information Systems Professionals it was found that employees reported the commonly experienced feelings such as frustration, pride in accomplishments, being overwhelmed, anxiety and common stress symptoms decrease in energy, anxiety, muscle tension, headache, stomach upset, negative thinking and insomnia thus both positive and negative effects were reported. It was discussed that employee's difficulties with stress within organization that continually introduce new technology and computer software into the work environment. Symptoms of stress are reviewed and employer and employee options to reduce stress are examined. The present study takes a holistic view of personhood and considers job stress as one imposed upon and interacting with other stressors. Therefore the study focuses on psychological distress, sense of wellness and organizational role stress of IT professionals as associated with stressful life events and coping resources. Very few studies have been obtained in this area. In India there is a virtual gap in study of this sector. Psychological distress in the present context has been defined as the overall feeling of anxiety, depression, and stress related dogmatization. It is the feeling of ill-being associated with various types and phases of mental illness. Wellness has been defined as a subjective feeling of being in a positive state of existence. Recent literature on mental health repeatedly emphasizes that absence of illness and presence of wellness are not synonymous: these have been found to be slightly and negatively correlated.

Global satisfaction can be divided into satisfaction with the various domains of life such as recreation, love, marriage, friendship, and so forth. Pleasant affect can be split into specific emotions such as joy, affection, and pride. Finally, unpleasant or unpleasant affect can be separated into specific emotions and moods such as shame, guilt, sadness, anger, and anxiety. Thus it is a measure of quality of life.Role stress refers to the conflict and tension due to the roles being enacted by a person at any given point of time. If enacted in the context of organizations, such role stresses are called organizational role stress. Any organization may be perceived as a system of roles. These roles are different from positions or offices in the organization. Office is concerned with the hierarchical positions and privileges, whereas role refers to the obligations attached to that office. Thus, office defines the power of the holder. Role determines the obligation of the person holding that office. Pestonjee and Pareek (1997) explains role as the totality of formal tasks, informal tasks and Distress, Wellness and OR acts as organized by an individual. Each individual is a member of social systems and the expectation as well as demand of one may put pressure on the other. There are 2 role systems: Role Space and Role Set. Both have built in potential for conflict and stress (Pareek, 2003). It may be expected that organizational role stress will operate in interaction with the general ill-being and well-being. There is unexpected high relationship of organizational role stress with these two. There is ample literature to associate life stress and coping resources to feeling of ill being and well-being. The stress diathesis model essentially says that the effect of stressors on illness and wellness is not absolute, but a function of moderating factors like inner strength and coping techniques

#### LITERATURE REVIEW

The human operative and the machine are mutually complementary parts of a process. Work has more and more become a matter of mental rather than physical workload. This can easily be seen when we are using everyday products e.g., mobile phone, ATM or computer application software, which are sometimes not really as easy and efficient to use as they could have been, if the designer had observed some of the principles related to mental workload. Machines have taken role of human. People believed that modern computer-aided technology has reduced their mental workload but in fact, it has increased their mental workload and it also weakened their social support (Sharma, 1999).
Research from the perspective of technology as a source of stress is limited. However, some studies have been conducted. Techno-stress (synonyms for computer-related stress) refers to any Stress and Human Performance negative impact on attitudes, thoughts, behaviors, or body physiology that is caused either directly or indirectly by technology. The very gadgets designed to make life easier can actually cause an added dimension of stress. It's frustrating when the faxes, e-mails, and voice mails pile up; annoying when phones don't stop ringing; and infuriating when equipment breaks down. Moreover, Techno-stress has also been suggested as a term to describe the state of cognition and cortical arousal observed in certain employees, who are heavily dependent on computers for their work. It is suggested that organizational re-engineering and the introduction of information technologies constitute potential stressors, challenging employees' cognitive resources. Prediction is made that psychosomatic syndromes in the workplace will most likely increase in the future due to the rapid changes currently transcending working life (Arnetz & Wiholm, 1997).

The rapid spread of computer-aided system (automation) use has changed the role of a man from an active performer to a passive observer, whether it's the aviation, defense or medical diagnostic systems, or whether it's the industrial process control or just the leisure activities in the home environment. Automation has also changed person's attitude towards automated system it places more reliance and trust on system and confidence in them (Singh, Molloy & Parasuraman, 1993). Computer-aided system or automation in rudimentary refers to those circumstances when a machine or a computer performs a task that is otherwise performed by the human operator. Automation has been defined as 'having equipment perform a function that could be performed by the pilot manually' (Kantowitz & Sorkin, 1983).

Automation further can be thought of as the 'process of allocating the activities to a machine or system to perform' (Parsons, 1985). Furthermore, Parasuraman and Riley (1997) defined automation as the execution of functions by machine (computer) which was previously carried out by a human. It is noteworthy that automation not merely signifies replacement of electrical cables by fiber optics or usage of a computer or super computer aided devices, rather it is the 'replacement of human function by machine function,' which can be elucidated in terms of human factors perspective as the 'allocation of functions' (Hancock & Scallen, 1996; Kantowitz & Sorkin, 1987). The performance of most automation depends on the interaction of people with the existing technologies. Hence, automation has grown a width with the development of technology and human brain studies (cognitive elements continuously being deciphered). The prevalence of sophisticated automated devices in aircraft and in other high-technology systems has necessitated researchers to focus on the consequences of automation on human operators. It is believed that automation can perform a function more efficiently, reliably, or accurately than the human operator. However, a potential cost of automation use has also been noted. The increasing trend headed for ever more complex technologies, which tax the human information processing system, makes it crucial to build up a meticulous understanding of the relationship between task demands, the operator's response to that demand, and the subsequent outcome reflected in the on-going level of performance efficiency.

Stress and Human Performance demonstrated the consequences of automation use Participants performed a low-fidelity simulation of flight tasks, including an engine-systems task that was automated but failed from time to time. Participants were required to detect the failures and reset the system. Parasuraman et al. (1993) found that operator monitoring of the automated system was poor compared to a manual control condition when the reliability of the automation was relatively high and unchanging. The complacency effect was eliminated when the reliability of the automation was variable, alternating between high and low, or when the automated task was the only task. Parasuraman et al. (1993) attributed the poor monitoring to an attention strategy related to operator over trust of the automation (Lee & Moray, 1992). Complacency might reflect an "attitude towards automation" (Singh et al., 1993), which allows operator to 'trust' the automation as a strategy for dealing, with high workload. Farrell and Lewandowsky (2000) suggested a computational model of the complacency effect that emphasized operator memory for automation states.

### MENTAL WORKLOAD AND HUMAN PERFORMANCE

One particular problem associated with automated systems is that of mental workload. One of the purposes of automation is to reduce mental workload, thereby improving performance. Extremes of mental workload can create conditions of overload or under load, which may both be detrimental to performance (Wilson & Rajan, 1995). The notion of an optimal level of mental workload is based on attentional resource theory, whereby overload or under load both can cause psychological strain due to a mismatch between demands and capabilities (Gopher & Kimchi, 1989; Byrne & Parasuraman, 1996).Overload occurs, if the demands of a task are beyond the limited attentional capacity of the operator. This can be worsened, if the operator becomes stressed, as stress is itself resource demanding and can compound cognitive interference (Matthews & Desmond, 1995).

Operators and automated systems are essentially members of the same team. Effective performance in any team is dependent upon good coordination and communication. However, automated systems are inherently bad at these tasks. Trayambak Tiwari, Anju L. Singh and Indramani L. Singh .The performance of the operator is hindered by the increase in processing load resulting from the additional task of collecting information about the system state. This is further complicated by the extent of the operator's knowledge about the system. In the event of manual takeover, the operator must be acutely aware of the system state, so as to match their actions to those which the computer is executing. If the user misperceives the state of the system, operator could end up in a conflict with the computer for control. In sum, lack of feedback, an increase in vigilance demands (Hancock & Verwey, 1997), and increased decision options in a given situation (Hilburn, 1997) can overload the operator. Conversely, those susceptible to stress or fatigue may find heir performance to be worse in conditions of underload, as there is a failure to mobilize compensatory effort appropriately to cope with the demands (Matthews & Desmond, 1997; Desmond, Hancock & Monette, 1998). Underload has also been associated with passivity, with optimal MWL reflecting a need to exercise a level of control (Hockey, Briner, Tatersall & Wiethoff, 1989). Young and Stanton (2002) have stated that "mental underload can lead to performance degradation due to shrinkage of attentional resources" (p.186). Indeed, underload is possibly of greater concern, as it is more difficult to detect than overload (Hancock & Verwey, 1997).

### **OBJECTIVE OF THE STUDY**

To object of the study is to analysis the impact of occupational complexity Increasing health problem and mental stress.

- 1. To identify the factors causing occupational stress in Indian IT Employees.
- 2. To understand and evaluate occupational stress.
- 3. To know how occupational stress is cause of health problems in IT employees.

The present study was planned to investigate the influence of occupational stress of IT professionals (managers) who have 5 to 10 years of organization (up 10 yrs been considered as seniors). The respondents for the study were 210 Indian IT employees working in both India and abroad. The respondents are randomly selected form five IT companies.

### **RESEARCH METHODOLOGY & DATA ANALYSIS:**

The data collected from both Secondary and primary data. Primary data has been collected through qualitative question specially designed for IT employees working in Delhi & NCR region. The data was collected form 210 employees (110 in India +100 in Abroad) IT employees working in good five (5) companies like IBM, Infosys, Wipro, Accenture and Sapient the IT employees who are working In India and abroad for onsite and offsite projects. We divide these two groups in A & B from Indian and Abroad employees. The study can be described as a descriptive research study with no intervention on the part of research. The study was conducted on random sample of IT Professional having experience 5-10 years in India and abroad. In order to enhance the reliability and validity of the study and subsequence analysis of the result it was decided by the researchers. We collected data from 210 IT Professionals working in India and abroad .The study was based on responses to a confidential questionnaire that was personally administered to the respondents. The sample consisted to IT Professional from different five (5) companies like IBM, Infosys, Wipro, Accenture and Sapient.

In order to reduce and purity purify the data factor analysis was applied to 10 variables of occupational stress. The rating scale and the questions were explained to the respondents directly by the researcher. The analysis of the resultant data was carried out by SPSS 17.The questionnaire used for the study had to rate on a five point Likert type scale and rate their overall experiences with various aspects of their work in IT industry. The scale used here was: 1-Terrible, 2-Not-satisfactory,3-Satisfactory,4-Good ,5-Excellent. The Ranking and extraction of factors are done Principal Component Analysis (PCA) and Rotated Component Matrix (RCM).

### DEMOGRAPHIC PROFILE OF RESPONDENTS (FREQUENCY TEST)

The 210 participants who responded for this study are working at IT at different locations, and they have been recruited in the organization through different sources. All of them had responded to the column on the Gender Ratio, Job Profile, Academic Qualification, Income Group, Level of post IT Industry. The results collected from the respondents of this study are described and summarized below. A Frequency Distribution shows us a summarized grouping of data divided into mutually exclusive classes and the number of occurrences in a class. It is a way of showing unorganized data. Frequency distributions are used for both qualitative and quantitative data. Statistical hypothesis testing is founded on the assessment of differences and similarities between frequency distributions (Field, A.P, 2005). This assessment involves measures of central tendency or averages, such as the mean and median, and measures of variability or statistical dispersion, such as the standard

deviation or variance. The following are frequency distribution results of demographic profiles, of the respondents:

a) Gender Ratio in IT Industry: The profile of respondents in terms of gender ratio is given in Table no-1.

|              | Table no-1. 110me of genuer ratio |                   |                     |  |
|--------------|-----------------------------------|-------------------|---------------------|--|
| Gender Ratio |                                   | No of respondents | Percentage of Total |  |
| 1            | Female                            | 66                | 33%                 |  |
| 2            | Male                              | 144               | 67%                 |  |
|              | Total                             | 210               | 100%                |  |

# Table no-1: Profile of gender ratio

Interpretation: In Table no-1 the gender ratio of female is 33% and of male is 67%. The total numbers of respondents are 210, of which 144 are male and 66 are female. This reflects that, in gender ratio the male are more than female in IT Industry.

b) Job Profile: The profile of respondents in terms of Job Profile in given Table no-2.

| _           | Tuble no 2: sob i rome of respondents |                 |                   |                     |  |
|-------------|---------------------------------------|-----------------|-------------------|---------------------|--|
| Job Profile |                                       | ob Profile      | No of respondents | Percentage of Total |  |
|             | 1                                     | Project Manager | 64                | 32%                 |  |
|             | 2                                     | Team Leader     | 68                | 30%                 |  |
|             | 3                                     | Team Member     | 78                | 38%                 |  |
|             |                                       | Total           | 210               | 100%                |  |

# Table no-2: Job Profile of respondents

Interpretation: In table no-2 the total number of respondent are 210 who are employees of IT Industry and are categorized into three profiles: project manager, team leader and team member. In these three categories, the numbers of team members are 78, team leaders are 68 in number and project managers are 64. After analyzing the data we found out that team member are more than team leaders and project managers.

c) Academic Qualification of respondents: The profile of respondents in terms of academic qualification is given in Table no-3.

| The second control of the point |           |                   |                     |  |
|--|-----------|-------------------|---------------------|--|
| Academic Qualification   |           | No of respondents | Percentage of Total |  |
| 1  | UG        | 62                | 32%                 |  |
| 2  | BE        | 82                | 40%                 |  |
| 3  | MTech/MCA | 66                | 38%                 |  |
|  | Total     | 210               | 100%                |  |

 Table no-3: Academic Qualification of respondents

Interpretation: In table no-3 the academic qualification of employees are under graduate, graduate and post graduate. About 32% are under graduate, 40% are graduate and 38% are Masters. After analyzing the data, it's observed that graduates are more than under graduates and those with master's degree.

### 2) DESCRIPTIVE OF RESPONDENTS

| Table-4   Descriptive Statistics |                 |         |         |        |               |
|----------------------------------|-----------------|---------|---------|--------|---------------|
|                                  | N of respondent | Minimum | Maximum | Mean   | Std Deviation |
| VAR00001                         | 210             | 1.00    | 5.00    | 2.4775 | 1.15089       |
| VAR00002                         | 210             | 1.00    | 5.00    | 2.4324 | 1.14114       |
| VAR00003                         | 210             | 1.00    | 5.00    | 2.5314 | 1.16634       |
| VAR00004                         | 210             | 1.00    | 5.00    | 2.6216 | 1.25085       |
| VAR00005                         | 210             | 1.00    | 5.00    | 2.5045 | 1.18991       |
| VAR00006                         | 210             | 1.00    | 5.00    | 2.6216 | 1.23623       |
| VAR00007                         | 210             | 1.00    | 5.00    | 2.4775 | 1.19732       |
| VAR00008                         | 210             | 1.00    | 5.00    | 2.7838 | 1.26782       |
| VAR00009                         | 210             | 1.00    | 5.00    | 2.8376 | 1.20258       |
| VAR00010                         | 210             | 1.00    | 5.00    | 2.5135 | 1.18984       |
| VAR00011                         | 210             | 1.00    | 5.00    | 2.6216 | 1.23634       |
| VAR00012                         | 210             | 1.00    | 5.00    | 2.6216 | 1.25807       |
| VAR00013                         | 210             | 1.00    | 5.00    | 2.4775 | 1.19732       |
| Valid N(Listwise)                | 210             |         |         |        |               |

The first stage of data was checked for reliability and validity. On ensuring its reliability and validity the data was subsequent qualitative and quantitative analysis was conducted and inference were drawn.

### 3) THE OVERALL CRONBACH'S ALPHA FOR THE OVERALL STUDY WAS .856(MALHOTRA, 2007), THE RELIABILITY STATISTICS WERE ACCEPTED

| <b>Reliability Test of</b> | Data(table-5) |
|----------------------------|---------------|
| Cronbach's Alpha           | No of items   |
| .856                       | 13            |

### 4) (a) KMO and Bartlett's Test

| Table -6 KMO and Bartlett's Test            |                    |         |  |
|---|--------------------|---------|--|
| Kaiser-Meyer-Olkin Measure of Sampling (KMO |                    | .873    |  |
| Test)                                       |                    |         |  |
| Bartlett's Test of Sphericity               | Approx. Chi-Square | 2583.51 |  |
|   | Df                 | 45      |  |
|   | Sig                | .000    |  |

At the table no 6 we describe the next step a principle component analysis was conducted with all the ten independent variables. A thought quantitative analysis of the acquired data brought forth that the KMO measure of sampling adequacy was .873, Chi-squere was found to be 2583.510. Thus the KMO and Bartlett's test showed that factor analysis was justified in this case. The principal component analysis extract three factors with eigenvalues which greater than 1.

(b) KMO's Method Test: Factor analysis (Table no 7: Factor wise mean score value, t factor loading value and their percentage of variables: KMO Method)

| Factor Analysis of Recruitment Analysis | Mean score      | Std.        | Factor  | % of     |
|---|-----------------|-------------|---------|----------|
|   | Value           | Deviation   | loading | Variance |
| F1 : Esteem Factors                     |                 |             |         | 29.32%   |
| Adequate pay                            | 3.77            | 1.072       | 0.849   |          |
| Appraisal, recognition and reward       | 3.79            | 1.183       | 0.800   |          |
| Merit based Promotions                  | 3.65            | 1.158       | 0.841   |          |
| Future Prospect and Growth              | 3.80            | 1.206       | 0.755   |          |
| F 2 : Security Factors                  |                 |             |         | 23.21%   |
| Security of tenure                      | 4.42            | .878        | .771    |          |
| Safety at work                          | 4.45            | .806        | .705    |          |
| F 3 : Comfort Factors                   |                 |             |         | 28.13%   |
| Job satisfaction                        | 2.69            | 1.070       | 0.645   |          |
| Working hours                           | 3.09            | 1.039       | 0.773   |          |
| Boss/Supervisor                         | 3.53            | 1.000       | 0.999   |          |
| Organizational Structure                | 3.06            | 1.214       | 0.775   |          |
| Role Ambiguity                          | 3.43            | 1.241       | 0.541   |          |
| Role conflict                           | 2.96            | 1.302       | 0.695   |          |
| Workload and job pressure               | 2.76            | 1.207       | 0.657   |          |
| Cumulative % of Variance                |                 |             |         | 80.66    |
| Kaiser-Meyer-Olkin (KMO) Mea            | sure of Samplin | ng Adequacy |         | 0.686    |
|   | • 1.            | M 1 0017    |         | •        |

(Source: Estimated from primary data, March 2017)

In table no-7 it defines the Kaiser-Meyer-Olkin(KMO) measure of sampling adequacy: The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is an index used to examine the appropriateness of the factor analysis. High Values (between 0.5 and 1.0) indicate factor analysis is appropriate. Value below 0.5 implies that factor analysis may not be appropriate. Residuals: Residuals are the differences between observed correlation, as given in the input correlation matrix, and the reproduced correlations, as estimated from the factor matrix. Factor loadings are simple correlations between the variables and the factors and standard deviation give the variances so after analysis the KMO measure of sampling adequacy is 0.686 it is adequate because it is more than 0.5.

| Table - 8 Total Variance explained |                                      |             |           |              |
|------------------------------------|--------------------------------------|-------------|-----------|--------------|
| Component                          | ent Rotation sums of Squared Loading |             |           |              |
|                                    | Total                                | % of Varia  | ance      | Cumulative % |
| 1                                  | 3.903                                | 39.03       |           | 39.030       |
| 2                                  | 3.836                                | 38.361      |           | 77.392       |
| 3                                  | 2.051                                | 20.514      | ŀ         | 97.905       |
| Extraction                         | on Method: Prin                      | cipal Compo | onent An  | alysis       |
| ſ                                  | able-9 Rotated                       | Component ] | Matrix    |              |
| Vari                               | ables                                |             | Compo     | nent         |
|                                    |                                      | <b>F1</b>   | <b>F2</b> | F3           |
| Job satisfaction                   |                                      | .307        | .918      | .178         |
| Adequate pay                       |                                      | .928        | .323      | .177         |
| Working hours                      |                                      | .319        | .921      | .150         |
| Appraisal, recognition and reward  |                                      | .931        | .318      | .160         |
| Boss/Supervisor                    | Boss/Supervisor                      |             | .916      | .166         |
| Security of tenure                 | ;                                    | .225        | .183      | .945         |
| Safety at work                     |                                      | .171        | .191      | .955         |
| Organizational Structure           |                                      | .306        | .909      | .180         |
| Merit based Promotions             |                                      | .922        | .308      | .207         |
| Future Prospect & Growth           |                                      | .924        | .326      | .174         |
| Role Ambiguity                     |                                      | .332        | .341      | .902         |
| Role conflict                      | .310                                 | .338        | .918      |              |
| Workload and job                   | .367                                 | .337        | .926      |              |

### (c) The factor extraction in this process was:

### (d) Extraction Method: Principal Component Analysis.

| Table-10 Extracted Components from principal component analysis |                      |                                   |  |
|---|----------------------|-----------------------------------|--|
| <b>Comfort Factors(F3)</b>                                      | Security Factors(F2) | Esteem Factors(F1)                |  |
| Job satisfaction  | Security of tenure   | adequate pay                      |  |
| working hours   | Safety at work       | appraisal, recognition and reward |  |
| Boss/Supervisor   |                      | Merit based Promotions            |  |
| Organizational Structure  |                      | Future Prospect and Growth        |  |
| Role Ambiguity  |                      |                                   |  |
| Role conflict   |                      |                                   |  |
| Workload and job pressure                                       |                      |                                   |  |

(Source: Estimated from primary data, March 2017)

According Table No-10 the principle component analysis(PCA) three components are extracted by the variables' like 1.Estreem factors (F1), 2.Comfort Factors (F3) and 3. Security factors (F2). After analyzing the data and variables IT professional are attracted by 1. Esteem factors (adequate pay appraisal, recognition and reward, Merit based Promotions, Future Prospect and Growth), 2.comfort factors (Job satisfaction, working hours Boss/Supervisor, Organizational Structure, Role Ambiguity Role conflict, Workload and job pressure), and 3. Security Factors (Security of tenure, Safety at work) if these three factors are up to mark with all the employees working in IT companies then it will create less health Problems.

These intrinsic factors that are related to work motivate the employees to join IT Companies. These factors also motivate people to carry on in the profession of IT Professional for long periods to time.

After a principal component analysis of the variables that were taken to be the most important representative of the work itself, three components were extracted:

- 1. The first component was termed Esteem factors. It comprised of 4 items, all of were related to the individual esteem of IT professionals These factors enhance IT professionals motivation by creating inherent attributes in the work which boost self estreem. These factors are adequate pay, appraisal, recognition and reward, merit based promotion and Future Prospect and Growth.
- 2. The second component represents comfort factors which consist which make the work of IT employees mentally and physically comfortable. These consist of Job satisfaction, working hours Boss/Supervisor,

1

Organizational Structure. These factors are essentials to increase workplace motivation in terms of directly improving efficiency and thus improving IT skills efficacy.

3. The third component represents security factors. This components includes variables like enhance workplace security both in term of tenure of service as well as physical security and safety of IT employees. The variable satisfies the needs of employees.

The finding shows IT employees should provide safe and secure work environment, with adequate pay package with optimal working hours. These should be mechanism for identifying talent among the employees and hone those talents, care should be taken to recognized good performance and reward them without political interference. A competent, just and empathetic IT leader is required to lead the Employees need. An adequate organizational structure should be designed to ensure optimal motivation. The study also carried out to understand and identify the major occupational stressors affecting IT professional who are working in IT Companies in India and aboard:

| Table-11 Health Floblens Faced by 11 Floressional |                                   |                                   |  |
|---|-----------------------------------|-----------------------------------|--|
| Health Problems                                   | INDIA(A)                          | Out of INDIA(Abroad)(B)           |  |
|   | % & Average frequency of          | % & Average frequency of          |  |
|   | Problems                          | Problems                          |  |
| Vitamin D deficiency                              | 68%(Once a year)                  | 54% (Once a year)                 |  |
| Alcoholism  | 69%(Every week)                   | 72%(Every week)                   |  |
| Diabetes  | 15%                               | 12%                               |  |
| Cholesterol                                       | 26%                               | 31%                               |  |
| Blood Pressure (hypertension)                     | 25% (once or twice in month)      | 10% (once or twice a month)       |  |
| Stomach Problem                                   | 40% (once or twice in month)      | 11% (once or twice a month)       |  |
| Body Ache   | 56% (once or twice in a week)     | 65% (once or twice a month)       |  |
| Neck pain   | 63% (once or twice in a week)     | 54% (once or twice a month)       |  |
| Back Pain   | 74% (once or twice in a week)     | 66% (once or twice a month)       |  |
| Headache  | 73% (once or twice in a week)     | 70% (once or twice a month)       |  |
| Eye Strain  | 88% (once or twice in a week)     | 78% (once or twice a month)       |  |
| Mental Stress                                     | 54% (once or twice in three       | 59% (once or twice in three       |  |
|   | months)                           | months)                           |  |
| Anxiety   | 84% (once or twice in month)      | 88% (once or twice a month)       |  |
| Depression  | 44% (its grow by period time)     | 49% (its grow by period of time)  |  |
| Central Fatigue/ poor physical fitness            | 69% (once or twice in month)      | 74% (once or twice in months)     |  |
| Insomnia  | 46% (once or twice in three       | 59% (once or twice in three       |  |
|   | months)                           | months)                           |  |
| Heart Disease                                     | 33% (once or twice in six months) | 30% (once or twice in six months) |  |
| Bacterial infections                              | 27% (once or twice in two         | 13% (once or twice in two months) |  |
|   | months)                           |                                   |  |
| obesity   | 65%                               | 72%                               |  |
|   |                                   | 1 0017)                           |  |

| Figure No-11 Conceptual Framework of Health Problems Faced in IT Professionals Con | mpanies |
|--|---------|
| Table, 11 Health Problems Faced by IT Professional                                 |         |

(Source: Estimated from primary data, March 2017)

In table no-11 IT Employees are suffering from many mental and physical diseases. IT professionals face continuous stress due to job deadlines supplemented by environmental & domestic stressors. Stress results from an imbalance between resources and demands including self imposed ones. During stressful situations, concentration, awareness on posture, dexterity during work and many neuro-physiological changes occur in the body leading to drop in work performance. Many young subjects lack positive lifestyle factors leading to early Vitamin D deficiency, Alcoholism, obesity, poor physical fitness and Heart Diseases, Depression, Mental Stress habits increase the risk of stress in them. Stress induced shoulder and neck pain, Body Ache, headache, etc.

Computer work related stress is influenced by complex factors such as the purpose of computer use, the environment, the equipment and the continuous duration of uses. But as you compare both employees who are working in India and out of India Heart diseases are more in India(33%) then Abroad(30%) ,the diabetes, blood pressure, Cholesterol are less in these employees, but headache, back pain, neck pain, body ache are very common in both the employees who are working in IT companies. But as the stress are increasing in employees between monitoring networks, configuring applications, and managing technology projects, IT professionals spend massive amounts of time in front of the computer screen. And because IT emergencies can occur at any time, workers often have to monitor IT systems outside normal business hours. Over time, target based work,

result orientation; extended periods at the computer can take a toll on your health. The central fatigue and poor physical fitness is increasing in India (69%) and 74% in aboard.

### CONCLUSION OF THE STUDY

In conclusion the Extension of automation of technology use in working environments will continue well into the modern era. In most cases, the criteria for applying automation to new systems have been technological feasibility and cost. Moreover, it seems to have an impact on individual's resources as moderators of stress. The empirical research pertaining to situation awareness, complacency, and skill degradation suggests that high levels of automation should be implemented only for low-risk situations. More clearly connections between technology and stress can be found when looking studies of job demands. Change is always a stressful situation and as technology changes not only the tools to work with but often the way work is organized, it is likely to increase job demands. As the role of technology as a stressor is not only directly emerge from the actual use of automation technology, but also it appears indirectly from changes in demands of the task and working environment. Employees having health problems like eye strain, headache, body ache, general fatigue, mental problem, depression etc. Long working hour, prolong sitting, lake of adequate exercise, less job security, fast layoff create many problems in IT employees. Studies also found that excessively high levels of mental workload can lead to errors and system failure, whereas low load can lead to complacency and eventual errors in the behaviors of IT employees. The differences in the prevalence rates of computer related problems in various studies depended upon factors like workstation environment, degree of immobilization and levels of constrained postures, awareness levels and practices of workers regarding computer ergonomics. It is observed that occurrence of visual problem is related more to number of hours spent gazing at the screen than number of years. On the other hand, musculoskeletal symptoms have a cumulative effect on the subjects with initial symptoms being mild and temporary and later with increasing years assuming more intense and permanent nature. Stress felt is seen more in initial years in the present study. It was further influenced by type of work and job content. It is evident that computer related morbidity had become an important occupational health problem and is a matter of great concern.

### RECOMMODATIONS

As number of young Indian aspirants perceiving IT job should develop complete awareness of problems related to health problems, competitive nature of IT industry may leave no time to regulate exercises proper rest break, adequate sleep, and relaxation are the major strategies to cope with the health problems. IT employees should incorporate ergonomic awareness, postural awareness and the most important regular physical exercise and know stress coping skills in the organization. Organization staffed with computer users should encourage frequent breaks during work and compulsory vacations in order to improve their work performance. Effective time management will help the professionals to develop these healthy occupational habits. Special attention should be paid towards neck pain, back pain and related problems and emerging early hypertension, mental disorders through regular employees counseling session to reduce stress given by organization.

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### PERFORMANCE AND ANALYSIS OF SIGNED HAN-CARLSON ADDER USING VLSI TECHNIQUE

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# ABSTRACT

Adders are commonly used in building an IC chip. In manufacturing of IC chip, the implementation of adder is used to reduce the area by replacing the number of gates. If the number of gates get reduced then the processing speed will be increased by reducing the delay. In this project Parallel Prefix adder are considered to speed up the binary addition process. Parallel Prefix adders are generally utilized as a part of ALU's, because of its advantages like low area and high speed. The parallel prefix adder is used to speed up the operation and reduce the area. Each prefix adder has the advantages and disadvantages. To overcome these advantages by changing the architecture of these adders like replacing xor by mux. Using the han-carlson adder and changing the architecture the area, delay can be reduced.

Keywords : Adder, IC chip, Parallel-Prefix adder, xor gate, mux, han-carlson adder.

# INTRODUCTION

The proposed Han-Carlson adder uses Brent-Kung adder and Kogge-Stone adder as two different stages. This is the modified parallel prefix adder type. It offers a solution for the binary addition and hence suited for FPGA implementation. The modified Han-Carlson adder helps to reduces the area and delay of the circuit. In VLSI, designers will be mainly focusing on three major factors namely area, power and delay. These factors play a very important role in digital circuits. Designers also focus on voltage, gates, and wires. These three factors depend on user application. The main goal of digital processor is with high speed, consumes less power and area too. These three factors cannot be reduced at a time, it depends on applications which users want to achieve. The addition of two binary numbers can be done by digital adder circuitry. The arithmetic logic units use adders for processing in computers and processors. For case specific applications like increment and decrement operators, addresses calculator, table indices, and other similar operations can also be processed by adders.

In this paper, the parallel prefix adder design is done. And it is shown that how prefix adders are good than conventional adders. In digital circuits, there are many parallel prefix adders, namely "Kogge-Stone adder, Ladner-Fischer adder, Knowles adder" etc. Among these Brent-Kung adder is used in this project. Further will be knowing the details of Brent-Kung adder.

### LITERATURE SURVEY

Adders are essential components in number juggling operations. Twofold adders are used as a piece of computerized circuit for expansion, subtraction operations and for drifting point duplication and division. Along these lines adders are Fundamental parts and enhancing their execution is one of the significant difficulties in advanced plans. PC math calculation has set up bring down limits on range and deferral of n-bit adders, the previous fluctuates directly with snake measure. Fast adders rely upon dug in parallel prefix structures like Brent-Kung, Han-Carlson, Kogge-Stone and soon. These standard structures work with settled inertness. Better normal exhibitions are accomplished by utilizing variable inactivity adders that have been as of late proposed in writing accelerating of inexact circuits.

S. Gedam [1] The Brent Kung adder processes the prefixes of 2-bit gatherings and prefixes are utilized to discover the prefixes for the 4-bit gatherings, which are utilized to register the prefixes for 8-bit gatherings et cetera. These prefixes are then processed for completion of the specific piece organize. These conveys are utilized alongside the group propagate of the following stage to register the sum bit of that stage. Brent Kung Tree will utilize 2log2N - 1 phases. Since we are outlining a 32-bit viper the quantity of stages will be 9. The fan-out for each piece arrange is constrained to 2. The graph underneath demonstrates the fan-out being limited and the stacking on the further stages being decreased. Be that as it may, while really executed the supports are by and large precluded.

Anitha R and V Bagyaveereswaran [2] mention that Han-Carlson adder contains a decent exchange off between fan out, number of rationale levels and dark cells. Along these lines, Han-Carlson adder accomplishes equivalent to speed execution adoration to Kogge-Stone viper, at bring down usage of power and domain. In this way, it is captivating to execute a theoretical Han-Carlson snake. The Han-Carlson theoretical prefixhandling stage by expelling the last columns of the Kogge-Stone piece of the snake is produced. The quantity of

levels of the theoretical Han-Carlson arrange reduces from  $1 + \log(n)$  to  $1 + \log(k)$  (accepting that is an energy of two). In Han Carlson tree, group of trees are organized between Brent-Kung and Kogge-Stone trees, performing the odd numbered bits by Kogge-Stone and one more stage is utilized after that to swell between even positions.

Swapna K. Gedam and Pravin P. Zode [3] illustrate that in the Kogge Stone tree, the fan-out of 2 at each phase and in addition the log2N stages are accomplished. However, there is an increase in the cost due to directed long wires between the stages. More and more PG cells are seen in the tree. The influence on format territory is negligible. Be that as it may, the quantity of doors increments all things considered. All the more significantly, the power utilization is high. Indeed, even at higher expenses the tree is generally utilized as a part of superior 32-bit and 64-bit adders.

### PARALLEL PREFIX ADDER

These adders use simple cells with regular connections between them making them suitable for VLSI implementation. The logic levels with number of fanout and wiring tracks decides each prefix structures. For delay minimization zero or many prefixes are added to all prefix stages and buffers are individually sized to minimize the delay, for fanout and loading on gates minimization, buffers are used and high fanout causes poor performance. In literature survey, we have discussed different types of adders. To start with parallel prefix adder lets discusses some prefix adders in digital circuits.

The variety of parallel prefix adders are

- a. Kogge-Stone adder
- b. Brent-Kung adder
- c. Ladner-Fischer adder
- d. Han-Carlson adder

Kogge-Stone structure is well known for its fast applications. This adder is a type of prefix trees that use the fewest logic levels. It is high speed because of its minimum logic depth and lower fan-out. The disadvantage of Kogge-stone adder is that it occupies large area and has high wiring congestion. The computational nodes have structure [(n) (log2n)-n+1]. It addresses the issues of fan-out by presenting a recursive multiplying calculation. This adder with fan-out of 2 in each cell uses minimum number of logic levels is used when speed is the primary concern. Many propagate-generate cells are used with routed wires between stages.



Fig 1:16-Bits Kogge-Stone adder

**Brent-kung adder (BKA)** removes its operational pace due to vast number of levels. It controls productive due to its minimal zone delay with more number of information bits. [(2\*log2n)-2] is the delay of the brent-kung adder where n is the input bias. It has a region of [(2\*n)-2-log2n]. The brent-kung adder has less area in characteristics and high logical depths. It implies high fan-out. It could form a simple tree structure, if the carry is computed at every power of two positions.



R. Ladner and M. Fischer invented **Ladner-Fischer adder** (LFA) in 1980. It has a least logic depth and extensive fan-out. It has got the carry operator nodes. This is a modified sklansky's adder structure. The delay of the structure is given by  $log_{2n+1}$ . The brent-kung adder being a super decision when two parallel prefix adders are compared. In brent-kung adder as the bit size widens, it doesn't radically as KSA. As the quantity of the bits upheld by PPA's the adder will be concern with the area. As per delay or time propagation Kogge-stone is the super decision.



Fig 3:16-Bit Ladner-Fischer adder

**Han-Carlson adder** was invented in the year 1987. It has the stages of Brent-Kung adder and Kogge-Stone adder. It consists of five stages, where the principle stage takes after the brent-kung adder and center three stages after the Kogge-stone adder. It has short wires than Kogge-stone adder. In the even bit position the dot operator was set and the in odd positions the dot operator was put. The structure has [(log2n) +1] postponement and the calculation of the hardware complexity is given by [(n/2) (log2n)]. By reducing the brent-kung stages the hardware complexity can be reduced. But it uses additional path for the carry. This structure gives the increase in tradeoff with logical depth for reduction in fan-out.



Fig 4: 16-Bit Han-Carlson adder

As discussed above the some of the parallel prefix adder. The Han-Carlson adder has got less power consumption, low fan-out and less delay compare to all other prefix adders. The Han-Carlson as increased speed.

### **DESIGN METHODOLOGY**

The Han-Carlson adder for superior adders is normal configuration. It is the combination of Kogge-Stone and Brent-Kung adder. The Han-Carlson adder results turn to be the fastest. Since it uses two adders wherein the Kogge-stone adder is good in speed while brent-kung adder occupies less area having an advantage in Han-Carlson adder. While the Kogge-stone adder has a low fan-out at each stage, which expands the execution. The Han-Carlson adder generates the propagation and generation signals (P&G). The parallel prefix adder is suitable for VLSI implementation as they rely on the use of simple cells maintaining a regular connection between them. Each prefix structure can be defined in terms of logic levels, wiring tracks and fanout. For delay zero reduction, more inverters are added to every prefix cell output and buffers are used for fanout minimization. The modified Han-Carlson adder consists of few prefix operations by the stage adjustment of brent-kung and Kogge-stone adder to reduce area required for adder. The han-carlson adder is generally utilized as a part of superior 32, 64, 128-bits adder as it diminishes the critical path contrast to the ripple carry adder. This adder was designed keeping into account of low fan-out which in turn reduces power and delay.



Fig 5: Graphical representation of 32bit Han-Carlson adder.

The fundamental adders in parallel prefix are Brent-Kung, Kogge-Stone and Sklansky adders. In Brent-Kung adder, minimal number of computation nodes are seen. That yields to area reduction with maximum depth in the structure increasing the latency. Sklansky reduces the delay but expense in the increased in fan-out. In Kogge-Stone, high speed and low fan-out is achieved with complex circuitry having more wiring tracks. An increased fan-out is produced in Kogge-Stone and Sklansky adders. A new introduced network named Ladner Fischer between the Brent-Kung and Sklansky produces tradeoff between logic levels with increase in fan-out. The two adders in the design the Kogge-Stone and Brent-Kung are constructed with the best feature of higher speed and low area respectively. The structure can be modified by adjusting the number of stages amongst adders to reduce area and delay. The Han-Carlson adder design constitutes of three stages namely

- a. Pre-processing stage
- b. Carry generation stage
- c. Post-processing stage

Let's look details of three stages and analysis the design. Fig 6 shows the design stages of parallel prefix adders.



Fig 6: Design process of Parallel Prefix Adder

### a. Pre-processing Stage

This is the initial stage which includes calculation of propagation and generation signals. The condition is given to these signals.

 $Pi = Ai \wedge Bi$  -----(1)

Gi = Ai & Bi -----(2)

### b. Carry generation stage

The second stage includes the calculation of carries. The generate and propagate signals of the block are only calculated instead of all carry values.

$$P(i: k) = P(i,j) \& P(j-1:k)$$
 -----(3)

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G(i: k) = G(i:j) | G(j-1:k).P(i:j) -----(4)

### c. Post-processing stage

The last stage of the adder is the post-processing stage. The processing of sum and carry bits are seen in this stage. The carry values are obtained from this subset and then used to obtain the approximate sum bits.  $Si = Pi \wedge Ci-1$  ------(5)



Fig 7: Flow diagram of Han-Carlson adder

The flow diagram has 3 steps namely,

1) Designing the modified 32-bit KSA with Usage of 2:1 MUX in the place of xor gates.

- 2) Calculation of P and G, intermediate carry signals and the sum, carry signals.
- 3) The design is verified using tool XILINX ver 14.5

### **RESULT ANALYSIS**



Fig 8: Shows the RTL schematic of 32-bit Han-Carlson adder



Fig 9: Shows the complete RTL schematic of Han-Carlson adder

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Fig 10: Han-Carlson adder's simulated result for 32-bit

| Type of adders | delay    | No of LUTs |
|----------------|----------|------------|
| Kogge-Stone    | 20.262ns | 204        |
| Ladner-Fischer | 23.218ns | 87         |
| Brent-Kung     | 22.961ns | 85         |
| Han-Carlson    | 6.257ns  | 170        |

Table 1: Comparison of different types of adders

### CONCLUSIONS

We conclude by seeing the device utilization and timing summary for different types of adders As there are many adders in the digital circuits. From conventional adders to the parallel prefix adder, designers face many problems related to the area, power and delay while designing the circuits. This report gives the complete information and tells the advantages of parallel prefix adder compared to the conventional adders. This parallel prefix adder compared to the ripple carry adder and carry look ahead adder.

In this project is analyzed using spartan-3 and XILINX 14.5 tool. this project is mainly concentrated on the delay reduction. This can be achieved by making changes in the architecture of the adder and keeping the flow of the adder same. The architecture was changed by replacing the xor gates by 2:1 mux in the Kogge-stone adder. In this project, the delay of the adder is 6.257ns.

Compare to other adders in the parallel prefix adder, I have chosen Han-Carlson adder because of its high speed in Kogge-stone adder and less area in Brent-kung adder. Compare to other adders Kogge-stone consumes more area while the Brent-kung adder has less speed, but taking the best advantage of the two adders and designing the Han-Carlson adder. While designing if the designers concentrate on delay and area, then this is the best option to go with Han-Carlson adder.

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### EFFECTIVENESS OF COMPUTER BASED MASTERY LEARNING STRATEGY ON LEARNING OUTCOMES OF NINTH GRADERS BIOLOGY IN RELATION TO THEIR ACADEMIC STRESS AND PARENTAL INVOLVEMENT

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### ABSTRACT

Mastering the study material by school children has been a topic of interest for many years. Till recently various strategies have been tried in the field of education. Computer Based Masrery Learning is considered today one of the most effective means of attaining mastery learning. To explore the effectiveness of Computer based Mastery Learning Strategy on achievement in Biology of IX graders in relation to Academic Stress and parental involvement, a school sample of two hundred and forty 9<sup>th</sup> grade students of high and low Parental Involvement and Academic Stress was drawn from the representative Secondary Schools of Chandigarh. The major findings of the study were:

- The mean gain in Biology through Computer Based Mastery Learning was higher than the mean gains through Conventional Group learning.
- The gain means in Biology of students belonging to high and low Parental Involvement groups were not statistically different.
- The gain means in Biology for the high academic stress group and low academic stress group were equal.
- The two variables viz. ; Instructional Strategies and Parental involvement interact with each other to yield different gain means for various combination groups.
  - Through Computer Based Mastery Learning, Students with High or low Parental Involvement obtained equal gain means in Biology
  - > Through Conventional Group Learning, students with High Parental Involvement achieved higher gains in biology than those with Low Parental Involvement.
  - Students belonging to High Parental Involvement achieved higher gain means through Computer Based Mastery Learning than those learning through Conventional Group Learning.
  - The. Students belonging to Low Parental Involvement achieved higher gain means through Computer Based Mastery Learning than those learning through Conventional Group Learning
- The Variable i.e., Instructional Strategies, was not found to interact with the other variable, Academic Stress to yield difference in mean gain scores in Biology.
- The effect of Parental Involvement was found to be independent of effect of Academic Stress as revealed by gain mean scores in Biology.
- The three variables Viz., Instructional Strategies, Parental Involvement and Academic Stress act independent of each other in respect of gain mean scores in Biology.

Key words:Learning Outcomes, Computer Based Mastery Learning (CBML), Conventional Group Learning (CGL), Academic Stress (AS), Parental Involvement(PI).

### PARENTAL INVOLVEMENT

Parental involvement is seen as an important strategy for the advancement of the quality of education. The ultimate objective of this is to expand the social and cognitive capacities of pupils. Grolnick and Slowiaczek (1994) denotes the extend to which as well as the way in which parents take a keen interest and actively participate in their child's education. Nurturing of children is directly related with home and parents. Parental Involvement implies how the parents involve themselves in developing the overall personality of the child. All parents have certain expectations, likes & dislikes and preferences regarding how children should be handled, brought up and educated.

### TYPES OF PARENTAL INVOLVEMENT

There can be two kinds of parent involvement ,Hall & Sante (2000).

**1. Presence of Parents within the home** ideally will include behaviours such as setting high expectations, monitoring homework, limiting television viewing or outside work, knowing a child's friends, discussing school events with children, valuing and talking about education, showing respect for teachers and all school staff.

**2.** The physical presence of parent's in the school, range from occasional attendance at a parent –teacher conference, regular participation in the school events, ongoing participation in school activities. Teachers and parents are all seen partners with their own but also shared tasks and responsibilities. Based on the factor analytic study of involvement indices by Grolnick and Slowiaczek (1994), the investigator puts forth a multidimensional representation of Parental Involvement that focus on not one specific activity, but on various dimensions. According to this conceptualization, parents may show their involvement in the Childs schooling in three different ways viz:

(i) **Behavior Involvement:** Parents may manifest their involvement through their *behaviors* i.e. their overt action may serve as indices of their involvement. They would include engaging in activities such as going to the child's school, meeting his teachers, attending parent-teacher meeting and the like. Parents are usually interested in knowing if their child is having any trouble in coping up with studies or not. Many research studies provide evidence for this form of involvement. One of the surveys (Chavkin and Williams, 1987) found that the most frequent actions were:

- Open house or special programmes.
- Parent-teacher meeting.
- Parents serving as chaperones.
- Parents assisting with social activities.
- Parents observing classrooms activities.

(ii) **Personal Involvement:** While parent's overt behavior is one way in which parents may exhibit their involvement in the child's schooling, the child may also have a more profound affective experience that his parents are providing resources to him and are concerned about him. The role of affective experiences and emotional climate at home has been worked upon by several researches. Studies have indicated the beneficial influence of emotionally supportive home situations on children's outcomes (e.g. Sauer and Gattringer, 1985).

This includes involvement in the academic and social life of the child. This would encompass activities such as: knowing about the child's day-to-day activities:

- His whereabouts, friends, what he usually does at school.
- How well he gets along with others.
- How well is he doing in studies.
- How regular and apt he is in his school work
- How well he performs in examinations, and the like.

(iii) Cognitive Stimulation and Cognitive Behaviors: Exposing the child to cognitively stimulating activities and materials represents a historically new role for parents in fostering children's cognitive development (Lareau,1987). Parental stimulation has been defined by Belsky, Goode, and Most (1980) as efforts to focus the infant's attention on objects and events within the environment. These attempts can be physical or verbal in nature. Parents should therefore ensure that their children are brought up in a stimulating, thought provoking surrounding. School must organize such activities from time to time that could encourage parents to pursue at home, behaviors that encourage learning in their children and indicate a value for schooling. Such school activities must be conducted that support the teacher-parent relationship.

# ACADEMIC STRESS

Academic Stress is mental distress with respect to some anticipated frustration associated with academic failure or even an awareness of the possibility of such failure, Gupta and Khan (1987). In the context of school, academic stress means a pervasive sense of urgency to learn all those things which are related or prescribed by the school, Shah (1988).

Lazarus (1966) pointed out that stress is a threat, real or implied to the psychological or physiological integrity of an individual. Stress involves a stressor and stress response and stressors are generally psychological. Lazarus (1982) emphasized the role of perception and cognitive appraisal in the stress response process. He

argued that unless we perceive a situation threatening, we will not experience stress. Stress has always been a concern of physiologists and psychologists who view the concept in different ways.

# LEARNING OUTCOMES

Learning' refers to the acquisition of behaviour being developed by the new Stimulus Response Connections. It is relatively permanent behaviour change tendency and is the result of reinforced practice (Kimble and Garmezy, 1963, Melvin, 1970).

According to Encyclopedic Dictionary and Directory of Education (1971) learning outcome is *a* result of experience in or outside the school stated in terms of pupil behavior. The outcomes of learning resulting from learning activities may be skills and habits, social competence, abstract and creative thinking.

Achievement is one of the most important goals of education. The outcomes of education are usually characterized as the achievement of those who have been educated. These may be expressed in terms of whether or not the aims of education were fulfilled in relation to those individuals and to that degree. In order to find out what has been achievement, one requires some form of assessment.

### COMPUTER BASED MASTERY LEARNING

Computer based learning is a method, which uses computers in a learning medium and strengthens students motivation and educational processes. It gives opportunities to both students and teachers to learn and teach more quickly and to combine active learning with computer technology. Collette and Collette (1989). The studies show that computer based learning by way of simulation programs makes the concepts and processes more concrete and causes the students to understand more easily .Mastery learning as one of the important approaches to enhance student learning, was presented by Bloom (1966) and his associates based on Carroll's (1963) model of school learning. It has been widely researched on and major projects have been carried out. MLS describe that the learning rate, LR, is a function of the time a learner has to learn to the time he actually needs to learn a given situation of instruction.Mastery Learning Strategy according to Bloom (1968a) begins with the assumption that most students can attain a high level of learning capacity; if

- Instruction is approached systematically
- Students are helped when and where they have learning difficulty
- They are given sufficient time to achieve mastery, and
- There is some clear criterion of what constitutes mastery

The researches have authenticated that computer based instructions or the instructions which are delivered by computer plays a magic role in classes. Mastery of the subject matter is carried out with the help of a scientific computer based instructional plan. As mastery learning is highly planned instructional method to enhance learning based on the principle that learning rate is a function of the time a learner has to learn to the time he actually needs to learn. The students are not advanced to a subsequent learning objective until they demonstrate proficiency with the current one. Use of mastery principles with computers and with the help of parents seems to be an ideal situation for students to enjoy higher strides of success.

In Computer Based Mastery Learning, individualized remediation is the essential part that makes the teaching leaning process filled with fun for each student as it caters to the individual needs of every student and in this way leads to the mastery of the instructional.

### **REVIEW OF THE RELATED LITERATURE**

Laney, James et al. (1995) explored the effects of cooperative and Mastery Learning methods, alone and in combination, on first and second grade student's learning and retention of basic economic facts. The study suggests that the cooperative-Mastery Learning method is in line with current early childhood practices and has the capacity for simultaneously boosting the conceptual development and language development of young children. *Kuchler, (1999)* suggested that CAI has only an overall small positive effect on mathematics achievement. The most effective CAI mode appears to be 'drill and practice'' CAI appears to be equally effective across gender and grade level but has a greater positive impact on students from low socio-economic backgrounds. *Laura (2012)* have reported persuasive evidence that students' perceptions of their classroom learning environment account for significant variance in cognitive and affective outcomes (e.g. intrinsic motivation, self-concept, liking for particular subjects and students' intention to drop out) found that females adopted significantly higher levels of mastery and performance approach goals towards biology, while males adopted significantly higher levels of mastery and performance approach goals towards physics. Males adopted significantly higher levels of performance avoidance goals towards both biology and physics. Positive

associations emerged between gender and the adoption of specific performance goals, perceived degree of competition in biology and physics classrooms, and levels of biology and physics classroom anxiety. These results suggest that motivational goal orientations and perceptions of learning environment are gender-dependent and domain-specific for the two science content areas. *Piia Maria Björn<sup>a\*</sup> & Paavo H.T. Leppänen(2013)*examined the results of Fast ForWord® training on English decoding-related skills. The students' English skills were examined in pre-test, post-test and follow-up measurements. The TRG (Training Group) students saw an acceleration in decoding-related skills.

Lin, Chun-Hung; Liu, Eric Zhi-Feng; Chen, Yu-Liang; Liou, Pev-Yan; Chang, Maiga; Wu, Cheng-Hong; Yuan, Shyan-Ming(2013) in their study sought to compare the effectiveness of game-based and video-based remedial instruction incorporated with elements of mastery learning. The results demonstrate that (a) both instructional videos and the proposed Monopoly game enhance the learning of mathematical concepts; and (b) the Monopoly game is more effective than instructional videos at leveraging the benefits of mastery learning. The goal of the research was to integrate games and mastery learning into after-school remedial instruction and design a game to practice the steps of mastery learning. Peter, Ronoh, Monika Ndonga (2014) found that students taught using CBML( Computer Based Mastery Learning) approach had significantly higher scores in SMQ (Students' Motivation Questionnaire) than those taught using conventional approaches and found that there is no gender difference in motivation when CBML is used. They recommended that CBML teaching strategy be incorporated in teacher education programs. Cindy De Smet<sup>ab\*</sup>, Tammy Schellens<sup>a</sup>, Bram De Wever<sup>a</sup>, Pascale Brandt-Pomares<sup>c</sup> & Martin Valcke (2014) conducted a quasi-experimental study in the context of a biology course involving 360 secondary school students. A  $2\times 2$  factorial research design was adopted. The study provides empirical evidence that both the design and the group setting (collaborative versus individual) have an impact on learning outcomes. Although there was no main effect, several significant interaction effects with gender were found. The results are helpful to direct research about the design and implementation of learning paths in a secondary school setting and underpin the relevance of representation modes in science learning. Nayark, Ajitha; Barker, Miles(2014) investigated current practices for learning biology in school computer labs in India in the light of the existing Indian pedagogical practices. The increasing availability of technology-based learning resources has increased the techno-pedagogical possibilities (i.e. the possibilities for pedagogical use of technology) in biology learning. Nevertheless, the teaching of biology currently continues to be partly in the traditional classroom and partly in the computer labs. It is observed that when computer labs became the sites for learning biology, the combination of the ICT provided, together with the teachers' emerging techno-pedagogical practices, presents heartening possibilities for promoting student learning in India in the future.

The review of literature provides a clear picture about the present status of importance of computers in education, computer assisted instruction and multimedia programme in teaching. From the findings of the recent researches on the students' performance, the need for effective teaching was felt. Hence it was understood that very few studies have been conducted to see the effect of multimedia programme on the students' performance. The very little studies have been concentrated on how students can be motivated through multimedia programme and also concentrated on the high and low achievers. Hence it was inferred that only a few researches have been attempted in multimedia programme in other subjects and biology in particular human anatomy and that too at the school level. The summary of related studies helped the investigator in identifying the research gaps in the area of the study. Thus in the present study, an attempt has been made to study the effectiveness of multimedia programme in perceiving human anatomy among higher secondary students. The investigator has formulated the objectives, hypotheses and research design based on the findings of the previous studies.

**OBJECTIVES;** the study was conducted with following objectives:

- 1. To develop and validate computer based mastery learning (CBML) instructional package in Biology for IX graders.
- 2. To study the impact of computer based mastery learning instructional packages on learning outcomes viz. achievement in Biology of IX graders.
- 3. To study the effect of academic stress on the learning outcomes viz. achievement in Biology of IX graders.
- 4. To study the effect of parental involvement on learning outcomes viz. achievement in Biology of IX graders.
- 5. To study the interaction effect of Instructional Strategies and academic stress on the learning outcome viz. achievement in Biology of IX graders.

- 6. To study the interaction effect of Instructional Strategies and parental involvement on learning outcomes viz. achievement in Biology of IX graders.
- 7. To study the interaction effect of academic stress and parental involvement on learning outcomes viz. achievement in Biology of IX graders.
- 8. To study the interaction effect of Instructional Strategies, Academic stress and parental involvement on learning outcomes viz. achievement in Biology of IX graders.

**HYPOTHESES;** The following hypotheses were formulated and tested:

- Ho.1: There is no difference in mean gain scores in Biology of IX graders when taught through Computer Based Mastery Learning and Conventional Group Learning.
- Ho.2: There is no difference in the mean gain scores in Biology of IX graders with high Parental involvement and low Parental involvement
- Ho.3: There is no difference in the mean gain scores in Biology of IX graders with high Academic stress and low Academic stress,
- Ho.4: There is no interaction between Instructional Strategies and Parental involvement in respect of mean gain scores in Biology of IX graders
- Ho.5: There is no interaction between Instructional Strategies and Academic stress in respect of mean gain scores in Biology of IX graders
- Ho.6: There is no interaction between Parental Involvement and Academic stress in respect of mean gain scores in Biology of IX graders
- Ho.7: There is no interaction among Instructional Strategies, Academic stress and Parental involvement in respect of mean gain scores in Biology of IX grader

### SAMPLE

The research investigation was carried out on the students of IX grade. The students ranged between 13 - 15 years of age. The sample was selected from the representative coeducational English medium senior secondary schools located in Chandigarh. The names of schools selected for the experiment have been listed below:

- 1. Shivalik Public School, 41-B, Chandigarh
- 2. DAV Senior Secondary School, Sec.8 Chandigarh

These two schools were assessed for matching of general background of the students and their entry behaviour knowledge (through Entry Behaviour Test). Both of these schools were found to be matched. Shivalik Public School, 41-B, Chandigarh was selected randomly for Experimental Group and DAV Senior Secondary School, Sec.8 Chandigarh was selected as control group. The control group was taught through Conventional method of teaching by their own teacher.Because of administrative constraints of the school, the experimental treatment was given to all the 150 students in three sections. During the process of experimentation that lasted for approximately 3 months, some students dropped out at one stage or the other. These students therefore were not considered at the time of analysis. The classification of students on the basis of Academic stress (high and Low) and parental involvement (high and Low) was done at the time of analysis. The final sample for analysis thus comprised of N= 92 Students.

| S.No. | Instructional Treatment | No. of Students          |              |  |  |  |  |  |
|-------|-------------------------|--------------------------|--------------|--|--|--|--|--|
|       |                         | Initial ungrouped sample | final sample |  |  |  |  |  |
| Ι     | Experimental Group      | 50+50+50                 | 46           |  |  |  |  |  |
| II    | Conventional Group      | 30+36+34                 | 46           |  |  |  |  |  |
|       | Total                   | 240                      | 92           |  |  |  |  |  |

 Table1: Final Sample according to Instructional Treatment

TOOLS USED; The following tools were used for collecting data:

- 1. Parental involvement Scale: Developed and validated by Ahuja and Sharma, (2002)
- 2. Scale of Academic stress: Developed and validated by Bisht (1987).
- 3. Entry Behaviour Test –Developed and validated by Malhan(2011)
- 4. Formative Tests Developed and validated by the investigators separately for each unit.

- 5. Enrichment material for early masters (Identified by the investigators from their Performance on each unit).
- 6. Remedial instruction (provided with the help of Power Point Presentations used by the students according to their requirements including peer- tutoring developed and Validated by the investigators).
- 7. Summative Tests for a group of 7 units of Biology (developed and validated by the investigators).
- 8. Computer based Mastery learning Instructional package: (developed and validated by investigators). The instructional package was based on Bloom's Mastery learning Strategy. The total package consisted of Content sequence, Enduring Understanding, Formulation of Objectives, orientation Session, Warm up session, Formative Test after every unit, Remediation (1 or 2 Rounds), Enrichment, Summative test .

The CBML package consisted of 7 units of Biology developed by investigators based on the cognitive skills, objectives and content matter taken from the syllabi of the IX class prescribed by National Council of Educational Research and Training, New Delhi. The topics selected were discussed with science teachers to scrutinize which content has to be taught. Instructional Objectives were written in behavioral terms and Sensitivity Indices were calculated for each item. Reliability coefficient for each Unit Formative Test was also calculated. Sensitivity indices & Reliability coefficient for all the Summative Tests of Biology were also calculated. Unit Formative Test & Summative Tests were found reliable as well as valid.

### ANALYSIS AND INTERPRETATION OF DATA

Since the study was experimental in nature employing a 2x2x2 factorial design, an analysis of variance was proposed for analyzing data.

### DESCRIPTIVE ANALYSIS ON GAIN SCORES IN BIOLOGY

The means, SD's of Experimental and Control groups across Parental Involvement and Academic Stress have been recorded in table no.2

|       | CBML<br>(Experimental group)  |                                | C(<br>(Contro                 | Total                         |                 |
|-------|-------------------------------|--------------------------------|-------------------------------|-------------------------------|-----------------|
|       | HPI                           | LPI                            | HPI                           | LPI                           |                 |
| HAS   | M =51.09<br>N =11<br>SD =9.98 | M =49.92<br>N =12<br>SD =9.34  | M =28<br>N =12<br>SD =6.08    | M =24.55<br>N =11<br>SD =7.46 | M=38.41<br>N=46 |
| LAS   | M =48.20<br>N =10<br>SD =7.63 | M =50.38<br>N =13<br>SD =11.18 | M =28.33<br>N =12<br>SD =8.50 | M =20.27<br>N =11<br>SD =6.33 | M=36.95<br>N=46 |
| Total | M=49.71<br>N=21               | M=50.16<br>N=25                | M=28.17<br>N=24               | M=22.41<br>N=22               | M=37.68<br>N=92 |
| Total | M=49.93<br>N=46               | 5                              | M= 2<br>N=46                  | 5.42                          |                 |

Table 2: Table for Means and SD's of Biology Gain scores

**CBML**= computer based mastery learning and **CGL**=and conventional group learning

HPI=High Parental Involvement and LPI= and Low parental involvement groups

HAS=High Academic Stress and LAS= Low Academic Stress

# 2X2X2 ANALYSIS OF VARIANCE ON GAIN SCORES IN BIOLOGY IN RELATION TO INSTRUCTIONAL STRATEGIES, PARENTAL INVOLVEMENT AND ACADEMIC STRESS.

The sample data as depicted in the table 2 showed variation in means on Biology Gain scores for selected two groups- experimental and conventional. To study whether the difference in means of the two groups was significant or not, a 2x2x2 analysis of Variance was applied on Biology Gain scores. Therefore sum of squares and F-ratios for main effects and two order and three order interaction effects were calculated and have been recorded in the following table no. 3.

| Table 3: Summary of Analysis of Variance for the Gain Scores in Biology |         |    |        |                |  |  |  |  |
|---|---------|----|--------|----------------|--|--|--|--|
| Source of Variation   | SS      | df | MSS    | <b>F-Value</b> |  |  |  |  |
| Main Effect   | 13854.8 | 1  | 13854. | 347.04**       |  |  |  |  |
| A: Instructional Strategies (CBML vs. CGL)                              |         |    | 8      |                |  |  |  |  |
| B:Parental Involvement (HPI vs.LPI)                                     | 25.4    | 1  | 25.4   | 0.63           |  |  |  |  |
| C:Academic Stress   | 48.8    | 1  | 48.8   | 1.22           |  |  |  |  |
| Two Order Interactions: A x B   | 357.2   | 1  | 357.2  | 8.95**         |  |  |  |  |
| Instructional strategy x Parental Involvement                           |         |    |        |                |  |  |  |  |
| AxC; Instructional Strategies x Academic Stress                         | 3.7     | 1  | 3.7    | 0.09           |  |  |  |  |
| BxC; Parental Involvement x Academic Stress                             | 0       | 1  | 0      | 0.00           |  |  |  |  |
| Three Order Interaction: (A x B x C)                                    | 94.37   | 1  | 94.37  | 2.36           |  |  |  |  |
| Within Group (Error)  | 3353.13 | 84 | 39.92  |                |  |  |  |  |
| Total   | 17737.4 | 91 |        |                |  |  |  |  |

### Main Effect; Instructional Strategy: CBML vs CGL;

It may be observed from the table no. 3 that the F-ratio for the difference in gain means for the two instructional strategies (computer based mastery learning and conventional group learning) was found to be 347.04 which is highly significant at the .01 level of confidence. It indicates that the mean gains through the two strategies were different .The null hypothesis *Ho.1*: for equality of the means; was rejected at the .01 level of confidence. The observation of their respective means (table 2.) indicates that students of Computer Based Mastery Learning group attained mean gain of 49 and their counterparts of Conventional Learning group attained mean gain 25. It led to conclude that the mean gains in Biology of IX graders, learning through Computer Based Mastery Learning were higher than the mean gains through Conventional Group learning.

### Main Effect; Parental Involvement: high and Low;

It may be observed from the table 3 that F-ratio for the difference in gain means in Biology for the two Parental Involvement groups (High & low) was 0.63 which is less than the table value of F at the .05 level of confidence. Hence the null hypothesis; *Ho.2:* could not be rejected even at the .05 level of confidence. It suggests that the gain means of the of IX graders belonging to High and Low Parental Involvement groups may not be treated as different beyond the contribution of chance factors and the observed difference in their gain means in Biology may be ascribed to chance factor alone. The two groups achieved equal gain means in Biology.

### Main Effect; Academic stress; High and Low;

The table 3 reveals that the F-ratio for the difference in mean gains in Biology of the High and Low Academic Stress groups was 1.22 which is less than the table value of F at the .05 level of confidence. Hence the null hypothesis; *Ho.3:* could not be rejected even at the .05 level of confidence. It suggests that the gain means in Biology for the high academic stress group and low academic stress group were not found to be different.

### Interaction Effect: Instructional Strategies and Parental involvement;

F-ratio for the difference in gain means of IX graders in Biology, due to interaction between Instructional strategies (CBML&CGL) and Parental Involvement (High & low) was 8.95 which was found to be significant at the .01 level of confidence. Hence the null hypothesis; *Ho.4:* was rejected at the .01 level of confidence. It suggests that the two variables viz; Instructional Strategies (CBML & CGL) and Parental involvement (High & low) *interact* with each other to yield different gain mean for various combination groups. The extent of their interaction has further been examined with the help of the t-ratios for the difference between various combination pairs. The means and the corresponding t-ratios were calculated to test the following relevant sub-hypotheses. Table .4 below presents the t-ratios;

- Ho 4.1; With CBML: High and Low Parental Involvement students achieve equal gain mean scores.
- Ho. 4.2: with Conventional Group Learning; High Parental Involvement group and Low Parental Involvement group achieve equal gain means in Biology
- Ho. 4.3: With HPI: students taught with Computer Based Mastery Learning achieve gain mean scores in Biology equal to those taught through Conventional Group Learning,
- Ho.4.4: with LPI; students taught with Computer Based Mastery Learning and those in conventional group learning, achieve equal gain means in Biology.

 

 Table 4: t-ratios for difference between Gain Means of Different combination pairs due to interaction of Instructional Strategies and Parental Involvement.

| Combination<br>Group | CB       | ML        | CGL      |          |  |
|----------------------|----------|-----------|----------|----------|--|
|                      | CBML/HPI | CBML/ LPI | CGL/ HPI | CGL/ LPI |  |
|                      | M=49.71  | M= 50.16  | M=28.17  | M=22.41  |  |
|                      | SD=8.84  | SD=10.1   | SD=7.23  | SD=7.09  |  |
|                      | n=21     | n=25      | n= 24    | n=22     |  |
| CBML/HPI             | -        | 0.24      | 11.52**  | 13.9**   |  |
| CBML/LPI             |          | -         | 12.28**  | 14.68**  |  |
| CGL/HPI              |          |           |          | 3.05**   |  |
| CGL/LPI              | -        | -         |          | -        |  |

### • With CBML; HPI VS LPI

It may be observed from the table above that t-value for the difference between High Parental Involvement Group taught with Computer Based Mastery Learning and Low Parental Involvement Group taught with Computer Based Mastery Learning was not found to be significant even at the .05 level of confidence, it led to support *Ho.4.1*. It led to conclude that students with High Parental Involvement and Low Parental Involvement obtained equal gain means through Computer Based Mastery Learning.

### • With CGL; HPI VS LPI

It may be observed from the table 4 that t-value for the difference in gain means of Biology for Conventional Group Learning and High Parental Involvement group and Conventional Group Learning and Low Parental Involvement group was found to be significant at the .01 level of confidence. Hence the means of both the groups were different found to be different beyond chance factors. Hence the *Ho. 4.2* was rejected at the specified level. The observation of their means reveals that the gain mean in Biology of Conventional Group Learning with High Parental Involvement (M= 28.17) was higher than the mean of Conventional Group Learning with Low Parental Involvement (M= 22.41).

### • With HPI; CBML Vs CGL

It may be observed from the table 4 that t-value for the difference in gain means of Biology for High Parental Involvement group, taught with Computer Based Mastery Learning and their counterpart group taught with Conventional Group Learning ,was found to be significant at the .01 level of confidence. Hence the Ho. **4.3**: was rejected at the specified level. It indicates that the two groups achieved different gain means. An observation of their means reveals that the gain mean in Biology of Computer Based Mastery Learning with High Parental Involvement (M= 49.71) was higher than the gain mean of Conventional Group Learning with High Parental Involvement (M= 28.17).

### • With LPI; CBML Vs CGL

The t-value for the difference in gain means of Biology for Low Parental Involvement Group taught with Computer Based Mastery Learning and Low Parental Involvement Group taught with Conventional Group Learning was found to be significant at the .01 level of confidence. Hence it may be inferred that the gain means of both the groups were different. Hence the hypothesis; *Ho.4.4:* was rejected. The observation of their means indicates that the mean gain scores of Computer Based Mastery Learning with Low Parental Involvement (M= 50.16) was higher than the mean gain scores of Conventional Group Learning with Low Parental Involvement (M= 22.41).

### Interaction Effect: Instructional Strategies and Academic stress;

It may be observed from the table 3 that the F-ratio for interaction between Instructional Strategies and Academic Stress in respect of mean gain scores of various combination groups was not found to be significant even at .05 level of confidence. Hence the null hypothesis; *Ho.5:*, could not be rejected even at the .05 level of confidence. It suggests that the variable of Instructional Strategies (CBML&CGL) do not interact with Academic Stress (High & Low) to yield difference in mean gain scores in Biology. It indicates that the effect of Instructional Strategies is independent of the Academic Stress as revealed by gain mean scores in Biology.

### Interaction Effect: Parental involvement and Academic stress;

It may be observed from the table 3 that the F-ratio for interaction between Parental Involvement and Academic Stress was not found to be significant even at the .05 level of confidence. Hence the null hypothesis; *Ho.6: was* 

*not* rejected even at the specified level of confidence, suggesting that the effect of Parental Involvement is independent of the Academic Stress as revealed by gain mean scores in Biology.

### Interaction Effect: Instructional Strategies Parental involvement; and Academic stress;

It may be observed from the table 3 that the F-ratio for the difference in gain means in Biology due to three order interaction effect among Instructional strategy, Parental Involvement and Academic Stress was not found to be significant even at the .05 level of confidence, . Hence the null hypothesis; *Ho.7: was* not rejected even at the .05 level of confidence, suggesting that the three variables Viz. Instructional Strategies, Parental Involvement and Academic Stress act independent of each other in respect of gain mean scores in Biology. Apart from the t-ratios, interpreted above, there are others which have not been treated by the researcher as they were not relevant in the light of the hypotheses formulated in the beginning.

# CONCLUSIONS

- The mean gain in Biology through Computer Based Mastery Learning was higher than the mean gains through Conventional Group learning.
- The gain means in Biology of students belonging to high and low Parental Involvement groups were not statistically different.
- The gain means in Biology for the high academic stress group and low academic stress group were equal.
- The two variables viz; Instructional Strategies and Parental involvement interact with each other to yield different gain means for various combination groups.
  - Students with High Parental Involvement and Low Parental Involvement obtained equal gain means in Biology through Computer Based Mastery Learning.
  - The gain mean in Biology of students of Conventional Group Learning and High Parental Involvement was higher than that of Conventional learning Group belonging to Low Parental Involvement.
  - Students belonging to High Parental Involvement achieved higher gain means through Computer Based Mastery Learning than those learning through Conventional Group Learning.
  - The. Students belonging to Low Parental Involvement achieved higher gain means through Computer Based Mastery Learning than those learning through Conventional Group Learning
- Variable Instructional Strategies was not found to interact with variable Academic Stress to yield difference in mean gain scores in Biology.
- The effect of Parental Involvement was found to be independent of effect of Academic Stress as revealed by gain mean scores in Biology.
- The three variables Viz. Instructional Strategies, Parental Involvement and Academic Stress act independent of each other in respect of gain mean scores in Biology.

### **DISCUSSION OF RESULTS**

Based on the findings there exists a significant difference between Computer Based Mastery learning as against Conventional Group Learning as far as achievement of ninth graders in Biology is concerned. It appears that in Computer Based Mastery Learning students achievement is higher as they proceed and get remediation according to their own needs through the programmed instruction that suits to their individual needs of learning and speed. On the other hand, in Conventional Group Learning students are taught through similar traditional method of instructions for all, which is mostly difficult to understand to the weak students and boring for the students with high IQ level. In other words, it is not according to the individual interest and need. In Conventional Learning they are unable to find instructions that fulfill their individual needs, separately. They lose their interest in their studies as compared to the students who are taught through Computer Based Mastery Learning. It has also been observed that students having higher parental Involvement achieve higher strides of learning in Biology as compared to those whose parents are low involved with academics of their children, even when both the groups are working with computer based mastery learning situation. The results of the present investigation were supported by research findings of **Bangert and Kulik**, (1990) who showed that mastery learning programs have positive effects on the examination performance of students in colleges, high schools, and the upper grades in elementary schools. The results were also supported by studies conducted by Laura (2012).

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### GROWTH AND DETERMINANTS OF EXPORT OF SPICES FROM INDIA IN LIBERALISED ECONOMIC SCENARIO

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### ABSTRACT

India, known as the home of spices, boasts a long history of trading with the ancient civilizations of Rome and China. Today, Indian spices are the most sought-after globally, given their exquisite aroma, texture, taste and medicinal value. India has the largest domestic market for spices in the world. Traditionally, spices in India have been grown in small land holdings, with organic farming gaining prominence in recent times. India is the world's largest producer, consumer and exporter of spices; the country produces about 75 of the 109 varieties listed by the International Organization for Standardization (ISO) and accounts for half of the global trading in spices. In value terms, India's spice market grew an average 8.8 per cent annually between 2009–10 and 2014– 15. About 893,920 tonnes of spices, valued at US\$ 2,440.8 million, were exported in 2014–15. In 2014–15, the US was the major importer, followed by China, Vietnam, the UAE, Malaysia, the UK, Germany, Saudi Arabia, Thailand and Sri Lanka. Spice exports to the US increased 4.3 per cent to US\$ 410.3 million in 2014–15 from US\$ 393.3 million in 2013–14. India commands a formidable position in the world spice trade with the spice exports expected to touch US\$3 billion by 2016-17. The present study examines the export of major spices and its determinants. The secondary data was collected from COMTRADE, Spice Board of India, and Agricultural situation of India etc. Analysis of growth pattern and export was done in post WTO (1995-2015) situation. To examine the export pattern of export of spices, the first order Markov Chain Approach was used. The analysis of growth of Indian spices exports during has revealed that they grew much faster than the overall agricultural exports and achieved some stability in the post Economic Reforms period. The factors like domestic price, exchange rate and world export prices along with lagged domestic production plays significantly influences export performance of spices. There is a vast domestic market for spices, export of spices is basically undertaken to dispose of the excess of domestic supply over domestic needs rather than as a specialized activity. That is exports of spices are mainly dependent on crop and domestic consumption rather than on international market signals. High commodity concentration and geographical concentration of Indian spices exports is a major concern for future growth and stability. The analysis on the dynamics in direction of exports using the Markov chain model revealed that in the post liberalization period, USA emerged as a stable export market mainly due to the disintegration of the erstwhile USSR. None of the importing countries were stable markets of Indian cardamom and India lost its share of international market to Guatemala which has emerged as a major competitor. During the pre liberalisation period the export price elasticity of pepper for Canada and Italy were found to be elastic and the income elasticity of demand was significant for Saudi Arabia and for other importers. The export price elasticity of cardamom for USA, France, Japan and Saudi Arabia were found to be elastic during the post liberalisation period. The export demand for ginger was significant for UAE, Saudi Arabia, USA and Bangladesh during the pre liberalisation period. During the post liberalisation period the price elasticity of demand was significant for Bangladesh and the income elasticity of demand was significant for UK and UAE. The growth of spices exports in the post liberalisation period could be attributed to the trade liberalisation policies.

### **INTRODUCTION**

The period after 1980-1981 saw India facing severe Balance of Payment (BOP) difficulties, which continued into the 1990s. This forced India into adopting the structural adjustment programmes of the IMF and World Bank, and globalisation is a part of the structured adjustment programme (Kapila 2001). Indian agricultural exports showed a steady pace of growth during 1991 to 1996 and thereafter took a downward turn. India's agricultural exports hovered around \$ 2-3 billion during 1990-1991 to 1992-1993. It jumped to \$ 4 billion in 1993-1994 and witnessed a further jump to \$ 7 billion till 1996-1997, but this tempo of growth could not be sustained after this period and declined to \$ 5.5 billion by 1999-2000. In contrast, agricultural imports witnessed an 80 percent increase after 1996-1997 (Chand, 2002). Indian spices export is on course to touch \$3 billion by 2016-17. Piggybacking on the good performance of mint, chilli and seed spices, spices shipments have shown 41% increase in rupee value and 27% rise in volumes for the nine months ended December 31, 2013. The objective of the present paper is to analyse the growth, direction and determinants of spices export from India.

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### **REVIEW OF LITERATURE**

The role of trade in economic development also played a central role in these theories. W. Arthur Lewis's theory (1955) of the dual economy was particularly prominent as a basis for attempting to understand the economies of the previously colonial world. A number of studies have been carried out on the growth and instability of exports. Few of them will be reviewed here. Studies of Coppock, (1962), Massell, (1964) and Macbean, (1966) laid foundation for empirical investigation of export instability. Later studies by Naya (1973), Kalaf (1974) and Kingston (1976) explored the determinants of export instability. But recent studies like that of Love (1985), Paudyal (1988), Tegegne (2000) Campa (2004) using time series data on an individual country basis resorted to co integration analysis for the validity of the results. In Indian context the papers of Sen, Pronab (1989) and Panchamukhi (1999) provides the methodological framework for measuring export instability and growth. Goyal, et al (2000) studied the trends in growth and instability of Indian agricultural exports with exponential growth trends and Coppock's Instability indices. Sarada et al, (2006) studied the growth prospects and causes of export instability in Indian sea food exports in a time series framework. Kaundal and Sharma (2006) in their study on Indian agricultural exports in the post reforms period estimated the trend growth rates and instability indices for various components of agricultural exports. Geetha and Mathur (2008), analysed the causes of instability in Indian agricultural exports in the post WTO scenario. There is lack of studies on determinants of spices exports from India. Mamatha (1995) in her study reported that positive growth rate of growth in pepper in case of Karnataka is not surprising since pepper is a commercial crop and flow of steady income to farmers has motivated them in expanding the area under the cultivation as pure crop as well as intercrop. Kerala showed a significant negative growth rate of (-) 3.32 per cent per annum during the study period.

# METHODOLOGY

The secondary data are used to study. Secondary data were collected from following sources: Spices Board of India, Spices Board Reports, India brand equity foundation and also necessary information gathered from various Journals, Books, Media Reports and internet website. The data of export and import for 22 years from the year 1994-2015 of major spices such as for analysis.

The data have been analysed with Compound Annual Growth analysis of data

 $Y = ab^t U_t$ 

Where,

Y = area, production, productivity and export quantities of spices in year 't'

a = intercept

b = regression coefficient

t = time variable and

U t = error term

The equation was estimated after transforming as follow Log  $y = \log a + t \log b + \log U t$ 

Then, the per cent compound growth rate (g) was calculated using the relationship  $G = [(antilog of b)-1] \times 100$ 

Significance of growth rate was judged by conducting student's t-test at 5 per cent and 1 per cent level of significance.

The trade directions of commodities exports were analyzed using the first order Markov chain approach. Central to Markov chain analysis is the estimation of the transitional probability matrix P. The elements P ij of the matrix P indicates the probability that export will switch from country i to country j with the passage of time. The diagonal elements of the matrix measure the probability that the export share of a country will be retained. Hence, an examination of the diagonal elements indicates the loyalty of an importing country to a particular country's exports.

In the context of the current application, structural changes were treated as a random process with selected importing countries. The average exports to a particular country was considered to be a random variable which depends only on the past exports to that country, which can be denoted algebraically as:

 $r \\ E_{jt} = \sum E_{it-1} P_{ij+} e_{jt}$ i=t

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where,

 $E_{jt} = Exports$  from India to j th country during the year t.

 $E_{it-1} = Exports$  to i th country during the period t-1.

 $P_{ij}=\mbox{Probability that the exports will shift from <math display="inline">i$  th country to  $j^{th}$  country.

 $e_{jt} = The \mbox{ error term which is statistically independent of E <math display="inline">_{it\mbox{-}1}$ 

t = Number of years considered for the analysis

r = Number of importing countries

The transitional probabilities P ij which can be arranged in a (c\* r) matrix have the following properties. The transitional probabilities  $P_{ij}$ , which can be arranged in a (c × r) matrix, having following properties:  $0 \le P_{ij} \le 1$  and n

n

 $\sum P_{ij} = 1$  for all i

i=1

The transition probability matrix was estimated in the linear programming (LP) framework by a method referred to as minimization of mean absolute deviation (MAD).

### **RESULTS AND DISCUSSIONS**

| Year    | Export      | GCA(000   | Production | Exchange      | International |
|---------|-------------|-----------|------------|---------------|---------------|
| 4004.05 | (Dillion 5) | nectares) | Tonnes     | rate (Rs/ \$) | price (\$/kg) |
| 1994-95 | 195         | 2097.5    | 2474.5     | 31.3655       | 1.3           |
| 1995-96 | 237.5       | 2008.1    | 2504.6     | 31.3986       | 1.2           |
| 1996-97 | 338.8       | 2065.3    | 2473.2     | 33.4498       | 1.5           |
| 1997-98 | 379.7       | 2138.2    | 2828.9     | 35.4999       | 1.6           |
| 1998-99 | 387.6       | 2276.8    | 2829       | 37.1648       | 1.8           |
| 1999-00 | 407.8       | 2316.5    | 3074.8     | 42.0706       | 1.7           |
| 2000-01 | 354         | 2216.1    | 3101.6     | 43.3327       | 1.4           |
| 2001-02 | 313.9       | 2036.6    | 2798.2     | 45.6844       | 1.3           |
| 2002-03 | 342         | 2213.2    | 3064.8     | 47.6919       | 1.2           |
| 2003-04 | 336.3       | 2024.2    | 2745.8     | 48.3953       | 1.3           |
| 2004-05 | 418.9       | 2232.3    | 3634.7     | 45.9516       | 1.1           |
| 2005-06 | 477.9       | 2197.9    | 3673.5     | 44.9315       | 1.2           |
| 2006-07 | 697.4       | 2070.1    | 3705.6     | 44.2735       | 1.4           |
| 2007-08 | 1072.3      | 2169.7    | 3934.9     | 45.2849       | 1.7           |
| 2008-09 | 1380.3      | 2261.3    | 4252.8     | 40.2410       | 2             |
| 2009-10 | 1298.5      | 2315.8    | 4732.9     | 45.9170       | 2             |
| 2010-11 | 1765.1      | 2382.1    | 4910.2     | 47.4166       | 2.3           |
| 2011-12 | 2757.1      | 2372.9    | 5022.9     | 45.5768       | 2.9           |
| 2012-13 | 2821.8      | 2617.2    | 5902.8     | 47.9229       | 2.8           |
| 2013-14 | 2503.5      | 2486.2    | 5350       | 54.4091       | 2.8           |
| 2014-15 | 2428.1      | 2393.6    | 5525       | 60.5019       | 2.6           |
| 2015-16 | 2501.3      | 2481      | 5829       | 61.1436       | 3             |
| CAGR    | 12%         | 1%        | 4%         | 3%            | 4%            |

Table 1: Area, Production and export and international prices of spices

It is obvious from the table that area under spices has increased at CAGR of 1% since 1994-95 to 2015-16 from 2097.5 (000 hectares) to 2481 (000 hectares). The production has increased from at CAGR of 4% from 2474.5 (MT) to 5829 (MT) during the same period. But export has increased from 152.1 billion \$ to 2501.3 billion \$ at CAGR of 12%. International prices of spices has increased from 1.3\$ per kg to 3 \$ per kg. at CAGR of 4%.

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| Table 2: Item-wise Estimated Export of Spices from India (2014-2015) |         |               |               |          |                |  |  |  |  |
|--|---------|---------------|---------------|----------|----------------|--|--|--|--|
| Items Qty % shar   |         |               | Value (Rs. In | % share  | Rate (Rs./Kg.) |  |  |  |  |
|  | (Tonne) | (In quantity) | Lakh)         | in value |                |  |  |  |  |
| Chilli   | 347000  | 38.82%        | 351710        | 23.6%    | 101.36         |  |  |  |  |
| Mint Products (3)  | 25750   | 2.88%         | 268925        | 18.0%    | 1044.37        |  |  |  |  |
| Spice Oils &<br>Oleoresins   | 11475   | 1.28%         | 191090        | 12.8%    | 1665.27        |  |  |  |  |
| Pepper   | 21450   | 2.40%         | 120842        | 8.1%     | 563.37         |  |  |  |  |
| Cumin  | 155500  | 17.40%        | 183820        | 12.3%    | 118.21         |  |  |  |  |
| Turmeric   | 86000   | 9.62%         | 74435         | 5.0%     | 86.55          |  |  |  |  |
| Other Spices (2)   | 36500   | 4.08%         | 44915         | 3.0%     | 123.05         |  |  |  |  |
| Curry<br>Powders/Paste   | 24650   | 2.76%         | 47626         | 3.2%     | 193.21         |  |  |  |  |
| Cardamom<br>(Small)  | 3795    | 0.42%         | 32346.7       | 2.2%     | 852.35         |  |  |  |  |
| Coriander  | 46000   | 5.15%         | 49812.5       | 3.3%     | 108.29         |  |  |  |  |
| Ginger   | 40400   | 4.52%         | 33133         | 2.2%     | 82.01          |  |  |  |  |
| Fenugreek  | 23100   | 2.58%         | 13947.6       | 0.9%     | 60.38          |  |  |  |  |
| Nutmeg & Mace  | 4475    | 0.50%         | 26797.5       | 1.8%     | 598.83         |  |  |  |  |
| Fennel   | 11650   | 1.30%         | 13165.5       | 0.9%     | 113.01         |  |  |  |  |
| Other Seeds (1)  | 28250   | 3.16%         | 16512.5       | 1.1%     | 58.45          |  |  |  |  |
| Garlic   | 21610   | 2.42%         | 8183.04       | 0.5%     | 37.87          |  |  |  |  |
| Cardamom<br>(Large)  | 665     | 0.07%         | 8403.9        | 0.6%     | 1263.74        |  |  |  |  |
| Celery   | 5650    | 0.63%         | 4302.1        | 0.3%     | 76.14          |  |  |  |  |
| Total  | 893920  | 100.00%       | 1489968       | 100.0%   |                |  |  |  |  |

Note : (1) Include Mustard, Aniseed, Ajwanseed, Dill Seed, Poppy Seed etc.

- : (2) Include Tamarind, Asafoetida, Cassia, Saffron etc.
- : (3) Include Mint Oils, Menthol & Menthol Crystal.

When we see item wise export India exporting varieties of spices. Major spices are Chili, cumin, ginger and coriander. In 2015-16 India has exported 893920 tons of spices valuing Rs. 489967.53 Lakh ruppes. Chili has major share of exports 38.82% in volume and 23.6% in value terms. Cumin has 17.40% share in volume and 12.3% share in value of total spice export during year 2014-2015. Coriander has 5.15% share in volume and 3.3% share in value of total spice export during year 2014-2015. Ginger 4.52% share in volume and 2.2% share in value of total spice export. Per kg price was highest (Rs. 1665.27) in case of Spice Oils & Oleoresins followed by large cardamom (Rs. 1263.74/kg).

### **DIRECTION OF TRADE**

To understand direction of trade of various spices we have used transitional probability matrix for major spices from 1994-95 to 2015-16.

| Table 3: Transitional probability matrix of Indian turmeric export in post-WTO period | (1995-96 to |
|---|-------------|
| 2015 16)  |             |

| 2013-10)  |        |        |        |        |        |        |  |
|-----------|--------|--------|--------|--------|--------|--------|--|
| Countries | USA    | UK     | Iran   | Japan  | UAE    | Others |  |
| USA       | 0.1887 | 0.029  | 0      | 0.2405 | 0.4904 | 0.0514 |  |
| UK        | 0      | 0.324  | 0.0915 | 0      | 0.5845 | 0      |  |
| Iran      | 0.0332 | 0.01   | 0.5113 | 0.1339 | 0      | 0.3116 |  |
| Japan     | 0.4667 | 0      | 0      | 0.2371 | 0.2962 | 0      |  |
| UAE       | 0.063  | 0      | 0.0878 | 0      | 0.3293 | 0.5199 |  |
| Others    | 0.0125 | 0.0565 | 0.0271 | 0.0367 | 0.0354 | 0.8318 |  |

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It is obvious from the Table that in turmeric export USA has retained only 18.87 percent share. Major share has been shifted to UAE (49.04%) and Japan (24.05%). UK has retained 32.4% of its earlier share and shifted 58.45% to UAE. Japan has retained only 23.71% of its earlier export share and shifted 29.62% to UAE. Other countries have retained its 83.18% share. One of the reasons for low retention probabilities of traditional importer of turmeric is that Indian turmeric is high priced, so the importing countries import from other countries like Burma and Thailand where the price is comparatively low. Secondly, in many areas such as, food, textiles and cosmetics, turmeric is being replaced by synthetic chemicals, as a coloring agent, Angles et al. (2011).

|              |          |         |         | 2015 10 |         |           |         |
|--------------|----------|---------|---------|---------|---------|-----------|---------|
|              | Malaysia | UAE     | UK      | Saudi   | South   | Singapore | Others  |
| Countries    |          |         |         | Arabia  | Africa  |           |         |
| Malaysia     | 0.27014  | 0.15602 | 0.06624 | 0.02521 | 0.06011 | 0.2155    | 0.2067  |
| UAE          | 0.2151   | 0.0461  | 0.0064  | 0.00601 | 0.00011 | 0.00161   | 0.72467 |
| UK           | 0.0530   | 0.00278 | 0.0004  | 0.00021 | 0.00007 | 0.0002    | 0.9433  |
| Saudi        | 0.00825  |         | 0.00001 | 0       | 0       | 0         |         |
| Arabia       |          | 0.00011 |         |         |         |           | 0.9916  |
| South Africa | 0.00113  | 0       | 0       | 0       | 0       | 0         | 0.9988  |
| Singapore    | 0.00015  | 0       | 0       | 0       | 0       | 0         | 0.9998  |
| Others       | 0.00002  | 0       | 0       | 0       | 0       | 0         | 0.9999  |

Table 4: Transitional probability matrix of Indian coriander export in post-WTO period: 1995-96 to2015-16

It was observed that Malaysia is one of the most stable destinations of among the major countries where coriander was exported from India. The transaction probability of retention was 27.01%. It may be concluded that Malaysia is most reliable international market for Indian coriander export. UK and UAE has retained its exports share of 0.041% and 4.61% respectively. Malaysia lost its export share to UAE (15.^%), Saudi Arabia (2.5%) and south Africa (6.01%) while it gained share from UAE (21.51%) and UK(5.3%). The sharp decline in the export of coriander from India reflects our inability to retain our share in the traditional markets and explore new markets. Being a major importer of Indian coriander, if countries lose their share, it will create a high instability in the export of coriander from India in future.

### Table: Transitional probability matrix of Black pepper export in post-WTO period: 1995-96 to 2015-16

| Countries | USA      | Germany | UK     | Italy   | Canada | Australia | Others |
|-----------|----------|---------|--------|---------|--------|-----------|--------|
| USA       | 0.3144   | 0       | 0.0123 | 0.08214 | 0.0432 | 0         | 0.5457 |
| Germany   | 0        | 0.2112  | 0.1762 | 0       | 0      | 0.3565    | 0.2561 |
| UK        | 0.090071 | 0.0059  | 0      | 0       | 0      | 0         | 0.09   |
| Italy     | 0        | 0.4065  | 0      | 0.065   | 0.3425 | 0.186     | 0      |
| Canada    | 0.0115   | 0       | 0      | 0       | 0      | 0         | 0.9885 |
| Australia | 0.0036   | 0       | 0      | 0       | 0      | 0         | 0.9964 |
| Others    | 0.001    | 0       | 0      | 0       | 0      | 0         | 0.9999 |

It is obvious from the above Table that USA is one of the stable export markets for Indian black pepper. It has transition probability index of 31.44% showing USA as loyal market for Indian back pepper. Germany has retained its share of 21.12%. USA has lost 8.2% share to Italy and 4.3% share to Canada. Italy has retained 6.5% of its original share. Germany has lost its 17.62% share to UK and 35.65% share to Australia.

| Country    | Malaysia | Bangladesh | Sri Lanka | USA    | UAE    | UK     | Others |  |
|------------|----------|------------|-----------|--------|--------|--------|--------|--|
| Malaysia   | 0.7423   | 0          | 0.1224    | 0.0691 | 0.0662 | 0      | 0      |  |
| Bangladesh | 0.0826   | 0          | 0.4539    | 0.20   | 0.1214 | 0.1421 | 0      |  |
| Sri Lanka  | 0.0867   | 0.2400     | 0.3753    | 0.109  | 0.044  | 0      | 0.145  |  |
| USA        | 0        | 0.0428     | 0.1456    | 0.226  | 0.0442 | 0.445  | 0.0964 |  |
| UAE        | 0.1744   | 0          | 0         | 0.0417 | 0.3913 | 0.3621 | 0.0305 |  |
| UK         | 0        | 0.0034     | 0         | 0      | 0.0164 | 0.9802 | 0      |  |
| Others     | 0        | 0          | 0         | 0      | 0      | 0      | 1      |  |

 Table 4: Transitional Probability matrix of Chili exports 1995-96 to 2015-16

It is obvious from the table that transitional probability matrix of chili export of UK, with the highest retention probability of 98.02 per cent emerged out to be the most stable and loyal market for Indian chilli. Malaysia, Sri lanka, and UAE were other important importers of chilli from India who have maintained their loyalty with the

country, retaining a share of 74.23 per cent, 37.53 per cent and 39.13 per cent respectively. Interestingly, the 'other countries' category which is the minor importers of chili shows a retention probability of unity. This suggests beneficial trade with these nations. UK, in addition to its high retention ability is likely to gain from the switch over from USA and UAE with a high probability of 0.4465 and 0.3621 respectively. Bangladesh was found to be the most unstable importer showing zero retention probability, losing about 45.39 per cent of its share to Sri Lanka, 20 per cent to USA, about 14.21 per cent to UK and 8.26 per cent to Malaysia. While USA retained about 27 per cent of its previous share of chilli exports from India but lost 44.65 per cent of its previous share to UK. UAE also lost about 36 per cent of its previous share to UK. This shows that export of Indian chilli have strong preference for UK in the export market. Therefore, in order to overcome this bottle neck and to capture higher share in the world trade, much emphasis needs to be laid on quality improvement of dry chilies, apart from cost efficiency in their production, use of standard packing and simplification in export procedure in order to maintain India's dominance in world market. (Mamatha, 1996).

# **DETERMINANTS OF EXPORT**

To understand determinants of spices export area under spices cultivation, production of spices, exchange rate and unit price of spices were considered. The descriptive statistics of variables are presented below in the Table

| sie et Descriptive statles of Export (Dinion \$); Geri, Froduction of spices from 1991 96 to 2016 |    |                 |         |           |                |            |  |
|---|----|-----------------|---------|-----------|----------------|------------|--|
| Items   | Ν  | Minimum Maximun |         | Mean      | Std. Deviation | Variance   |  |
| Export  | 22 | 195             | 2822    | 1064.32   | 949.490        | 901531.465 |  |
| GCA   | 22 | 2008            | 2617    | 2244.18   | 165.484        | 27385.108  |  |
| Production  | 22 | 2473            | 5903    | 3835.09   | 1165.252       | 1357812.37 |  |
| Exchange rate   | 22 | 31.3655         | 61.1436 | 44.528359 | 7.9006853      | 62.421     |  |
| International price   | 22 | 1               | 3       | 1.82      | .795           | .632       |  |

 Table 5: Descriptive statics of Export (Billion \$), GCA, Production of spices from 1994-95 to 2015-16

It is obvious from the table that mean export of spices was 1064 billion (SD=949.490). It shows there were variations in export. The mean area under the cultivation of spices was 2197.336 (SD = 165.484) (hectares) and mean production of spices 3835.09 tonnes (SD=1165.252). Mean exchange rate with respect to US\$ was 44.528 (SD=7.900). Average International price during post WTO period was 1.82\$ per kg.

| Table 6: Correlation coefficient Export values, gross cropped area (GCA) under spices, Pro- | duction, |
|---|----------|
| Exchange rate and International price   |          |

|                        |                     | Export | GCA   | Production | Exchange rate | International |  |
|------------------------|---------------------|--------|-------|------------|---------------|---------------|--|
|                        |                     |        |       |            |               | price         |  |
| Pearson<br>Correlation | Export              | 1.000  | .848  | .953       | .670          | .877          |  |
|                        | GCA                 | .848   | 1.000 | .873       | .615          | .808          |  |
|                        | Production          | .953   | .873  | 1.000      | .763          | .785          |  |
|                        | Exchange rate       | .670   | .615  | .763       | 1.000         | .490          |  |
|                        | International price | .877   | .808  | .785       | .490          | 1.000         |  |
| Sig. (1-tailed)        | Export              |        | .000  | .000       | .000          | .000          |  |
|                        | GCA                 | .000   |       | .000       | .001          | .000          |  |
|                        | Production          | .000   | .000  |            | .000          | .000          |  |
|                        | Exchange rate       | .000   | .001  | .000       |               | .010          |  |
|                        | International price | .000   | .000  | .000       | .010          |               |  |

We initially regressed export value with GCA, spice Production, Exchange rate, International price  $R^2$  found to be high 0.957 but standard error was also high and Durbin-Watson test value was 1.247 which shows autocorrelation.

| Model Summary <sup>b</sup>   |                   |          |                      |                               |                   |  |  |
|--|-------------------|----------|----------------------|-------------------------------|-------------------|--|--|
| Model  | R                 | R Square | Adjusted R<br>Square | Std. Error of<br>the Estimate | Durbin-<br>Watson |  |  |
| 1  | .978 <sup>a</sup> | .957     | .946                 | 220.021                       | 1.247             |  |  |
| a. Predictors: (Constant), international price, exchange rate, GCA, production |                   |          |                      |                               |                   |  |  |
| b. Dependent Variable: Export  |                   |          |                      |                               |                   |  |  |

The log transformation was done initially to reduce variance in the data. The data is time series so ordinary least square techniques cannot be used because of non- stationary data. Stationary test was done using ADF (Augmented Dickey fuller test).

To understand determinants of export we have taken variables e, g. atea, production, exchange rate and international price. We have transformed these variables into their log values and tested stationarity.

Dependent Variable: DLOG(EXPORT)

Method: Least Squares

Date: 09/26/16 Time: 19:17

Sample (adjusted): 2 22

Included observations: 21 after adjustments

| Variable   | Coefficient  | Std. Error   | t-Statistic   | Prob.   |
|--|--|--|---|---|
| C<br>DLOG(GCA)<br>LOG(PRODN)<br>DLOG(PRODN)<br>DLOG(EXCHANGER<br>ATE)<br>DLOG(PRICE)   | 1.082205<br>-0.981988<br>-0.125616<br>1.353236<br>-0.641705<br>1.152154        | 0.766075<br>0.869625<br>0.094267<br>0.595647<br>0.472467<br>0.263482       | 1.412661<br>-1.129208<br>-1.332552<br>2.271873<br>-1.358200<br>4.372794           | 0.1782<br>0.2765<br>0.2026<br>0.0382<br>0.1945<br>0.0005                |
| R-squared<br>Adjusted R-squared<br>S.E. of regression<br>Sum squared resid<br>Log likelihood<br>F-statistic<br>Prob(F-statistic) | 0.707665<br>0.610220<br>0.115456<br>0.199951<br>19.07147<br>7.262189<br>0.0000 | Mean depe<br>S.D. deper<br>Akaike inf<br>Schwarz c<br>Hannan-Q<br>Durbin-W | endent var<br>ndent var<br>To criterion<br>riterion<br>uinn criter.<br>atson stat | 0.121503<br>0.184929<br>-1.244902<br>-0.946467<br>-1.180134<br>1.951656 |

These all variables found to be non stationary. We have taken first diffrence to make it stattionary and estimated the following model

 $Dlog(export) = C + \beta 1 \ dlog(GCA) + \beta 2log(prodcution) + \beta 3 dlog(production) + \beta 4 \ dlog(exchange rate) + \beta 4 \ log (international price)$ 

Here  $\beta$ i, are elasticities of export. Durbin-Watson stat value estimated as 1.951656 (closer to 2) which shows no autocorrelation. Only DLOG(PRODN) and DLOG(PRICE) have found to be significant. When production of spices increased by one unit, export in value terms increased by 1.353236 billion \$. Similarly when international price has increased by 1 unit spices export has increased by 1.152154 units. Exchange rate has negative impact on spices export. It may be concluded that we should more focus on increasing production of spices and provide export incentive to promote spice exports from India. We have to see to focus new emerging markets in spices exports. High value of F-statistic shows overall significance.

### CONCLUSION AND RECOMMENDATIONS

India has been traditionally recognized as a 'land of spices', as a wide variety of spices is grown in the country since ancient times. Spices have been playing an important role in the Indian agrarian economy as it accounts for 5 percent of the agriculture GDP of the country. Area under spices has increased at CAGR of 1% since 1994-95 to 2015-16 from 2097.5 (000 hectares) to 2481 (000 hectares). The production has increased from at CAGR of 4% from 2474.5 (MT) to 5829 (MT) during the same period. But export has increased from 152.1 billion \$ to 2501.3 billion \$ at CAGR of 12%. International prices of spices has increased from 1.3\$ per kg to 3 \$ per kg. at CAGR of 4%. The Markov chain approach to examine the change in direction of export of major Indian spices revealed that the markets which gained its share in export of major spices and shown loyalty are Canada for black pepper, UK for chilli, Bangladesh for turmeric, UAE for cumin and Malaysia for coriander. The transitional markets which have come out to be the most unstable importers such as Germany and USA for black pepper, Bangladesh for chili, UAE and UK for turmeric, and Singapore and UK for coriander. Though in most

of the spices India has managed to retain one of its original markets, but India cannot depend excessively on one market alone to avoid trade risk in the long-run. New markets also needs to be explored and more stress has to be given to the countries like USA, UK, UAE, Malaysia and other countries category for maintaining present status of export and market share in future. In the changing economic scenario, where more competitors are lining up in the spices trade, government policy should aim at increasing productivity, reducing cost per unit of production, improving trade standards and meeting all the trade related barriers which are of greater concerns for the importing nations. This can enhance India's competitiveness in the world market and regain its repute in the spice trade. Gradual erosion of price competitiveness of Indian spices in International markets due to low productivity and high cost of production is a major concern at present. The physical condition and hygienic standards of Indian spices are far below the international standards. Export competitiveness of Indian spices could diminish either because of explicit bans or the costs of compliance with the new standards such as Sanitary and Phytosanitory Agreements. Emergences of new competitors at the global level with no or very little domestic consumption are posing a major constraint for future growth of spices exports.

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# ELLIPTIC CURVE DIFFIE-HELLMAN KEY EXCHANGE ALGORITHM USING GF(P)

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### ABSTRACT

Among one of the secured algorithm is the elliptic curve Diffie Hellman key exchange algorithm. this method is used over prime fields i.e. gf(p) for more security purpose. The algorithm consume less power. less area ,less memory, less bandwidth, provides more efficiency and less complexity when compared to other cryptosystems. In order to avoid the man in the middle attack this elliptic curve Diffie Hellman algorithm has been proposed. It gives bidirectional encryption between customer and the server. The key size is reduced for more security, in this method only the exchange of keys takes place and there is no encryption and decryption of the key between customer and server. ECDHKE over gf(p) provides more security by avoiding the man in the middle from listening stealthily.

Keywords: Elliptic curve, Diffie Hellman, cryptosystem, Encryption, Decryption.

### **1. INTRODUCTION**

Neal koblitz and Victor Miller put forward the elliptic bend cryptography in the year of 1980.Elliptic bend cryptography was considered as an matured open key cryptosystem. The elliptic bend cryptography gives more security using smaller keys.Computation speed is faster, memory saving is more, power and bandwidth are also saved. as the security is very important with respect to time, elliptic bend cryptography provides the security and also increases its security. In this undertaking elliptic bend cryptography and Diffie–Hellman enter algorithm, itself will be a obscure (non-verified) key-understanding convention, it provides for those introduce should a combination about affirmed conventions, Also is used will provide for forward puzzle on web projects requisition using HTTPS. For its common sending on the web, HTTPS accommodates affirmation of the webpage What's more web server is related and individual is chatting , which guarantees that Man-in-the-middle ambushes. Additionally, it accommodates bi-directional encryption for correspondences between A customer Moreover server, which guarantees against tuning in On Besides altering and furthermore dealing with those substance of the correspondence.

### 2. LITERATURE SURVEY

Neha Jha and Brajesh Patel[1] have said in their paper that, Elliptic Curve cryptography and Diffie - Hellman key Algorithm are extremely vigorous in giving front end security to the web programs. They have said diverse disservices of more seasoned cryptography frameworks and how this new framework conquers this impediment and furthermore clarified the sending of this calculation in HTTPS conventions.

Kefa Rabah[2] has said dangerous development in online exchanges, change of data over a system and inadequacies of those, so they similarly determined the advantages of Diffie-Hellman key and Elliptic Bend Cryptography calculation and other propelled cryptography frameworks.

Raghavan and P. Darwin[4] have said over their paper that done framework client server correspondence who allotments the mystery word, checks correspondence between them a d same time set up cryptographic enter by exchange for messages Also information. An client will store An mystery expression ordinarily for the customer quit offering on that one server What's more assuming that that server bombs At that point unauthenticated get on might happen with the goal keeping for mind the conclusion objective to keep up a key separation from that they need suggested a two server show for including more stupendous security.

K. Suganya What's more k. Ramya [5] displays An security transform that makes those Diffie-Hellman way assention Furthermore encryption contrive more secure against assaults, for example, those known plaintext assaults, it prescribes the use of randomized parameter to both plans, this will permits with convey in turn common puzzle magic every the long haul a correspondence session will be fabricate Also on make different encryption messages for an extensive variety for messages regardless for same message, Appropriately making the Diffie-Hellman a greater amount secure contrasted and the fundamental structure of the Diffie-Hellman.

### **3. DESIGN METHODOLOGY**

An uncommon expansion operation may be characterized In elliptic curves What's more this for the consideration of a purpose O, called perspective toward boundlessness. In three focuses need aid with respect to an offering meeting a elliptic curve, and the aggregate is equivalent for side of the points towards boundlessness O, that demonstrations Likewise those personality lattice for this expansion operation.


Fig 1:Elliptic curve

To use the elliptic bend cryptography the bend should not be singular this is one of the important condition to be followed for obtaining the polynomial:

The equation for the elliptic curve is given as:

 $y^{2} + mny + ny = m^{3} + px^{2} + qx + r....(3.1)$ 

m, n, p, q, and r, are real numbers.

 $f(x) = m^3 + pm + q....(3.2)$ 

 $4p^{3} + 27q^{2} \neq 0$  .....(3.3)

Figures 3.1 and 3.2 shows the two elliptic curves

 $n^{2} = m^{3} + 2m + 5$  .....(3.4) and  $n^{2} = m^{3} - 2 + 1$ ....(3.5).

Should be obvious the individuals two equations meet a elliptic aggregation over those Galois field Ep (p,q) will be got Eventually Tom's perusing registering m3 + pm+ q mod encountered with urban decay because of deindustrialization, engineering concocted, for  $0 \le m < p$ . For the value of constant p the value of q must be the positive number and it should be more than the number that we have taken as a prime s.As the "mod s" has been used the equation (3.3) is given in below:

$$4p^3 + 27q^2 \mod s \neq 0....(3.6)$$



Fig 2:Elliptic curve at infinity

The example is taken as below, here the variable p and variable q are taken as in the elliptic set .The addition operation in the elliptic set is given as below:

(1) P+O = O + P = P

(2) If 
$$x^2 = x^1$$
 and  $y^2 = -y^1$ ,  
P(x1, y1) and Q = (x2, y2) = (x1-y1) = -P  
P+Q = O.

(3) If 
$$Q \neq -P$$

 $\mathbf{P} + \mathbf{Q} = (\mathbf{x3}, \mathbf{y3})$ 

 $x3 = \lambda - x1 - x2 \mod s$ 

 $y3=\lambda \left( \ x1-x3 \ \right) -y1 \ mod \ s$ 

#### 3.1 Diffie Hellman Key Exchange Algorithm

"Diffie-Hellman key trade (D-H)" it is a meticulous technique for safely trading cryptographic keys over an open channel and was one of the primary open key conventions as initially conceptualized by Ralph Merkle and named after Whitfield Diffie and Martin Hellman . " D - H" is considered as most punctual functional cases of open key trade executed inside the field of a cryptography.

The plan was first distributed by Whitfield Diffie and Martin Hellman in the year of 1976, yet in 1997 it was uncovered that James H. Ellis, Clifford Cocks and Malcolm J. Williamson of the GCHQ, British signs insight office, had beforehand demonstrated how open key cryptography could be accomplished.



Fig 3: Illustration of Diffie Hellman key exchange

#### **3.2** Cryptographic Explanation

The least complex and the first usage of the convention utilizes the numbers which are under modulus operation over numbers prime ie p and these operations are carried iut under multiplication. In this condition p is taken as prime and primeval root as "modulo p". For instance consider:

- 1. Bob and Alice are the two parties that are raedy to exchange the keys.consider number for prime as v=7 and base as h=3
- 2. The input of Alice is t=4.To calculate the public key  $T = h^t \mod v$

•  $T = 81 \mod 7 = 4$ 

3. The input of bob is u=3.To calculate private key  $U = h^u \mod v$ 

•  $U = 27 \mod 7 = 6$ 

- 4. The swaped key of alice is  $E=U^t \mod v$ 
  - $E = 6^{4} \mod 7 = 1$
- 5. The swaped key of bob is  $E = T^u \mod v$ 
  - $E = 4^3 \mod 7 = 1$
- 6. At last both the parties have the similar swap keys ie 1

As both the parties have the similar keys they are used for the encryption purpose for other fields known only to both for conveyance of post over a similar interchanging channels.

Bigger estimations of t, u, and v are expected as secured case, since there are about 7 conceivable consequences of n mod 7. No withstanding, if v is a prime of no less than 300 in number, t and u are no less than 100 in length, at that point even the quickest current PCs can't locate the given just h, v, hu mod p and ht mod v. The issue of PC desires to comprehend known as distinct logarithm issue. The computation of h t mod v is recognized as measured as exponentiation and must be possible productively notwithstanding in favor of vast figures. Notice that the h require not be expansive by any means, it should be typically a little prime (like 2, 3, 5...) on the grounds that primitive roots for the most part are very various.

#### 3.3 EC used on Fp Prime Field

The state of the elliptic bend on a prime field Fp is y2 mod  $p = x3 + ax + b \mod p$ , where  $4a2 + 23b2 \mod p \neq 0$ . Here the segments of the restricted field are numbers in the region of 0 and p - 1. Each one of the operations, for instance, development, substation, division, increment incorporates entire numbers in the region of 0 and p - 1. The prime number p is picked with the true objective that there is limitedly considerable number of spotlights on the elliptic bend to make the cryptosystem secure . SEC shows bends with p going between 112 - 521 bits. The arithmetical standards for point development and point increasing are balanced for elliptic bends over Fp. The development of two elliptic bend centers in Fp requires several number juggling operations (extension, subtraction, increment, inversion ) in the shrouded field.

#### **RESULT ANALYSIS**

Elliptic Curve Diffie-Hellman Key Exchange Algorithm Over GF(p) is implemented using Xilinx ISE Simulator and QUESTA SV/AFV -6.4 c simulator. The result consists of data flow diagrams and simulation waveforms along with the calculations



Fig 4.3: Symbol of ECDHKE for 8 bits





Fig 4.6:Simulation of ECDHKE of 256 bits

#### 4.1 Comparison of device utilization and timing report

Evaluated result for device utilization summary and timing report of Elliptic Curve Diffie-Hellman Key Exchange Algorithm over GF(P) for 5bits, 8bits, 16bits and 256bits.

| Logic Utilization | ECDHKE        | ECDHKE        | ECDHKE        | ECDHKE         |
|-------------------|---------------|---------------|---------------|----------------|
|                   | (5 bits)      | (8 bits)      | (16 bits)     | (256 bits)     |
| Number of slice   | 16 out of     | 23 out of     | 6242 out of   | 6229 out of    |
| Registers         | 11440 (0%)    | 11440 (0%)    | 11440 (54%)   | 301440 (2%)    |
| Number of slice   | 1593 out of   | 75 out of     | 10189 out of  | 11274 out of   |
| LUTs              | 5720 (27%)    | 5720 (1%)     | 5720 (178%)   | 150720 (7%)    |
| Number of LUT     | 1593          | 75            | 12023         | 13053          |
| FF pair used      |               |               |               |                |
| Number of IOs     | 18            | 31            | 51            | 768            |
| Number of         | 18 out of 102 | 30 out of 102 | 51 out of 102 | 768 out of 400 |
| Bonded IOBs       | (17%)         | (29%)         | (50%)         | (192%)         |
| Time delay        | 133.873ns     | 4.683ns       | 9.638ns       | 4.718ns        |
| Total REAL time   | 16.00secs     | 14.00secs     | 286.00secs    | 282.00secs     |
| to XST            |               |               |               |                |
| completion        |               |               |               |                |
| Total CPU time    | 16.47secs     | 14.07secs     | 285.90secs    | 282.52secs     |
| to XST            |               |               |               |                |
| completion        |               |               |               |                |

Table 1: Device utilization and timing summary of ECDHKE



Fig 4.7: Bar graph comparison of ECDHKE

#### **5. CONCLUSIONS**

The work presented here consists of Diffie-Hellman Key Exchange Algorithm using Elliptic Curve protocol over galois field of prime numbers which is regular and expandable and makes it easy to realize with currently available VLSI technology. It provides more network security compared to various other algorithms. Both elliptic curve cryptography and diffie hellman key exchange algorithm are synthesized using the Xilinx tool and Questa sim tool. Comparing the device utilization and timing summaries of the results for different bits, the elliptical curve diffie hellman key exchange algorithm over GF(P) with the higher bits utilized least resources compared to lower bits results, this method represents that as higher bits are compared the key sizes are reduced and they use less resources. ECDHKE over GF(P) with the lower key sizes is an efficient one compared to other algorithms.

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#### EFFECTIVENESS OF CORPORATE GOVERNANCE PRACTICES AND ITS IMPACT ON PERCEPTIONS OF SENIOR MANAGEMENT

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#### ABSTRACT

This paper examines the impact of Corporate Governance (CG) practices on the perception of senior management. This impact has been tested by taking various commercial banks in India by convenience sampling method for the financial year 2015-2016. Different statistical tools are applied to test the impact of CG practices and its effectiveness on senior management in these commercial banks. Various senior management officials have been given the questionnaires to know their perception. The questionnaire is based on Five Point Likert Scale. The most prominent result of this paper is significant impact of all the independent variables such as board meetings, board composition, board responsibility, enabling shareholders rights except ownership structure. It can be concluded in the findings that the perception of senior management towards Corporate Governance practices is effective.

Key Words: Corporate Governance, Commercial Banks, Perceived Effectiveness, Perceptions.

#### INTRODUCTION

Corporate Governance is a sum of relations between management, board, major and minor stakeholders and other interested groups. A good system of corporate governance contributes to sustainable economic growth, strengthening of the efficiency of economic societies and the improvement of their access to external sources of capital. The parties that are involved in corporate governance, whether direct or indirect, have an interest in the financial performance of the corporation. The people involved such as directors, management and staff will receive remuneration, benefits and reputation, in which the investors expect the returns. Customers and beneficiary communities are concerned with the certainty of the provision of goods and services of an appropriate quality; suppliers are concerned with compensation for their goods or services, and the possible continued trading relationships. Regulators and donors are usually concerned with compliance with the laws that govern the operations of the company.

The decision of the stakeholder to participate or engage with the company is their confidence that they will be receiving the expected outcomes. When they lose their confidence of being controlled and directed in a manner consistent with their desired outcomes, there will be uncertainty for being engaged with the company.

Corporate governance is defined as the structures and processes by which companies are directed and controlled. Good corporate governance helps companies operate more efficiently, improve use of capital, reduce risk and safeguard against mismanagement. It makes companies more accountable and transparent to investors and gives them the tools to respond to stakeholder concerns. Corporate governance also contributes to development. Increased access to capital encourages new investments, boosts economic growth, and provides employment opportunities.

#### INTERNAL MECHANISM

The foremost sets of controls for a corporation come from its internal mechanisms. These controls monitor the progress and activities of the organization and take corrective actions when the business goes off track. Maintaining the corporation's larger internal control fabric, they serve the internal objectives of the corporation and its internal stakeholders, including employees, managers and owners. These objectives include smooth operations, clearly defined reporting lines and performance measurement systems. Internal mechanisms include oversight of management, independent internal audits, structure of the board of directors into levels of responsibility, segregation of control and policy development. (Julie Davoren, 2015)

#### EXTERNAL MECHANISM

External control mechanisms are controlled by those outside an organization and serve the objectives of entities such as regulators, governments, trade unions and financial institutions. These objectives include adequate debt management and legal compliance. External mechanisms are often imposed on organizations by external stakeholders in the forms of union contracts or regulatory guidelines. External organizations, such as industry associations, may suggest guidelines for best practices, and businesses can choose to follow these guidelines or ignore them. Typically, companies report the status and compliance of external corporate governance mechanisms to external stakeholders. (Julie Davoren, 2015)

In the banking system, effective CG practices are necessary for achieving and maintaining the public trust and confidence. Poor CG may lead to bank failures and it can also lead to markets to lose confidence. Therefore the ability of a bank to manage its assets and liabilities could turn in liquidity crisis. As the banks are responsible to their shareholders, they also have the responsibility to their depositors.

The increased competition has led to the effectiveness of CG for protecting shareholders interest. CG is a system of structuring, operating and controlling a company with a view to achieve long term strategic goals to satisfy its shareholders, creditors, employees, customers and suppliers.

Corporate governance mechanisms are often broadly divided into two categories: mechanisms internal to the company, such as the board of directors and the senior management team, and mechanisms external to the company, including shareholders, creditors, customers and suppliers. (Sim Shuzhen ,2015)

Lee (2015) is particularly interested in checks and balances that are imposed by a company's senior management team itself and in whether or not these contribute to the effectiveness of overall corporate governance.

#### PERCEIVED EFFECTIVENESS OF CORPORATE GOVERNANCE MECHANISMS:

Banks play a pivotal role in the financial and economic system of the nation. Banks are critical components of the economy while providing finance for commercial enterprises, basic financial services to broad segment of population and access to payment system.

Effective CG practices are essential in achieving and maintaining public trust and confidence in the system. From a banking industry perspective, CG involves the manner in which the business and affairs of banks are governed by their board they function. The corporate governance framework in banks has been strengthened through regulation, supervision and by maintaining constant interaction with the management.

In organizations, perceptions of leaders, managers and employees shape the climate and effectiveness of the working environment. Perception is the way we all interpret our experiences. Having the right perception is significant skill for any effective leadership.

The top management plays a crucial role in every organization. So, the top management of banks should attach considerable importance to improve the ability to identify, measure, monitor and control the overall level of risks undertaken.

The board of directors, to whom a company's senior management is accountable, is considered a key internal governance mechanism. But much less is known about corporate governance mechanisms that operate closer to the ground, deeper within the company itself. (Sim Shuzhen ,2015)

#### STATEMENT OF THE PROBLEM

It is hypothesised that senior management have perceptions of their roles as effective managers. The market regulator Securities Exchange Board of India (SEBI), the Basel Committee on Banking Supervision (BCBS), the Organisation for Economic Co-operation and Development (OECD) and various committees have given their codes on corporate governance mechanisms, but how much of that is perceived by the senior management is crucial.

#### LITERATURE SURVEY

Westphal and Zajac (1997) in their study noted that board of directors is an important governance mechanism in United States Corporations and thus the board's role is rapidly evolving as a major strategic force in U.S. business firms. Kathuria and Dash (1999) in their empirical study revealed that the size of the board plays an important role in influencing the financial performance of corporations. They concluded that the performance improves if the board size increases, but the contribution of an additional board member decreases as the size of the board increases. In other words, corporations which already have a high average board size do not gain much if an additional board member joins. Spenger (2003) in his empirical study highlighted that today the companies are violating the shareholder rights in various aspects. He also elaborated' the best-known violation techniques of shareholder rights adopted by the companies from time to time like share dilution, delayed dividend payments, asset stripping or transfer pricing, disinformation and outright deception, etc. McGregor (2003) recognized the key human components of corporate governance as, knowledge of the key business issues, the key people and the capacity of the company to deliver sound results with no unpleasant surprises; The right composition, balance of power and succession planning; High level decision making, including the ability to deal with complex information; and Effective working relationships between the board, fund managers, other shareholders and owners, management and other stakeholders.

Angrish (2003) stated that corporate governance is a set of systems and processes which ensures that a company is managed to the best interests of all stakeholders. The set of systems that aid the task of corporate governance, which include certain structural and organisational aspects and the process vacillating corporate governance that embrace how things are done within such structure and organizational systems. He examined the ways through which disclosure norms that are the part of the control mechanism, keep a tab on corporate sector. He has also elaborated the various provisions contained in various legislative pieces having a bearing on corporate governance.

Rahman and Ali (2006) investigated the extent of the effectiveness of the board of directors, the audit committee and concentrated ownership in constraining earnings management among Malaysian listed firms. Their study reveals that earnings management is positively related to the size of the board of directors. Arguden (2010) studied the effectiveness of corporate governance. He said that gender, nationality and age diversity are not sufficient to evaluate the effectiveness of a board. We should also evaluate the relevance of experience of board members to address the main challenges the company is like to face. He also said that quality of the information that the board gets is a key determinant of its effectiveness. Sahu & Manna (2012) investigated that whether the corporate board composition and board meeting affect the performance of selected Indian manufacturing companies. The study period was taken from April 2006 to March 2011 on 52 manufacturing companies. They measured the corporate performance through the measure like ROA, ROCE, RONW, Tobin's Q and EVA, MVA. The results showed that board size and board meetings have a positive impact on corporate performance whereas independence of the board and presence of non-executive chairman in the board has negative impact. Also found that there is no significant relationship between the proportion of executive directors in the board and the performance of the companies.

Bhalla (2012) studied the perception of senior and middle level executives in indian companies. It is from three public companies and three from private. The result of the study was that there was no significant difference between the respondents of public and private companies. The study noticed that the respondents have same vies related to Corporate Governance Practices. Cram et.al. (2013) did their large scale study on importance of perceived effectiveness, organization and management support for innovative culture and their study revealed that perceived effectiveness is also important to innovative culture. Managers should carefully consider health care professional's perceived effectiveness during implementation to ensure their commitment to project success.

**Research Gap:** The review of literature indicates that even though there is a plethora of research literature on CG, most of the studies have been done on its conceptual framework, the practices of CG, the role of the board and shareholders wealth maximisation for the efficient markets of the developed nations of the world like US, UK etc., In India, very limited research work is done on perception of the senior management on CG practices and the prevalent situation in listed commercial banks in is rarely studied even though as per the code issued by Government they have to follow CG practices mandated in the listing agreement.

## RESEARCH METHODOLOGY

#### **OBJECTIVE OF THE STUDY**

The prime and only objective is to identify the effectiveness of perception of senior management towards corporate governance mechanisms such as Board Meetings, Board Responsibility, Enabling Shareholder Rights and Ownership structure.

#### HYPOTHESIS

Keeping the objective of the study in mind, the following hypotheses are set for the study:

H1: Board Meeting has a positive impact on Perceived Effectiveness.

- H2: Board Composition has a positive impact on Perceived Effectiveness
- H3: Board Responsibility has a positive impact on Perceived Effectiveness.
- H4: Enabling Shareholders Rights has a positive impact on Perceived Effectiveness.

H5: Ownership Structure has a positive impact on Perceived Effectiveness.

#### **RESEARCH DESIGN**

The research methodology used in this study is described and the research propositions relating to the objectives of the study are stated. In addition, the variables, questionnaire design and techniques used to analyse data are stated.

#### SAMPLE

The convenient with size of 198 respondents has been taken from various public and private sector commercial banks in India.

| Questionnaires | Public Sector Banks | <b>Private Sector Banks</b> | Total  |  |  |  |  |
|----------------|---------------------|-----------------------------|--------|--|--|--|--|
| Delivered      | 134                 | 119                         | 253    |  |  |  |  |
| Collected      | 106                 | 92                          | 198    |  |  |  |  |
| Response Rate  | 79.10%              | 77.13%                      | 78.26% |  |  |  |  |

Data Collection /Sector-wise Response Rate

#### **COLLECTION OF DATA**

This study is based exclusively on primary data. The primary data have been obtained through the administration of a structured questionnaire from the senior management. i.e. various types of board of directors, General Managers, Deputy General Managers, Assistant General Managers, Vice-president etc. The questionnaire has been structured on Five Point Likert Scale.

#### SAMPLING TECHNIQUE

The sampling technique used in this study is convenience sampling. Convenience sampling is a type of nonprobability sampling which involves the sample being drawn from that part of the population which is close to hand. That is, a sample population selected because it is convenient. It may be through meeting the person or including a person in the sample when one meets them or chosen by finding them through technological means such as the internet or through phone. The data is collected from various Public and Private Sector Commercial Banks in India.

#### VARIABLES STUDIED

The variables selected under the study include:

Dependent Variable: Perceived Effectiveness of the board – Board Evaluation, Board Effectiveness

**Independent Variable: Corporate Governance Mechanisms -**Board Meetings, Board Composition, Board Responsibility, Enabling Shareholders Rights, Ownership Structure

#### ANALYSIS OF DATA

To analyse the data collected on perception of senior management on corporate governance practices in Commercial Banks in India, the following statistical tools have been applied for arriving out the relevant inferences on the data through SPSS package.

1. KMO and Bartlett's Test

- 2. The test of reliability (Cronbach's Alfa) has been used to know the internal consistency between the variables.
- 3. Factor Analysis
- 4. Linear Regression, ANOVA

#### **CONCEPTUAL MODEL**

The conceptual model is the combination of various dependent and independent variables. In this model there is one dependent variable that is Perceived Effectiveness of Corporate Governance Mechanisms and six independent variables such as Board Meetings, Board Composition, Board Responsibility, Enabling Shareholders Rights and Ownership Structure.

The model used to conceptualize the dependent and independent variables is based on many other models used by different researchers over the years.



#### **RESULTS OF THE STUDY**

Table 1 represents the Sampling Adequacy and Sphericity with the help of KMO and Bartlett's Test.

| Kaiser-Meyer-Olkin Measure    | .546                        |          |
|-------------------------------|-----------------------------|----------|
|                               | Approx. Chi-Square          | 7964.220 |
| Bartlett's Test of Sphericity | df                          | 630      |
|                               | Sig.                        | .000     |
| (Sources Former               | lated by the Decomposition) |          |

(Source: Formulated by the Researcher)

Table 1 explains the Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Barlett's test of Spericity. A value close to 1 indicates that patterns of correlations are relatively compact and so factor analysis should yield distinct and reliable factors. Kaiser (1974) recommends accepting values greater than 0.5 as acceptable. As in the above table the value is 0.546 which indicates the value is mediocre. So, we can say that factor analysis is appropriate for these data.

Bartlett's measure tests the null hypothesis that the original correlation matrix is an identity matrix. The significant test tells us that the R-matrix is not an identity matrix. Therefore we can conclude that there are some relationships between the variables. For the above data, the Barlett's test is highly significant (p<0.001) and therefore factor analysis is appropriate.

|                           | Component |      |      |      |      |      |     |
|---------------------------|-----------|------|------|------|------|------|-----|
|                           | 1         | 2    | 3    | 4    | 5    | 6    | 7   |
| Our bank is making        |           |      |      |      |      |      |     |
| progress towards the      | .098      | .160 | .608 | .282 | 038  | .000 | 109 |
| stated Mission and Vision |           |      |      |      |      |      |     |
| BM confidence to share    |           |      |      |      |      |      |     |
| information with all      | .187      | .093 | .674 | .204 | .057 | .277 | 099 |
| stakeholders              |           |      |      |      |      |      |     |

Table 2: Rotated Component Matrix<sup>a</sup>

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| 1  |      | 1    | I    | I    | I    | I    | 1    |
|--|------|------|------|------|------|------|------|
| Board notess are<br>comprehensive and cover<br>all areas as advised by<br>RBI and GOI from time<br>to time               | .291 | .151 | .596 | .117 | .377 | .298 | .162 |
| Adequate process for<br>orienting and educating<br>Neww directors.   | .086 | .539 | .050 | .006 | .366 | .267 | .098 |
| Board monitors financial<br>and other indicators and<br>takes appropriate action   | .228 | .623 | .587 | 060  | .128 | 014  | .004 |
| as required.<br>Board regularly asses<br>strategic and operating<br>risks and takes<br>appropriate action as<br>required | .242 | .607 | .585 | 124  | .254 | 176  | .047 |
| There is trustworthy<br>relationship between the<br>corporatitons and its<br>stakeholders in our bank.                   | .026 | .609 | .389 | .078 | 188  | .278 | 049  |
| Our bank has capacity to<br>adapt to the changing<br>environment   | 091  | .433 | .394 | .175 | .520 | 010  | 029  |
| Our bank management is proactive   | 147  | .173 | .391 | .132 | .510 | .222 | 178  |
| written list of<br>responsibilities of the<br>directors  | 187  | .330 | .046 | .211 | .744 | .001 | 046  |
| It is ensured that effective implementation is done in our bank.   | .213 | .656 | .067 | .060 | .133 | .466 | 255  |
| The assessment of non-<br>compliance or listing<br>requirement is done in<br>our bank.                                   | .095 | .675 | .321 | .019 | .117 | .266 | 330  |
| The percentage of<br>government ownership<br>influences performance<br>of the bank                                       | 105  | .015 | 005  | 117  | 011  | .034 | .791 |
| The percentage of foreign<br>ownership influences<br>performance of the bank.  | .036 | 070  | 358  | 010  | 134  | 010  | .787 |

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| The newspaper of           |             |      |      |       |      |              |      |
|----------------------------|-------------|------|------|-------|------|--------------|------|
| institutitonal ownership   | 035         | 184  | .140 | .032  | .125 | 017          | .845 |
| nerformance of the bank    |             |      |      |       |      |              |      |
| Our board is about the     |             |      |      |       |      |              |      |
| right size not too big nor | 721         | 234  | 104  | 336   | 021  | - 141        | 040  |
| too small                  | .721        | .234 | .104 | .550  | .021 | .171         | .040 |
| Board size is effective at |             |      |      |       |      |              |      |
| monitoring senior          | .694        | .067 | .212 | 368   | 059  | 219          | 104  |
| management                 |             |      |      |       |      |              |      |
| Time spend on agenda of    |             |      |      |       |      |              |      |
| meetings is sufficient     | .724        | .085 | .054 | .213  | 140  | 060          | 082  |
| Agenda of meeting is       |             |      |      |       |      |              |      |
| given well in advance to   |             |      | 101  | . = . |      | - 1 <b>-</b> | 0.17 |
| adequately prepare for     | .750        | .318 | .184 | .179  | 159  | 047          | 065  |
| meetings                   |             |      |      |       |      |              |      |
| Quality discussions takes  | <b>5</b> 04 | 246  | 100  | 202   | 0.27 | 100          | 0.20 |
| place in board meetings    | .584        | .346 | .189 | .293  | .037 | .133         | .038 |
| Amount spent on            |             |      |      |       |      |              |      |
| discussions on strategic   | 700         | 022  | 0.67 | 120   | 071  | 227          | 074  |
| and general issues is      | .700        | .023 | .067 | .129  | .271 | .327         | 074  |
| sufficient                 |             |      |      |       |      |              |      |
| The number and length of   |             |      |      |       |      |              |      |
| board meetings is          | .713        | .081 | 003  | .027  | .162 | .181         | 017  |
| appropriate                |             |      |      |       |      |              |      |
| Board receives             |             |      |      |       |      |              |      |
| adequately and timely      | .725        | .030 | .188 | 078   | .043 | .275         | .015 |
| information prior to BMs   |             |      |      |       |      |              |      |
| Individual directors       |             |      |      |       |      |              |      |
| attendance in the board    | .307        | .050 | 008  | .036  | .719 | .013         | .200 |
| meetings is assessed.      |             |      |      |       |      |              |      |
| Board have right mix of    |             |      |      |       |      |              |      |
| charatistics experience    | .279        | 079  | .243 | .843  | 043  | .068         | 227  |
| Gender                     |             |      |      |       |      |              |      |
| Ethnicity                  | .198        | .096 | .101 | .844  | .154 | .045         | .014 |
| Age                        | .142        | .471 | .195 | .750  | .175 | 093          | .078 |
| Field of Expertise         | .283        | .674 | .107 | .428  | .089 | .011         | 286  |
| Board has right number     |             |      |      |       |      |              |      |
| of committees of an        |             |      |      |       |      |              |      |
| appropriate size and       | .729        | .157 | 067  | .182  | 133  | .375         | 252  |
| composition to perform     |             |      |      |       |      |              |      |
| their work effectively and |             |      |      |       |      |              |      |
| efficiently                |             |      |      |       |      |              | l    |

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| Delegation of<br>responsibilities by the<br>board to its committees ia<br>appropriate                    | .401 | .718 | .042 | .075 | .314 | 022  | 057  |
|--|------|------|------|------|------|------|------|
| number and length of<br>committee meetings is<br>appropriate   | .534 | .299 | 026  | .187 | .170 | .052 | .175 |
| Committee regularly<br>review its mandate and<br>performance   | .370 | .728 | .034 | .170 | .108 | .202 | .048 |
| Minority shareholders<br>rights are protected.   | .453 | .205 | .339 | 002  | 072  | .479 | .244 |
| to remove and elect<br>members of the board  | .234 | .202 | .234 | .018 | 026  | .677 | .130 |
| The reason for absence of<br>directors in board<br>meetings is clearly<br>mentioned in annual<br>report. | .039 | .025 | .005 | 148  | .619 | .491 | 194  |
| Our bank discloses the information of  | .046 | .167 | .028 | .036 | .250 | .784 | 060  |

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 10 iterations.

managerial ownership

(Source: Compiled by the Researcher)

The above table shows the rotated component matrix which is a matrix of factor loadings for each variable on to each factor. This matrix is calculated after rotation. The factor loadings less than 0.4 have been supressed. The content of questions that load on to same factor is shown in the table with seven factors and also identified the common themes. The factors are

In Perceived Effectiveness two factors have been identified

- Factor 1 Board Evaluation (BEVA)
- Factor 2 Board Effectiveness (BEFF)

In Governance Factors five factors have been identified

- Factor 1 Board Meetings (BM)
- Factor 2 Board Composition (BCOM)
- Factor 3 Board Responsibility (BRES)
- Factor 4 Enabling Shareholders Rights (ESHR)
- Factor 5 Ownership Structure (OS)

Table 3 is the table which represents the values of Cronbach's Alfa considering all the dependent and independent variables.

| Cronbach's Alpha  | N of Items |  |  |  |
|---|------------|--|--|--|
| .913  | 36         |  |  |  |
| $(\mathbf{C}_{1}, \dots, \mathbf{C}_{n}, \dots, \mathbf{C}_{n}, \dots, \mathbf{C}_{n})$ |            |  |  |  |

(Source: Compiled by the Researcher)

The above table 3 of Reliability test (Cronbach's Alfa) shows that there is high internal consistency between all the variables as the value is .913 with number of items 36. (Note that a reliability coefficient of .70 or higher is considered "acceptable" in most social science research.

Table 4 represents variable wise values of Cronbach's Alfa.

| Table 4: Results of Cronbach's Ana                  |       |              |  |  |  |
|---|-------|--------------|--|--|--|
| Variables   | Value | No. of Items |  |  |  |
| Perceived Effectiveness (Board Evaluation) - DV     | .913  | 9            |  |  |  |
| Perceived Effectiveness (Board Effectiveness) - DV  | .700  | 3            |  |  |  |
| Board Meetings (Independent Variable)               | .902  | 10           |  |  |  |
| Board Composition (Independent Variable)            | .887  | 3            |  |  |  |
| Board Responsibility (Independent Variable)         | .747  | 5            |  |  |  |
| Enabling Shareholders Rights (Independent Variable) | .743  | 3            |  |  |  |
| Ownership Structure (Independent Variable)          | .797  | 3            |  |  |  |
| (Source: Compiled by the Desearch                   | an)   |              |  |  |  |

### Table 4. Desults of Cronbach's Alfa

(Source: Compiled by the Researcher)

The alpha coefficient for the dependent variable i.e. perceived effectiveness is .913 when Board Evaluation is taken and .700 when Board Effectiveness is taken and for all other independent variables it is more than .70 suggesting that the items have relatively high internal consistency.

#### Regression

#### **Dependent Variable- Board Evaluation**

Table 5 : Model Summarv

| Model | R                 | R Square | Adjusted R<br>Square | Std. Error of the Estimate |
|-------|-------------------|----------|----------------------|----------------------------|
| 1     | .726 <sup>a</sup> | .527     | .515                 | 3.56561                    |

a. Predictors: (Constant), OS, ESHR, BCOM, BRES, BM

#### Table 6 : ANOVA<sup>a</sup>

| Model |            | Sum of<br>Squares | df  | Mean<br>Square | F      | Sig.              |
|-------|------------|-------------------|-----|----------------|--------|-------------------|
|       | Regression | 2720.451          | 5   | 544.090        | 42.796 | .000 <sup>b</sup> |
| 1     | Residual   | 2441.003          | 192 | 12.714         |        |                   |
|       | Total      | 5161.455          | 197 |                |        |                   |

a. Dependent Variable: BEVA

b. Predictors: (Constant), OS, ESHR, BCOM, BRES, BM

(Source: Compiled by the Researcher)

Table 5 the model summary and Table 6 ANOVA constitute important observation. In this the dependent variable perceived effectiveness is taken as board evaluation. The R value is .726 indicates common variation (nothing but the correlation) between the independent and dependent variables. The above table shows that Rsquare is (0.527) and Adj. R-square value (0.515) explains around 53% of variance in Perception of senior management (DV) is explained by the factors that influence the perceived effectiveness of Corporate Governance Mechanisms. 53% fluctuation of Perception of Senior Management jointly can influence by the 5 variables in the sample but not in the population. The above ANOVA table explains that the model is good fit at the significance level of 0.05 (the significance of p-value < 0.05). It means this model well explains the extent of variance of perceived effectiveness of the senior management towards corporate governance mechanisms.

|       | Table 7: Coefficients <sup>a</sup> |                                |               |                              |        |      |                     |                       |
|-------|------------------------------------|--------------------------------|---------------|------------------------------|--------|------|---------------------|-----------------------|
| Model |                                    | Unstandardized<br>Coefficients |               | Standardized<br>Coefficients | t      | Sig. | 95.0% Co<br>Interva | onfidence<br>al for B |
|       |                                    | В                              | Std.<br>Error | Beta                         |        |      | Lower<br>Bound      | Upper<br>Bound        |
|       | (Const<br>ant)                     | 966                            | 1.771         |                              | 546    | .586 | -4.459              | 2.527                 |
|       | BM                                 | .361                           | .068          | .325                         | 5.339  | .000 | .227                | .494                  |
| 1     | BCOM                               | .386                           | .152          | .144                         | 2.546  | .012 | .087                | .685                  |
|       | BRES                               | .694                           | .114          | .332                         | 6.068  | .000 | .468                | .919                  |
|       | ESHR                               | .628                           | .190          | .194                         | 3.295  | .001 | .252                | 1.003                 |
|       | OS                                 | 309                            | .114          | 137                          | -2.703 | .007 | 534                 | 083                   |

a. Dependent Variable: BEVA

(Source: Compiled by the Researcher)

The co-efficient results provide support all the hypotheses from H1 to H5. It means all the variables such as board meetings, board composition, board responsibility, enabling shareholder rights and ownership has a positive impact on perceived effectiveness of Corporate Governance as the p values are .000, .012, .000, .001 and .007 which less than 0.05 that indicates the value is significant. All the independent variables selected has positive significant impact on perceived effectiveness except ownership structure. Ownership structure has a negative significant impact on the perceived effectiveness. The results could be explained by the facts that the variables such as board meetings, board composition, board responsibility, enabling shareholder rights and ownership structure explain the perceived effectiveness of Corporate Governance Mechanisms.

#### **REGRESSION RESULTS**

#### 2. Dependent Variable- Board Effectiveness

The below are the regression results of the second dependent variable and all independent variables.

| Table 8: Model Summary                |                   |      |        |               |
|---------------------------------------|-------------------|------|--------|---------------|
| ModelRR SquareAdjusted RStd. Error of |                   |      |        | Std. Error of |
|                                       |                   |      | Square | the Estimate  |
| 1                                     | .650 <sup>a</sup> | .422 | .407   | 1.15716       |

a. Predictors: (Constant), OS, ESHR, BCOM, BRES, BM

| Table 9:                  |  |
|---------------------------|--|
| <b>ANOVA</b> <sup>a</sup> |  |

| Model |            | Sum of<br>Squares | df  | Mean<br>Square | F      | Sig.              |  |
|-------|------------|-------------------|-----|----------------|--------|-------------------|--|
|       | Regression | 187.682           | 5   | 37.536         | 28.033 | .000 <sup>b</sup> |  |
| 1     | Residual   | 257.091           | 192 | 1.339          |        |                   |  |
|       | Total      | 444.773           | 197 |                |        |                   |  |

a. Dependent Variable: BEFF

b. Predictors: (Constant), OS, ESHR, BCOM, BRES, BM

From the above tables it is clear that the model is the good fit as ANOVA table gives the significant result. The R value is .650 that the noting but the correlation between the board effectiveness and board meetings, board composition, board responsibility, enabling shareholders rights and ownership structure. The R-square value is .422, it means 42% of variance in Perception of senior management (DV) is explained by the factors that influence the perceived effectiveness of Corporate Governance Mechanisms when board effectiveness is considered.

|       | Table 10: Coefficients <sup>a</sup> |                |                        |                              |       |      |                     |                       |
|-------|-------------------------------------|----------------|------------------------|------------------------------|-------|------|---------------------|-----------------------|
| Model |                                     | Unstan<br>Coef | ndardized<br>fficients | Standardized<br>Coefficients | t     | Sig. | 95.0% Co<br>Interva | onfidence<br>Il for B |
|       |                                     | В              | Std.<br>Error          | Beta                         |       |      | Lower<br>Bound      | Upper<br>Bound        |
|       | (Const<br>ant)                      | 258            | .575                   |                              | 448   | .655 | -1.391              | .876                  |
|       | BM                                  | .050           | .022                   | .154                         | 2.291 | .023 | .007                | .093                  |
| 1     | BCOM                                | .229           | .049                   | .291                         | 4.662 | .000 | .132                | .327                  |
|       | BRES                                | .129           | .037                   | .210                         | 3.468 | .001 | .056                | .202                  |
|       | ESHR                                | .259           | .062                   | .273                         | 4.192 | .000 | .137                | .381                  |
|       | OS                                  | 032            | .037                   | 048                          | 867   | .387 | 105                 | .041                  |

a. Dependent Variable: BEFF

The above coefficient table explains that all the variable have a positive significant impact on the perceived effectiveness of senior management except ownership structure. The ownership structure has a negative insignificant impact on the perceived effectiveness. It may be because of government ownership we find only in public sector banks.

#### FINDINGS OF THE STUDY

Any corporation is governed by the Board of Directors and the Management. They are responsible for good/bad/effective/ineffective governance. Effectiveness of Corporate Governance is normally mistaken to compliance of the Board, Management to the standards and guidelines defined for governing the corporation. The findings of the study say that the model is a good fit. The independent variables selected for the study jointly influence the perception of the senior management towards corporate governance mechanisms. In case of ownership structure we can say that the percentage of government ownership, foreign ownership and institutional ownership does not impact the board effectiveness. As the study considered both the public and private sector banks most of the private banks officials may think that whoever may be the owner it will not affect the banks. In public sector we find that 51% is government ownership. The perception of all senior management officials towards other variables such as board meetings, board composition, board responsibility and enabling shareholder rights is effective. The main responsibilities of the board are to provide effective Oversight and strategic Guidance for the management.

Ownership structure is one of the main dimensions of corporate governance and is widely seen to be determined by other country-level corporate governance characteristics such as the development of the stock market and the nature of state intervention and regulation (La Porta, López-de-Silanes, Shleifer and Vishny, 1998).

#### DISCUSSIONS

#### (i) IMPLICATIONS

This study will help the senior management in identifying and understanding the main factors that influence the perceived effectiveness of corporate governance mechanisms. The senior management should concentrate on board meetings which play an important role in making the corporate governance effective.

#### (ii) LIMITATIONS OF THE STUDY AND SCOPE FOR FURTHER RESEARCH

The following are the limitations of the study:

- 1. This study was mainly on primary data collected from senior management of Indian commercial banks.
- 2. This study employed statistical tools which have certain inherent limitation.

The following are the pointers which can be used for further research:

- 1. A study with similar objective could be made with reference to other parameters.
- 2. A study with similar objective could be made from time to time.
- 3. A study with similar objective could be made as a comparative study of public sector with private sector banks in India.

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#### TECHNOLOGY-ENHANCED TEACHING ENGLISH AND DIRECT METHOD OF TEACHING ENGLISH AT UPPER PRIMARY LEVEL OF RURAL BACKDROP: A STUDY OF CORRELATION

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#### ABSTRACT

In the Indian backdrop teaching second language in the classroom situation is a challenging assignment. The teacher has to give maximum dedication to generate ESL skills among the learners who constitute a heterogeneous group in the class. Usually the teacher adopts the traditional grammar translation method to generate competencies among the  $L_2$  learners. But varied types of learners are not benefitted equally in this method. If learning situation is operated using the techniques associated with Direct Method, second language learning may bring variety to the learners and they might feel the urge to be engaged in the language learning process. Apart from this, if the ESL teacher gets technologically equipped, the learning situation might become so animating that the skill development among the ESL learners may take place in a desired manner. The present Study is an attempt to explore the effectiveness of teaching English with Direct Method and that using the effective application of the technology in the second language classroom situation at upper primary level of rural backdrop.

Key Words: Direct Method, Technology - Enhanced teaching Method, ESL learners, Upper Primary level

#### **1. INTRODUCTION**

In conventional learning situation the second language teacher aims to create a good learning environment in a stereotyped manner through which he seeks to grow productive skills (speaking and writing) and receptive skills (listening and reading) among the learners by means of providing ample verbal exposure of the second language in the conventional method. But the skill development can be made more feasible if second language learning situation is manipulated by the relevant application of some technology-enhanced methods. Again the advocates of the Direct Method think that ESL learning may be more positive if the teacher consciously uses strategies associated with the Direct Method. The present study is an attempt to explore the comparative effectiveness of Direct Method and technology-enhanced teaching method in terms of its application in the second language learning situations.

#### 2. OBJECTIVES OF THE STUDY

The investigator undertakes an experimental project to know:

- 1) Whether the application of specific methodological paradigm increases the requisite level of second language acquisition among the ESL rural learners belonging to the upper primary level under W.B.B.S.E. in the district of Birbhum
- 2) Whether the technology-enhanced method is more effective in language skill development than Direct Method of teaching English texts
- 3) Whether the Direct Method is more effective in language skill development than technology-enhanced method of teaching English texts
- 4) Whether second language learning with technology-enhanced method in classroom situation enhances the *retention* level of the learners belonging to the *rural* background in comparison to the Direct Method of teaching the same category of learners or vice versa

#### **3. REVIEW OF RELATED LITERATURE**

**Browse** (1986) reviewed research on learning from films and concluded that i) films are effective in teaching inquiry learning and problem solving, ii) low aptitude students tend to benefit more from films, iii) films can positively influence self concept. **West Laboratory** (1994) conducting review of current research and evaluation has determined that the integration of technology and telecommunication into education i) increases performances when interactivity is prominent, ii)improves aptitude and confidence –especially at risk students for solving any problems. **Means & Olson** (1997) found that technology can support teacher's effort to engage students in long term complex projects by dramatically enhancing student motivation, encouraging greater collaboration, and giving students additional impetus to take on an advisory role. **Vigotsky** (1972) found that in shared learning resources the students and the teachers enjoy the facility of shared information wherever they are in school through television monitor.

According to Franke (1884), German Scholar a language could best be taught by using it actively in the classroom. Rather than using analytical procedures that focus on explanation of grammar rules in classroom teaching, teachers must encourage direct and spontaneous use of the foreign language in the classroom. Learners would then be able to induce rules of grammar. Known words could be used to teach new vocabulary, using mime demonstration and pictures. The principles are seen in the following guidelines, according to Titone (1968):

- Never translate: demonstrate
- Never explain: act
- Never make a speech: ask questions
- Never speak with single words: use sentences

But the Direct method also have several drawbacks .The Harvard Psychologist Roger Brown (1973:5) described his frustration in observing a teacher performing verbal gymnastics in an attempt to convey the meaning of Japanese words ,when translation would have been a more efficient technique. However the Direct Method can be regarded as the first language teaching method to have caught the attention of teachers and language teaching specialists. It marked the beginning of the "Methods Era".

#### 4. STATEMENT OF THE PROBLEM

The problem under the present study is entitled:

Technology-Enhanced Teaching English and Direct Method of Teaching English at Upper Primary Level of Rural Backdrop: A Study of Correlation

#### 5. TERMS DEFINITIONS

**Technology-Enhanced Teaching:** The use of Computer, LCD projector are referred to here as the technologyenhanced learning materials as they aim to develop the basic language proficiency in terms of listening speaking, reading and writing with the effective and relevant use of the electronic media. The use of these media accelerates the process of communicative competence by generating the learners' productive skills.

**Direct Method:** Direct Method is based on the psychological principle of direct association between forms and meanings in the target language and provided for a theoretical justification for a monolingual approach to language teaching. It propagates that a language could best be taught by using it actively in the classroom. Rather than using analytical procedures that focus on explanation of grammar rules in classroom teaching, teachers must encourage direct and spontaneous use of the foreign language in the classroom. Learners would then be able to induce rules of grammar. Known words could be used to teach new vocabulary, using mime demonstration and pictures.

#### 6. HYPOTHESES

The following null *hypotheses* are formulated:

- There exists no significant correlation between the mean scores of pre-test and post test of the experimental group in rural school.
- There exists no significant correlation between the mean scores of post -test and retention test of the experimental group in rural school.
- There exists no significant correlation between the mean scores of pre-test and post test of the control group in rural school.
- There exists no significant correlation between the mean scores of post-test and retention test of the control group in rural school.

#### 7. DESIGN OF THE STUDY

Keeping in mind the objectives of the Present research the researcher has devised the necessary design which comprises the following components:

- Method of Study
- Population of Study
- Sample of the Study
- Sources of collection of data
- Procedure for investigation and data collection
- Data treatment

8. METHOD OF STUDY

The present study has been planned and implemented under experimental method. It aims at enumerating the effectiveness the second language teaching with Direct Method in comparison to technology enhanced teaching of second language at upper primary level rural classroom situation under West Bengal Board of Secondary Education. For the proper implementation of experimental design a school from the rural backdrop has been selected. Class VIII has been chosen for the purpose of experimentation of the teaching methods.

#### 9. POPULATION OF THE STUDY

The school belonging to Dubrajpur Block under the jurisdiction of Birbhum District has been selected deliberately for the specified purpose of investigation. The school from the rural background is Jashpur High School .Thus the pupils of the rural school constitute the population of the present study.

#### **10. SAMPLE OF THE STUDY**

The 8<sup>th class</sup> of the rural school has been fixed up for experimentation. Two sections of the 8<sup>th</sup> class of the school comprising 30 students each have been taken up for present study. Thus taken together total 60 students constitute the sample of the present study.

#### **11. SOURCES OF COLLECTION OF DATA**

In order to achieve of the present study the following tools were employed for collection of data:

- Pre-test of the students of the school
- The post-test of the pupils of the school
- The retention-test of the pupils of the school

The following scores will constitute the data for the present experiment

- The scores of the pre-test of the 8<sup>th</sup> class students
- The scores of the post-test of the 8<sup>th</sup> class students
- The scores of the retention test of the 8<sup>th</sup> class students

### 12. PROCEDURE FOR INVESTIGATION AND DATA COLLECTION

As mentioned earlier two sections of the  $8^{th}$  class of a rural school are definite backdrop for the present experimental research. A pre-test of the  $8^{th}$  class students of the rural school is taken. On the basis of the scores of the pre-test of the pupils of the said class of the rural school the pupils are equalized and they are divided into Experimental and Control group by using **pair random sampling technique.** It is to be mentioned at the outset that the number of pupils under each group is 30. The design is as follows:

- 1) Pupils are randomly assigned to two Groups (R)
- 2) One group will receive Experimental treatment (T)
- 3) One group will receive Control treatment (C)
- 4) Both the Groups will receive a Pre-test
- 5) Both the Groups will receive a Post-test
- 6) Both the Groups will receive Retention-test

#### 13. EXPERIMENTATION

After careful observation of the teaching learning situation of the Birbhum district, one rural school is selected as the experimental backdrop. The rural school, namely, Jashpur High School belongs to Dubrajpur Block. One English teacher, belonging to the school is selected to teach the Experimental group and the Control group.. The following two English prose texts prescribed by the West Bengal Board of Secondary Education for class VIII are selected for teaching both the experimental and control groups: 1.*The Great Escape* by Sugata Bose, 2. *The Happy Prince* by Oscar Wilde.

The teacher was provided with necessary orientation regarding the following points on the use of Direct Method through which the Control group will be taught.

- Never translate: demonstrate
- Never explain: act
- Never make a speech: ask questions
- Never speak with single words: use sentences

The teacher was also instructed to use English in a consistent manner minimising the use of mother tongue and inspiring the pupils to communicate only in the mode of target language. Use of gesture and countenance was the teaching style to be used for conveying the meaning of the foreign words.

The Experimental group is taught with the relevant use of the electronic media to help them gather concepts on the above mentioned texts. For the first text a documentary movie on Netaji's Escape relating to the text **The Great Escape** is shown with the help of LCD projector. On the subsequent day a power-point presentation highlighting the conceptual domain and also the specific structural pattern of the said texts is made in order to help them retain and also to consolidate their conception on the said text. The teacher here did not go through the text and explain verbally anything but after watching the movie the motivational level of the pupils was so high that they feel themselves to go through the text in a mode of self learning. As a result their concept formation gets geared up by the proper use of the teaching aids. The same procedure is taken for teaching the text **The Happy Prince** by Oscar Wilde.

#### **14. TEST CONSTRUCTION**

As mentioned earlier a pre-test was taken to divide the learners into Experimental and Control groups. After the experimentation of teaching comprising two weeks duration is over, a teacher-made post-test was taken to compare the effectiveness of the two methods. The investigator constructed both the pre-test and post-test after a careful consideration of the techniques of the principles of test construction on relevant sections of selected prose units. After a gap of one month a retention test of both the control group and the experimental group was taken. In addition, the consent of the class teacher and teaching experts were also weighed in the construction of the tests. Each test comprises 50 multiple choice types items based on the selected prose units of 8<sup>th</sup> class. While constructing the texts the dimensions of the language and structures are taken into consideration.

#### **15. RELIABILITY OF THE TEST**

Spearman-Brown Prophecy formula is used to determine the reliability of the pre-test and post-test. Here the reliability is estimated by comparing the halves of the pre-test and post-tests. In this way the reliability co-efficient is found to be 0.69.

#### **16. ANALYSIS OF DATA**

Raw scores obtained from pre-tests, and post-test and retention test were presented in a tabular form for the purpose of interpretation.

 $H_0$  1: There exists no significant correlation between the scores of pre-test and post test of the experimental group in rural school

Table-1: Table of correlation between the scores of pre-test and post test of the experimental group in rural school

|    | 5411001   |           |  |  |  |
|----|-----------|-----------|--|--|--|
|    | V1        | V2        |  |  |  |
| V1 | 1.0000000 | 0.938551  |  |  |  |
| V2 | 0.938551  | 1.0000000 |  |  |  |

Here V1 and V2 implies that the correlation between the scores of pre-test and post test of Experimental group is **0.938551** 

The obtained result shows that there exists a high degree of correlation between the scores of pre-test and post test of the Experimental group, which signifies that the achievement level of the pupils through teaching by technology-enhanced teaching method has resulted in the skill development of the ESL learners.

 $H_0$  2: There exists no significant correlation between the scores of post -test and retention test of the experimental group in rural school

 Table-2: Table of correlation between the scores of post-test and retention test of the in rural school
 experimental group

|    | V2        | V3        |  |  |  |  |
|----|-----------|-----------|--|--|--|--|
| V2 | 1.0000000 | 0.9389332 |  |  |  |  |
| V3 | 0.9389332 | 1.0000000 |  |  |  |  |

Here V2 and V3 implies the correlation between the scores of post test and retention test of Experimental group is 0.9389332

The obtained result shows that there exists a high degree of correlation between the scores of and post test and retention test of the Experimental group, which signifies that the achievement level of the pupils through

teaching by technology-enhanced teaching method has resulted in high level of skill development of the ESL learners.

 $H_0$  3: There exists no significant correlation between the scores of pre-test and post test of the control group in rural school.

 Table-3: Table of correlation between the scores of pre-test and post test of the control
 group in rural school

|    | V1                | V2        |
|----|-------------------|-----------|
| V1 | 1.0000000         | 0.9293541 |
| V2 | 0. <b>9293541</b> | 1.0000000 |

Here V1 and V2 implies that the correlation between the scores of pre-test and post test of Control group is 0.9293541

The obtained result shows that there exists a very high degree of correlation between the scores of pre-test and post test of the Control group, which signifies that the achievement level of the pupils through teaching by Direct Method has resulted in the skill development of the ESL learners.

 $H_04$ : There exists no significant correlation between the scores of post -test and retention test of the control group in rural school

 Table-4: Table of correlation between the scores of post-test and retention test of the
 control group in rural

| school |  |
|--------|--|
|        |  |

|    | V2        | V3                |
|----|-----------|-------------------|
| V2 | 1.0000000 | 0 <b>.9380331</b> |
| V3 | 0.9380331 | 1.0000000         |

Here V2 and V3 implies that the correlation between the scores of post test and retention test of Control group is 0.9380331

The obtained result shows that there exists a high degree of correlation between the scores of and post test and retention test of the Control group, which signifies that the achievement level of the pupils through teaching by Direct Method has resulted in considerable skill development of the ESL learners.

#### 17. RESULTS & DISCUSSION

After systematic analysis of data the four hypotheses were experimentally verified and necessary results were drawn. The obtained result relating to  $H_0 I$  shows that there exists a high degree of correlation between the scores of pre-test and post test of the Experimental group, which signifies that the achievement level of the pupils through teaching by technology-enhanced teaching method has resulted in the skill development of the ESL learners The obtained result relating to  $H_02$  shows that there also exists a high degree of correlation between the scores of and post test and retention test of the Experimental group, which signifies that the achievement level of the pupils through teaching by technology enhanced teaching method also has resulted in high level of skill development of the ESL learners. The obtained result relating to  $H_03$  shows that there exists a very high degree of correlation between the scores of pre-test and post test of the Control group, which signifies that the achievement level of the pupils through teaching by Direct Method has resulted in the skill development of the ESL learners. Again the obtained result relating to  $H_04$  shows that there exists a high degree of correlation between the scores of and post test and retention test of the Control group, which signifies that the achievement level of the pupils through teaching by Direct Method has also resulted in considerable skill development of the ESL learners. From the study it is clear that teaching through Direct Method as well as technology enhanced teaching method improved the performance of the learners and the two methods were helpful in enhancing the retentive skill of the learners in terms of language proficiency. Both the methods were equally helpful in generating second proficiency among the learners.

18. ABBREVIATIONS: ESL –English as Second Language

L<sub>2</sub>- Second Language

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# USE OF JATRABHINOY AS A TOOL OF DEVELOPMENT COMMUNICATION IN ASSAM – A CASE STUDY

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#### ABSTRACT

Traditional media has enjoyed a special place in educating and informing apart from entertaining the people. The traditional media holds strong credibility and impact among the masses. On the other hand, there are some limitations of modern media to reach rural and remote communities. As such it is difficult to communicate rural masses through the modern mass media in order to disseminate the messages of the flagship governmental development programs. Jatrabhinoy, a popular traditional performing art in Assam has been instrumental in educating and entertaining the general populace. Jatrabhinoy being a traditional performing art is the gateway to a community and their lives. It holds a strong sway over the people and as a result makes for a suitable platform to educate and build awareness regarding development programs and schemes. This study attempts to assess the effects of Jatrabhinoy as a tool of development communication in Assam.

Key Words: Jatrabhinoy, Traditional Media, Performing Arts, Development Communication, IEC, Rural Community, Development Programs, Health, Impact.

#### **OBJECTIVES**

1. To overview the scope of Jatrabhinoy to use as tool of Development Communication.

2. To assess the effect of experiment to use Jatrabhinoy as carrier of health messages.

#### **INTRODUCTION**

A society carries with it a long history of traditions, its customs and social niceties. Traditions are ever changing as it continuously evolves to sustain in the changing times. Since the advent of civilization tradition has played a significant part of human life. Without tradition human civilization, human progress would have taken other shape. Tradition gives direction to human life in order to coexist with each other harmoniously. Tradition is not something of a written document; it permeates and transmits from one generation to the other. It sets out the guidelines to follow if life as a social being. Earlier there was no written word on traditions; they were transmitted through the word of mouth. The rich oral tradition later was documented, which gave us a somewhat clearer picture about the old traditions.

To understand the traditions of a community, the traditional mass media gives an array of information on it. In places where the modern mass media has not been able to make an impact, the traditional mass media comes to the aid of providing entertainment and information of various issues.

The people involved with the traditional mass media work as a facilitator between the masses and the information caterer. They channel information to the rural masses and help in bringing down social evils. The persuasive power of the traditional media helps in achieving social changes, and in bringing down the ills of the communities. Its conscientiousness on bringing change in society has gathered appreciation over the years; as a result, a number of Government departments are keen on working with traditional media to bring development right from the grass root levels.

Traditional performing arts' influence on the rural masses had led to the re-evaluation by the governments. With studies suggesting the traditional performing arts as a viable means of social developments, it has paved a new way to think in terms of bringing development to the threshold of rural communities. These performing arts have a strong emotional appeal to the community. They are nothing short of a tradition for the communities. These art forms have primarily dealt with morality and religious plays. The changes happened with time, and now it has evolved into social plays with condiment of development messages. Since these performing arts have close ties with the community their credibility remains high. The media experts and the other professionals have sought out to bring changes in the scripts of these art forms to impart their messages to a wider range of audience. These art forms communicate on different levels and thus allow room for dialogues and interactions. The audio visual element of these forms help in penetrating the audience as the events seems real-like.

Traditional performing arts have different tools in its disposal that they can make use of. They have the elements of indigenous songs, dances, puppetry, and invocation, among other things where new changes can be made or modified.

Traditional media is a force to reckon with if a rural community has to witness its manifold development. The modern electronic media while lags behind in exercising its influence, the traditional media have assumed the role of imparting knowledge to the rural people. Therefore, it makes an excellent site for inducing modern development messages and transmission of knowledge. As development schemes cannot fully be utilised due to lack of proper arrangement to reach out to these people, these traditional performing arts can build an information network and hep in bringing the rural population into the mainstream development schemes and programmes.

As Parmar has stated, "these performing arts are indigenous tools of communication. They cater to the rural folk communities in entertainment and education". Another significant social scientist has noted that traditional media is not a thing of the past but are thriving social institutions that help in sustaining the society. It promotes certain values to be inculcated, and work as educating the masses, and as a socializing force. Therefore, these traditional arts act as a social binder too and inextricably related to society. By gauging the impact of the traditional performing arts, the Five Year plan intended to include them into bringing development changes in the rural communities. The UNESCO incorporated this plan as they found it beneficial to wrought or modify a community organises gatherings and festivals, religious occasions and public functions; it is here where the traditional performing arts can convey its messages efficiently. Through development and social messages infused into the body the performing arts they would serve as a caterer for information as well as entertainment. This study aims to find how Jatrabhinoy of Assam- a traditional performing art can be utilised as a tool of development communication. This research paper has been examined with the effect of Jatrabhinoy experiment to carry out the health messages at the Chayani Barduar development block of Kamrup district covering the 20 villages. The experiment was conducted since 1st Of October, 2016 to 31st March, 2017 for a half year period.

# JATRABHINOY- A TRADITIONAL PERFORMING ART AS TOOL OF DEVELOPMENT COMMUNICATION

It is a universal and human urge to seek for ways to express themselves. This yearning to find expression led to the origins of many forms of performing arts. These performing arts have been carrying forward its work as traditional media too. By allowing itself to experiment with different aesthetic forms and expression, these performing arts have carved a place of its own in the history of cultural and social progression. Their elasticity to adapt with the demands of time has tilted its structures from time to time, but they have retained their authentic essence over the centuries.

Bringing social change in a society is an uphill task, because it demands unwavering and concerted efforts from those included in the process. It is not a thing that happens within a fortnight, therefore patience and sensitive handling of the issues is of paramount importance. To begin with, changes have to be brought first within the mind set of each individuals and then move on to greater issues of the community. Having said so, a community must prepare its people to became aware of things then only will it tantamount to development. To part ways with old customs must be a hard thing, but that should not blind one from taking an ethical and moral standpoint. Development communication's role is to root out the ill practices of a community by making people aware of those ills; their role is to make people well informed.

Jatrabhinoy is a prominent tool in bringing such social changes, making them aware and building a scientific temperament among the mass. It can motivate people to change their behaviour and work for constructive goal achievement. Traditional performing arts have asserted its role as a traditional mass media over and over again. New approaches have been experimented in the field of Jatrabhinov to study its impact on the rural masses. So far, many development schemes have been promoted. Plays have already dealt with health schemes, planned parenthood, abolition of witch hunting to name a few. That it tears down any obstruction, any gap in communication is irrefutable as the changes in behavioural and social pattern attest to it. Jatrabhinoy-a traditional performing art of Assam has an intimate relation with the cultural heritage of a community. Its ability to connect individuals at a personal level has given way to its wide popularity. This traditional performing art which performs plays and dance dramas in various parts of the region. Assam has nearly 104 active Jatrabhinoy groups, each comprising around 110 artistes and other workers. These groups perform plays for nearly nine months in the year, starting in August, during which period they roam across the state. At an average, a theatre group performs two evening shows a day. These are mobile performing groups which are performing across the state mostly in lower Assam. It has a strong presence in the rural areas because the content and format is simple, without any complexity of ideas, deals with known subject matter, characters drawn from rustic life. Even the use of the same language variety as the community generates more audience, because the unlettered population cannot understand or comprehend easily the languages foreign to them. Due

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to absence of language barrier the communication of messages does not have to suffer any hindrance in translating or reception. It helps in maintaining heterogeneity in the community as it welcomes audience belonging to all sects and groups. To channelize the popularity of Jatrabhinov for development purposes, the government has come up with various initiatives. For tapping its immense possibility in the rural areas, the government agencies have commissioned writers to come up with plays that focus on the development messages. For instance, there are plays and dance dramas that take up the theme of family planning and health related issues to underscore the messages that those agencies want to impart. Thus we see how the government agencies and the Jatrabhinoy group come together to create awareness by incorporating development messages. Appropriate information, education and communication (IEC) means sharing information and ideas in a culturally acceptable manner through key messages that prompts, encourages and motivates the community to change its attitude or an aspect of their behaviour in a predefined period of time, leading to a positive impact on their lives. The dynamics of IEC create the ability on part of the audience (receiver) to acquire and select the right information, to appreciate and understand the message, and finally to customise it to suit own's purpose and share it with and influence others. A message is a part of information that is used to target individuals or a community to change its behaviour. Based on the initial assessment of the community's needs, concerns, and resources, a message may be developed. By keeping in mind the wide popularity of Jatrabhinov among the rural masses, it has proved to be an ideal site to experiment with the modern mass media trends and injecting development messages into its corpus. The flexibility of Jatrabhinoy gives ample room for using development mesgaes into the story and the plots, thereby in the end enlightening people about the certain issue.

#### **RESEARCH METHODOLOGY**

The objective of this study is to examine the effect of Jatrabhinoy- a traditional performing art as a tool of creating awareness on health programs. This paper also attempts by extension to analyse the knowledge of rural people about the role ASHA workers in health care services. This study used qualitative and quantitative method of research. Two target groups were identified to conduct the interviews and surveys. One group consisted of health officials and media experts of health department and the other group consisted of the village people. Data had been collected from the scheduled questionnaires and observation method. Different parameters of health had been incorporated in the questionnaires.

In this kind of study, the researcher's familiarity with local language, culture, beliefs and attitude of the people is a must. Therefore, Chayani Barduar block of Kamrup district of Assam state of India was purposively selected as the researcher is well acquainted with the local language, area, its culture and traditions. The sample for the study has been drawn from nine Gaon Panchayats(GPs) of Chayani Borduar Block of Kamrup district, Assam. Jatrabhinoy is widely popular in this area and twenty-two Jatrabhinoy plays have been performed during the study period in that block that contained and dealt with different health messages.

Selection of respondents has been arbitrarily done (lottery method) from all social strata of the villages to avoid bias i.e. random sampling method; a total of 150 respondents each from the selected villages were finalized. All 114 respondents were found to be regular viewers of the Jatrabhinoy.

Data has been collected with the help of semi-structured interview schedules by conducting face-to-face personal as well as group interviews with all the respondents. The investigator also has recorded his observations.

The first method of study is the reviews of individual responses of media experts and health professionals of National Health Mission. An expert review has been conducted independently on an assigned questionnaire to understand whether each item is unambiguous or not. The review form was designed along with a problem. Space was provided at each question for notes about suspected problems.

The Jatrabhinoy performances were mainly entertained people and tried to enlightening the target communities about health information and facilities. When analysed with the effect of purposive health messages I have also observed: (a) the level of the community's knowledge of Reproductive and Child Health. (b) The numbers of institutional deliveries at the nearest health care facilities, c) the numbers of immunisation among children, infants, and mothers. D) The support of ASHA workers to access health care facilities.

The Jatrabhinoy troupes' performances have been intended not only to inform the respective villages about health care facilities for mothers and children but also to mobilise rural people to access government health facilities through ASHA workers, and to take advantage of the free services available to the community. To understand the impact of health messages imparted through Jatrabhinoy an analysis was carried out to review the health cards of registration and admission of mothers and children in rural health care centres.

#### FINDINGS

Almost all of the media experts and other government officials who have been interviewed here have asserted that the Jatrabhinoy- traditional performing art makes for an excellent carrier of development messages and that Jatrabhinoy has become an active agent for them to carry forward the task of reaching to the wide audience in lower part of Assam. Given its strong grip on the rural masses, and its ability for emotional appeal, Jatrabhinoy persuades the masses to follow its contents regarding health messages. They also opined that in those remote areas the effects of purposive messages of health programs are very encouraging where the access of other mass media is comparatively limited. According to the media experts rural people have come to a better understanding now of the role of ASHA workers as health facilitators where the particular dance play (AMAR ASHA) has been performed by Jatra tropes. They also have emphasised on the changing patterns visible in availing health services in rural areas which points in a positive direction. This is due to the promotion of health messages in those areas by the Jatra tropes. Now they are willing to carry this collaboration a step ahead by bringing constructive changes.

Following facts have been found from the data analysis gathered from audience of Jatrabhinoy and rural people.

- 1. Increasing knowledge of the importance of institutional delivery and access of government health care facilities
- 2. Awareness about family planning methods.
- 3. Knowledge about the access of free immunization of children.
- 4. Role of ASHA workers is very significant to avail health care services

From among this group a number of people had no knowledge of Reproductive and child health prior to watching the Jatra play. Afterwards most of them have acknowledged about learning the importance of vaccination of Pulse polio and other diseases. Thanks to the message of Jatrabhinov play through which a group of male audience has come to know about male vasectomy for family planning. Moreover 60 percent of the respondents have revealed that they have comprehended the importance of institutional delivery and its free access at government hospital.

It is commendable how government media agencies and departments are utilising Jatrabhinoy to bring about changes in the outlook of the rural masses toward the Reproductive and Child Health. Having said so, Jatrabhinoy together with modern media agencies have been successful to a greater extent in imparting knowledge and creating awareness for health and hygiene. Jatrabhinoy's role in disseminating education is well attested by the changes seen in the sphere of heath seeking behaviour of the masses. The rural masses once alienated or their unwillingness to seek health advices and help now have started to come forward to make changes in their lives. Jatrabhinoy plays have brought these changes among the masses, in educating them about the rights and services they can avail through different government sectors, in making them understand the need for certain changes in their lives, the role of health workers and what to seek from them. The respondents' answers further reveal the growing sense of awareness and knowledge after they have watched Jatrabhinoy performances in two tribal dominated GPS. During the course of this survey, as much as 64 percentage of the target community could present us with acceptable response about the significance of ASHA worker.

#### CONCLUSION

It is evaluated that Jatrabhinoy of Assam has immense potential that can be useful in propagating development programs of IEC. It is observed how Jatrabhinoy does what it does- that is to transform rural masses into concerned and responsible populace regarding their health and community well-being. The development messages incorporated in the body of Jatrabhinoy lead to further dissemination of health facilities.

The media experts and development professionals have successfully experimented with Jatrabhinoy to make it a viable source of information carrier to rural community. Jatrabhinoy's flexibility has led to further augmentation of new techniques, trends, and contents that befit both of them.

Being cut off from the mainstream governance, Jatrabhinoy bridges the gap between governance and the marginalised people. In remote parts it is the only mass media popular among all the communities therefore, the media teams and government departments have taken this advantage to reach out to large number of audiences through it.

#### RECOMMENDATIONS

1. The government departments should take steps to involve Jatrabhinoy troupes in more development programs keeping in mind the rural community as different communities have different needs.

- 2. Workshops and training sessions for the people involved in Jatrabhinoy should be held from time to time to come to a better understanding of the demands and changes in development communication.
- 3. Training session for the media professionals are recommended to understand and handle a community sensitively. A guiding principle should be generated by the development experts on how to use and adapt Jatrabhinoy for motivational purposes and promoting development programmers without misrepresenting its traditional spirit and contents.
- 4. To formulate policies in a way to encourage producers and playwrights to incorporate development messages in Jatrabhinoy and to seek ways to direct its ramifications for further development.
- 5. Careful follow-up and close observation are needed in order to keep check on them whereby chances of distortion of messages could be managed.

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