A Study on the Level of Self Esteem of Students with Low Academic Performance

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Abstract: *Self-esteem has long been considered an essential component of good mental health. It is a widely used concept both in popular language and in psychology. It refers to an individual's sense of his or her value or worth, or the extent to which a person values, approves of, appreciates, praises, or likes him or herself (Blascovich and Tomaka, 1991). The investigator personally is interested to work with teenagers and had come across some children, who found it difficult to cope with academics due to problems like comparison between the siblings and too much expectation from the parents.*

Objectives of the Study were to understand the Socio-Economic background of Respondents, to assess the level of self esteem of the Respondents, to assess the co-relation between Self-Esteem and Academic Performance and to assess the level of Self-Esteem and Academic Performance between boys and Girls. The research design of the study is descriptive in nature. The aim is to study the level of self esteem of the students with low academic performance. The Universe of the study includes, students (aged 13-15) studying in High school in the district of Serchhip and Aizawl in Mizoram and Dimapur in Nagaland and have achieved low marks (below 60%) and failed in one or more subjects would be the population for the present study. The sample would be selected from 3 private schools (15 each). The Simple Random sampling techniques of probability sampling would be used to draw out the sample. The Researcher will concentrate on collecting primary data by questionnaire methods. Keeping in mind the observation as a supportive tool while meeting them and seeing their progress reports. The secondary data will be obtained from the books, magazines, reports, school records and websites. The following tools will be used to measure the variables

Vast Majority of 75.6 percent of the total respondents do have high self esteem. The reason could be the environment where they are grown, their friends circle and also other opportunities to shine.

Parents' income impact on self esteem via academic performance: It is argued that social class is mediated in a cultural level, which in turn determines family expectation, values and attitudes regarding education. Pearson's correlation test was applied for the above variables. There is no significant relationship between Self-esteem and Academic Performance of the Respondents.

Key Words: *Self Esteem, Academic Performance, Parents' Income.*

Introduction

Self-Esteem

Self-esteem has long been considered an essential component of good mental health. It is a widely used concept both in popular language and in psychology. It refers to an individual's sense of his or her value or worth, or the extent to which a person values, approves of, appreciates, praises, or likes him or herself (Blascovich and Tomaka, 1991). Self-esteem is a set of attitudes and beliefs that a person brings with him or herself when facing the world. During childhood, if individual's feelings are respected, thoughts are valued and abilities recognized then self esteem strengthens. When feelings are trampled upon, thoughts belittled and abilities criticized then the individuals self esteem remains at a low point of development and is therefore weak. During the course of time, an individual faces many life situations. Depending upon the success or failure and one's reaction to every significant situation in life, self–esteem grows stronger or gets considerably weakened. Self-esteem is described as the evaluation that one makes about oneself, based on one's self-worth. Increases and decreases in self-esteem generally bring strong emotional reactions.

Theories of Self Esteem

There are many theories about self esteem. These include Maslow's Theory of needs, Carl Rogers Theory of personal development and Bednar and Peterson's Theory of self esteem among others. However, this study will use Maslow's hierarchy of needs to investigate the effects of self esteem on academic performance.

Theories of Needs

According to Maslow's Theory of needs, people are motivated to seek personal goals that make their lives rewarding and meaningful. (Abraham Maslow, Motivation and Personality 2nd ed., Harper and Row, 1970). The

law contends that human beings have wants and rarely reach a state of complete satisfaction. He stated that all human beings have needs that are innate and are systematically arranged in ascending (order) hierarchy of priority. Satisfaction of one need creates another need that commands the person's attention and efforts. The basic assumption in Maslow's Theory is that the lower order pre-potent needs must be relatively satisfied before the person can become aware of or motivated by higher order needs. Physiological needs should be satisfied first followed by safety and Security needs, love and belonging needs. Self-esteem needs are 4th in the hierarchy. Maslow divided it into self respect and respect for others. To Maslow, satisfaction of self-esteem needs generate feelings and attitudes of self confidence, self worth, capacity and the feeling of being useful and necessary in the world. Frustration of these needs lead to feelings and attitudes of inferiority, ineffectiveness, weakness, passivity and dependency. These negative self perceptions give rise to basic discouragements, a sense of futility and hopelessness in dealing with life's demands and low evaluation of self vis-à-vis others.

Alexander (2001), the founder of the Self-Esteem Network in Britain, views self-esteem as a syndrome, as a set of indicators for mental well-being. The core of self-esteem is an "unconditional appreciation of oneself" meaning an appreciation of both an individual's positive and negative potential in its fullest sense. Alexander also distinguishes between 'trait' self-esteem which reflects confidence or ability in a particular area, such as work or sport, and 'global' self-esteem which is the intrinsic worthiness regardless of what particular abilities or qualities an individual may possess.

Erickson (1968) specifically identified academic achievement as a vital component in forming a healthy self-image. Academic self-esteem is operationally defined as the evaluative appraisal of the experience of being capable of meeting academic challenges and being worthy of happiness.

Review of Literature

The Review of literature examines factors associated with self-esteem and academic performance. These reviews of literature has helped the researcher to further identify some of the variables and factors which are conceptually and practically important for the study. It is a body of text that aims to review the critical points of current knowledge including substantive findings as well as theoretical and methodological contribution to a particular topic. Literature reviews are secondary sources.

Studies done by (Haarer, 1964; Jones and Grieneekz, 1970; Lamy, 1965; Morse, 1963; Smith, 1969; Wattenberg and Clifford, 1964) show that self-esteem influences academic performance. Research done by (Morse, 1963; Smith, 1969; Wattenberg and Clifford, 1964) shows that self-esteem is a better predictor of academic success than measured intelligence.

A study was done by Della Marks (2011) on self–esteem and academic achievement in 3 English medium schools in Mangalore on students of 9th standard between the age group of 14-15 years. The study shows that the majority (75%) of the respondents are having an average level of self-esteem.

The present study aims at searching and defining the existence and extent of any prevailing relationship between self esteem and academic performance. The scope of the present study is in the fact that it aims to explore self esteem level among adolescents in relation to academic performance.

Methodology

Methodology includes the Research Design, Operational Definition, Sampling Technique used and Method of Data Collection. It also puts forth the skeleton of the entire research study. The aim of this chapter is to present a description of methods followed for the study and it gives a clear idea to the readers about the scope of the study.

Significance of the Study

Self-esteem and academic performance are important for the holistic development of the students. The investigator personally is interested to work with teenagers and had come across some children who are finding difficult in academic performance due to problems like comparison between the siblings and too much expectation from the parents. So the researcher felt that this study will help in the better understanding of low academic performers and in the future to plan out some programmes for such adolescents.

Objectives of the Study

1. To understand the Socio-Economic background of Respondents.
2. To assess the level of self esteem of the Respondents.
3. To assess the co-relation between Self-Esteem and Academic Performance.
4. To assess the the level of Self-Esteem and Academic Performance between boys and Girls.

Operational Definition of the Terms

Self Esteem

The term self-esteem comes from a Greek word meaning "reverence for self". The "self" part of self esteem pertains to the values, beliefs and attitudes that we hold about ourselves. The "esteem" part of self esteem describes the value and worth that one gives oneself.

Academic Performance

In the present study, the word academic performance is used to denote the performance of the students on academic tests and examinations expressed in marks.

The Research Design

This study also tries to know what could be the reason for low academic performance in spite of having high self esteem. The research design of the study would be descriptive in nature. It aims at studying the level of self esteem of the students with low academic performance.

Universe

The students (aged 13-15) studying in High school in the district of Serchhip and Aizawl in Mizoram and Dimapur in Nagaland and have achieved low marks (below 60%) and failed in one or more subjects would be the population for the present study.

Sample size

The sample would be selected from 3 private schools (15 each). The Simple Random Sampling Techniques of Probability Sampling would be used to draw out the sample. The sample is selected from the population which will include equal number of boys and girls.

Tools of Data Collection

The Researcher collected primary data by questionnaire method. Keeping in mind the observation as a supportive tool while meeting them and seeing their progress reports. The secondary data will be obtained from the books, magazines, reports, school records and websites.

The following Tools are Used to Measure the Variables

1. Socio-Demographic Profile.
2. HARE Self Esteem Scale (1987).
3. Academic Performance from their Progress Report.

Data Collection Procedure

The researcher approached the headmaster/headmistress of the schools chosen, and explained the importance of this Research. The researcher made a list of students with low academic performance. The researcher gave the instructions to the participants and helped them to fill the self esteem scales and the socio demographic profile.

Data Analysis

The purpose of the analysis is to use data as a model, to study the relationship between variables. After collecting the data according to the aim and objectives of the study, it was edited by Using SPSS vs20 coded and analyzed using tables and charts with percentages.

Limitation of the Study

1. Due to time constrains the sample size was restricted to only 90 adolescents, thus not giving much scope for generalization.
2. As the study focused mainly on Self-esteem and Academic performance it did not give a holistic picture as other factors were not considered.

MAJOR FINDINGS

Socio-Demographic Profile of the Respondents

Age of the Respondents

Among the total Respondents more than half the size 56.7 percent belongs to the age group of 14-15 years among that 28.9 percent are male and 27.8 percent are female participants.

Gender of the Respondents

As the sample was chosen purposefully, there is an equal number of male and female respondents (45 each).

Place of Residence of the Respondents

Majority of 69 percent of the respondents live in the urban area.

Size of the Family

A majority of 60 percent of the respondents' family have 4-7 members.

Type of Family of the Respondents

A majority of 68.9 percent of the total respondents are living in the urban area, among that 42.2 percent are living in a nuclear family.

Education of Paternal and Maternal Parent

From the study it is clear that majority of the respondents parents have completed their high schooling. This means their parents are educated.

Religion of the Respondents

Vast majority of 86.7 percent of the respondents belong to the faith of Christianity, since majority of the people of that place practice Christian Faith among that 45.6 percent are females and 41.1 percent are males.

Economic Condition

Occupation of the Father and Occupation of the Mother

More than half that is 58.9 percent of mothers are home makers. Regarding the occupation of the father, 34.4 percent are a government employee which includes Police, Teachers, Engineers, and Security Guards, working in the Public Welfare Departments, Commanders and Armies.

Monthly Income of the Family Vs Self Esteem Score

Parents income impact on self esteem via academic performance: It is argued that social class is mediated in a cultural level, which in turn determines family expectation, values and attitudes regarding education. In other words, motivation to succeed depends more on the parents' level of learning than on their level of income (Llorente, 1990). Other studies indicated that the most influential family components on performance are not socio-cultural or economic, but rather those pertaining to the affective or psychological dimensions: that is, although good academic preparation is provided by the parent, and a positive cultural environment, favor scholastic performance, it is the affective and rational variables which stands out the most as factors that contributes to better performance. In the present study a 35.6 percent

of the total respondents each have the monthly income of below 10,000 Rupees and in between Rupees 10,000 to 20,000. There is no significant relationship between the two variables. So the above studies contradict my study.

Self Esteem and Academic Performance

Self Esteem

Vast Majority of 75.6 percent of the total respondents do have high self esteem. The reason could be the environment where they are grown, their friends' circle and also other opportunities to shine.

Gender of the Respondents and Self Esteem Score

Pearson's correlation test was applied for the above variables. Since the level of significance is .054, which is more than 0.05. There is no significant relationship between the two variables. There is also a strong empirical evidence indicating differences in the conceptualization of self and academic performances according to sex and age (Awad, 2007, Thomson and Zand, 2007, Tolman et al, 2008). There is a significant Gender difference in the level of self esteem and this has been proved.

Academic Performance and Self Esteem Score

Pearson's correlation test was applied for the above variables. There is no significant relationship between Self-esteem and Academic Performance of the Respondents. So the above table clearly shows that 50 percent of the students who have high self-esteem have low academic performance. Thus it is obvious that in spite of having high self esteem academic performance is still low. So in the hypotheses there is a significant correlation between Self Esteem and Academic Achievement of the students and do not correlate in the present study.

Conclusion

The conclusion drawn from the major findings of the study where the researcher found that there is a gender difference where the female respondents have more self esteem than male respondents. But there is no significant correlation between the self esteem and academic performance of the respondents. Besides, the educational system of the country, the child's psychological environment-their family, peers, teachers are of utmost

importance in determining the adolescent's performance at school/college. While the college's influence on the adolescents performance has been acknowledged, almost all the studies and practical experiences substantiate the fact that parents, friends and significant people can make a world of difference on an adolescents life, in academic performance and personality.

Implications for the Social Work Practioners

1. Interaction programme for Parents-Teachers to help the adolescents to increase their self esteem and academic performance.
2. An effective Interaction practice need to be organized to help the adolescents to improve their self esteem and academic performance.

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Corporate Social Responsibility Projects of KIOCL: An Impact Assessment

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Abstract: *As pressure is added by consumers seeking to make more responsible choices and by the constraints of ever-dwindling natural resources, more companies are incorporating sustainable strategies and adopting more socially responsible practices. The top trends in the area of corporate social responsibility include increased transparency, investment in green technologies, local community and employee engagement, and recognition of economic inequality. The organisations can no longer see themselves only as profit-making machines if they wish to survive. Companies today are giving more priority to the corporate responsibility as it is the need of the hour. The corporate is increasingly being required to align with societal norms while generating financial returns. The CSR practitioners and organisations, validate the segments like production and distribution, wealth, ethical systems, sustainable management practices by applying approaches that may be unique to the organisation. A unique and varied approach to develop CSR strategies is very useful for the development of the community and nation as a whole. KIOCL has undertaken several community oriented projects and the study revealed that it was the need of the community and it has benefitted them to a great extent.*

Key Words: *Corporate Social Responsibility, Impact Assessment, Sustainability, Community Services.*

Introduction

The organisations can no longer see themselves only as profit-making machines if they wish to survive. Corporate engagement with society is termed as corporate social responsibility (CSR). The study of corporate social performance is important so as to ensure that there exists no gap between the social goals and business actions. Businesses, in order to sustain their

existence, depend on society. Therefore, they constantly strive to pattern their activities so that they are in congruence with the goals of the overall social system (Sethi, 1979).

Husted (2000) emphasized that to maintain legitimacy and social support, it is necessary for the firm to satisfy and sometimes even exceed the expectations of its stakeholders. In other words, firms must be concerned with their social performance. The principal objective in developing indicators and measuring performance is to generate information on which future action (i.e. management initiative) can be based (Warhurst, 2002).

CSR has been receiving lots of attention from various backgrounds of researchers worldwide (Ismail 2011), it has attracted a great deal of attention over the past decade (Zu and Song 2008). Therefore business leaders, government officials, and academicians are focusing more and more attention on the concept of "Corporate Social Responsibility" (Reinhardt et al 2008).

Most of the academic literature on CSR originates from Western countries (Vancherwaran and Gautam, 2009, Raman, 2006) and argue that the utilization of Western CSR approaches can fail in Asia because of cultural as well as economic and political differences. Arevalo and Arvind (2011) pointed out that study of management and CSR practices in emerging economies like India is important not only because these are strategically significant economies for global growth but also that such studies can offer new insights.

Local social issues can be identified through checking the gap between ideal situation and the reality. It can be both specific issues such as heavy pollution and abstract issues such as harmonious community culture. In order to identify those social issues, many things should be done. Primarily it is important to gain a deep understanding of the underlining structure and culture of local community, thus mastering the "cause and effect" and to help figure out solutions. when the social issues have been identified, it is necessary to analyze them systematically. Only by understanding the related barriers and resources, the best solutions can be carried out. The logic of this is from macro to micro. In order to connect local social issues with the capability of business, the next step is to consider the resources of a company, which comprises of both internal and external resources. Understanding the motivations and objectives of a CSR project is extremely important for a Business organization (Zhaoyan Zhang, 2004)

KIOCL has diagnosed the community needs of drinking water, education, health and environment and drawn up projects in the related areas. However it becomes very important to do an impact assessment to evaluate the objectives of the CSR projects and if they have met the expectations of company as well as community. By doing this one can hope to increase market transparency for businesses wanting to engage with the community. The value of conducting business responsibly lies not only in complying with the law and avoiding financial and reputational risks, but also in sustainably accessing, rapidly growing markets and to connect the business goals with the development goals."

Objectives

1. To study the CSR projects carried out by KIOCL at different locations in Karnataka.
2. To ascertain the level of satisfaction among the respondents with regard to the amenities/services provided.
3. To suggest measures to CSR projects for sustainable development.

Methodology

Descriptive as well as case study method is adopted in this study as per the STUDY requirement. The samples were drawn based on 10 CSR projects undertaken by KIOCL Limited, Panambur, Mangaluru, in different parts of Karnataka. The projects were undertaken in different parts of Mangaluru, different parts of Bengaluru and Kudremukh. The sample was randomly selected from the above universe.

Community Services Rendered by the KIOCL Ltd.

KIOCL Limited, a flagship Company under the Ministry of Steel, Government of India, with Mini Ratna status was formed on 2nd April 1976. The country's prestigious Export Oriented Unit having expertise in Iron Ore Mining, Filtration Technology and Production of high quality Pellets has its Corporate office at Koramangala, Bangalore and Pelletization Complex at Mangalore, the coastal city of Karnataka. Kudremukh, a peak in Sahyadri range in Chikamagalur District, Karnataka, having very rich deposits of Magnetite Ore was first discovered by Shri P Sampath Iyengar, a renowned Geologist. The projects undertaken by the company are:

1. Sponsoring of Cataract Surgery for the Poor in Bengaluru.

In this CSR Project the Shankara Eye Hospital, Bengaluru was given the responsibility to conduct surgery for poor and economically weaker section of the society, Bengaluru. The hospital was founded in 1982 and was named Sankara Eye Hospital, later called the Sankara Eye Foundation. The patients, officials or staff who were interviewed stated that the surgeries were successful and there were no case of complaints reported. This showed that the surgeries were done with care. The post-surgery expenses of the cataract surgery patients were borne by the company. The expenses included the further consultancy charges of doctors, charges for spectacles, and medicines. The patients and the officials stated that their experience with KIOCL was fruitful.

2. Rural Development Projects in and Around Bengaluru (Planting of Trees and Providing dustbins).

Under this project, KIOCL Limited has taken up green initiative projects in Ragihalli village. Adamya Chethana is the executing agency and Indian Institute of Science was the planning agency for this project.

KIOCL Limited has planted 1000 medicinal and revenue generating plants in the village. In addition to this, the company has also installed plastic waste collecting bins in the village to minimize the negative effects on the environment. The officials of Adamya Chethana and randomly selected people of the locality were interviwed regarding the facility provided by KIOCL Limited. All officials and the villagers, gave a feedback that this helped the people to dispose the waste properly in their area and maintain cleanliness in the village.

Further the experience of the facility provided by KIOCL to the officials and the villagers were satisfactory. This project highlights the green and clean initiative taken by the company.

3. Development of Tree Park in Pilikula Nisargha Dhama, Mangaluru

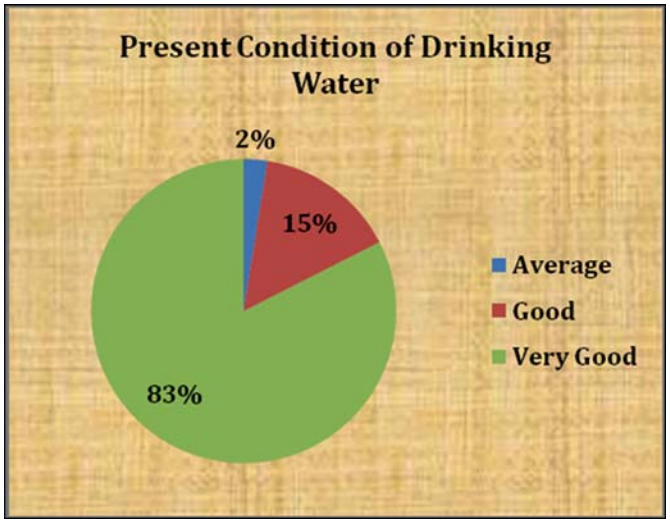
Pilikula Nisarga Dhama (Pilikula) is a major eco-education and tourism development project promoted by the District Administration of Dakshina Kannada in the beautiful city of Mangaluru, in Karnataka State, India. An integrated theme park with a wide variety of features, Pilikula has many attractions of cultural, educational and scientific interest.

The company in order to mitigate adverse effects of industrialization on environment over a period of time and to protect endangered species of Western Ghats, has initiated the concept of development of "Tree Park" in M/s Pilikula Nisargha Dhama, Mangaluru in an area of 15 acres by planting and maintaining saplings comprising of rare, endangered and threatened species of Western Ghats. With the funding of KIOCL, M/S Pillikula Nisargha Dhama is able to maintain the Tree Park.

4. Purified Drinking Water Facility to Sri Vivekananda Vidya Kendra, Hoskote.

Under this project, facilities like bore well, pump, overhead water tank, reverse osmosis, steel tanks for storage of purified water are provided in the school premises of Sri Vivekananda Vidya Kendra (SVVK), which is a not-for-profit private school in Hoskote, Bangalore accredited by the Government of Karnataka, India and managed by Vishwa Hindu Parishad Karnataka Trust. It mainly caters to the educational needs of students in Hoskote taluk and 92 villages nearby. Company also provided steel drums and 1700 water bottles for the usage of students. Around 1700 students and 100 faculties who are from rural and poor background are benefitted by this project.

Chart No. 1: Present Condition of Drinking Water in School



This diagram presents the condition of drinking water facility at present after the purifier is installed in the school.

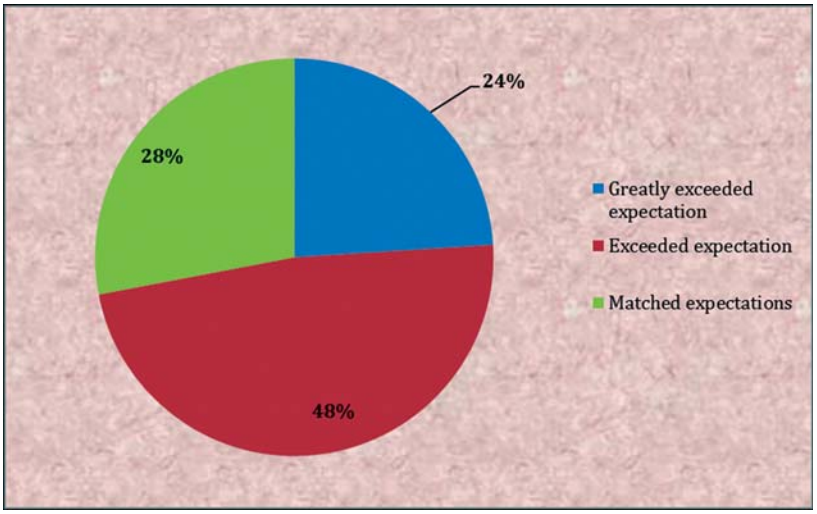
Majority (83%) of the respondents stated that the current condition of water facility was very good, while 15% of them stated it was good and 2 percent of the respondents stated the present condition was average.

Further interactions with the respondents revealed that prior to the installation of the purifier in the school, there was no proper facility for the students to get pure drinking water and after the installation of purifier the respondents are getting wholesome drinking water.

Construction of School Building at Taneerbavi, Mangaluru

Under this project, KIOCL Limited with an objective to support the community school located in the surrounding areas of the company, has constructed a new school building by demolishing the old building which was constructed in 1940. It was beyond repair and on the verge of collapse. This school is located very close to the Pellet Plant Unit of KIOCL. The school has around 60 students who are economically poor and were benefitted by this project.

Chart No. 2: Rating the Construction of the School



As per the data shown in the pie chart, the respondents have rated the construction of the services rendered by KIOCL Limited.

Majority (48%) of the respondents rated the construction of the school as it exceeded the expectation of the respondents, while 28% of them stated that it matched their expectations and 24% of them stated that their expectations were greatly matched by them. On the whole it could be concluded that, the construction has helped the students and teachers as all the respondents say so.

6. Overhead Tank and Supply of Water Facility to Resettlement Colony of SC/STs at Prokodi, Mangaluru

Under this project, KIOCL Limited has constructed overhead tank of 50,000 litres capacity for providing water to the resettlement colony set up for displaced families of SC/ST's at Porkodi, Mangaluru. They have been provided with water lines for sanitation and drinking from this overhead tank. There are 20 households in the resettlement colony and all of them have availed this facility.

Table 1: Satisfaction Level of the Residents on the Provision of Overhead Water Tank

Satisfaction Level	Frequency	Percent
Satisfied	12	60%
Very Satisfied	8	40%
Total	20	100%

The above table shows the satisfaction level with regard to the overhead water tank provided by KIOCL.

A Majority (60%) of the respondents stated that the people in the vicinity were satisfied with the facility provided by KIOCL Limited, whereas 40 percent of the respondents stated that they were very satisfied with the facility provided by KIOCL Limited. The project of construction of overhead

tank and supply of water facility to the resettlement colony of SC/ST's at Porkodi, Mangaluru highlighted that prior to the construction of overhead water tank, people faced lot of problems with regard to acquiring water. The facility provided by KIOCL Limited was extremely helpful for the people as it saved time from fetching water and also regularized the water facility in their area.

7. Construction of Toilets under Swacha Vidyalaya Abhiyan in Mangaluru, Bengaluru and Kudremukh (7 Schools)

The first project, was the construction of 22 urinals, 4 toilets, 1 bathroom and 3 wash basins for students in Alike Sathya Sai PU College, Mangaluru.

The second project was construction of toilets under Swatch Vidyalaya Abhiyan in 5 Schools/Colleges, in Kudremukh and Mangaluru namely, Government Junior College, Kalasa, Government Higher Primary School, Balehole, Government High School, Hirebylu, Government High School, Samse, Sri Mujilnaya aided Higher Primary School, Nooralbettu. Under this project, KIOCL Limited has constructed 1 toilet Block (3 Urinals and 1 Indian Closet) for girl students and 1 Toilet Block (4 Urinals & 1 Indian Closet) for Boys each in following schools under Corporate Social Responsibility. Facilities like sanitary, washing, overhead tank along with pump was provided for usage of students.

The third project was construction of toilets to Government High School, Madiwala, Bengaluru in which 8 Toilets were for female students in Madiwala PU College, Bangalore under Corporate Social Responsibility. Facilities like sanitary, washing, overhead tank with pump is provided for usage of female students. Repair works of old toilets was also carried out to support the students from poor background.

Table 2: Rating of the Toilet Facility Provided by KIOCL Ltd.

Rate Facility Provided	Name/School College							Total
	Govt. School, Madiwala, B'lore	Alike Sathya Sai PU College, Mangaluru	Sri Mujilnaya Aided Higher Primary School, Nooralbettu	Government Junior College, Kalasa	Govt. Higher Primary School, Balehole	Govt. High School, Hirebylu	Govt. High School, Samse	
Greatly exceeded expectation	10 20%	7 17.5%	35 100%	23 76.7%	23 76.7%	30 100%	20 66.7%	148 60.4%
Exceeded expectation	12 24%	19 47.5%	0	3 10%	7 23.3%	0	7 23.3%	48 19.6%
Matched expectation	25 50%	14 35%	0	4 13.3%	0	0	3 10%	46 18.8%
Less than expected	3 6%	0	0	0	0	0	0	3 1.2%
Total	50 100%	40 100%	35 100%	30 100%	30 100%	30 100%	30 100%	245 100%

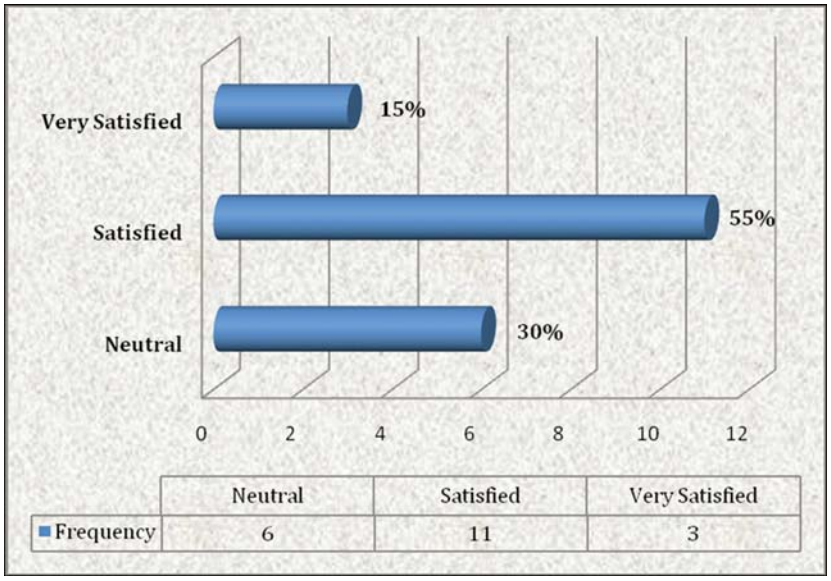
The above table shows the rating given by the students and the teachers of the school on the facility provided.

Majority (60.4%) of the respondents stated that the facility provided greatly exceeded their expectation, while 19.6 percent of them stated that the facility provided exceeded their expectation, and 18.8 percent of the respondents stated the facility provided matched their expectation. Only 1.2 percent of the respondents stated that the facility provided was less than their expectation.

8. Provision of Solar Street Lights at Bajagoli Village near Mangalore

The Project was undertaken during the year 2015-16. The company has provided 40 solar street lights at Bajagoli village, near Mangaluru. This project was taken up to promote renewable energy concept in rural areas and to support energy savings by bringing down electricity consumption. In this project around 2000 villagers were benefitted. The table below shows the satisfaction of the villagers regarding the installation of the solar light facility in their village.

Chart 3: Rating Given for the Street Light Facility Provided by KIOCL Ltd.



The above chart depicts the rating given by the residents of Bajagoli Village for the street light facility provided. A Majority (55%) of the respondents were satisfied with the facility provided, 30 percent had neutral opinion regarding the installation of the solar lighting in the village and 15 percent of the respondents were very satisfied with the solar lighting facility in the village.

Findings of the Study

1. A Majority (82.5%) of the respondents stated that the drinking water facility was very good after the purifier is installed in the school.
2. All (100%) of the respondents stated that there were enough classrooms for all the classes in the school after construction of school building by the company at Tanneerbavi, Mangaluru. They also confirmed that there are separate toilets for girls and boys in the school.

3. A majority (65%) of the respondents stated that they used to fetch water from the borewell available in their area, while 35 percent of them stated that they used the common tap for acquiring water for their requirements before the construction of overhead tank in Porkodi, Mangaluru.
4. All (100%) of the respondents in the study said that the present condition of the water in their area is regular now and stated that the overhead tank built by the company is also supervised by the company.
5. A majority (60%) of the respondents stated that the people in the vicinity were satisfied with the facility provided by KIOCL Limited.
6. A Majority (55%) of the respondents were satisfied with the facility provided
7. In Govt. School, Madiwala, Bengaluru, majority (50%) of the respondents felt that the construction matched their expectation.
8. In Alike Sathya Sai PU College, Majority (47.5%) of the respondents felt that the construction exceeded their expectation.
9. In Sri Mujilnaya Aided Higher Primary School, Nooralbettu, all (100%) the respondents felt that the construction greatly exceeded the expectation.
10. In Govt. Higher Primary School, Balehole, majority (76.7%) of the respondents felt that the construction greatly exceeded their expectation.
11. In Govt. High School, Hirebylu, all (100%) the respondents felt that the construction greatly exceeded their expectation.
12. In Govt. High School, Samse, a majority (66.7%) of the respondents felt that the construction greatly exceeded their expectation.

Suggestions for Sustainability

1. The toilets that are built, could the school authorities motivate the student council to take charge for the maintenance and cleanliness of the toilets? This way the facility is valued and responsibility is taken for its maintenance. A similar exercise can be conducted in the SC/ST colony.
2. Villagers and schools receiving clean drinking water, can be suggested to work on small water recycling units as well as water harvesting projects. This will help them to be sustainable in having required water for their usage.

3 To sustain the concept of Tree Park the general public can be invited to join hands and each one support one tree, so that people are sensitised as well as take responsibility for our greenery and there is a continued contribution of growing trees. Thus helping this green cover to slowing but surely increase.

4 Cataract surgery Patients who have gained through the free surgery given, could be motivated to extend voluntary service for other economically poor patients.

5 Based on the success of the CSR projects undertaken by KIOCL it could be further recommended that Purified drinking water facility may be extended to other schools also as safe drinking water is very essential for the healthy growth of children. The cataract surgery for the economically backward sections by the company can also be extended to other parts of Karnataka. The present government stresses on cleanliness therefore the concept of installation of dustbins, planting of saplings etc. can be extended to other localities too. A healthy school building adds to the education of the children. The company may concentrate on this area too. They can also extend their Swatch Vidyalaya Abhiyan to other schools. It can also be extended to villages where there is inadequate sanitation facility.

Conclusion

Koû Annan, the UN Secretary-General, at an event organized by business action for sustainable development, remarked "more and more we are realizing that it is only by mobilizing the corporate sector that we can make significant progress. The corporate sector has the nuances, the technology and the management to make this happen".

The support extended by KIOCL to the community, was really needed as there was an acute demand for clean drinking water, education, health in their neighbouring communities. The school will facilitate the Millennium Development Goals for achieving universal primary education to the underprivileged. It is commendable that KIOCL understood the need of increasing the green cover in the city, toilet facility and drinking water to the schools and SC/ST community and took it forward, which is serving the community in their development.

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Human Rights and Stigma Reduction in the Process of Rehabilitation of the Mentally Ill

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Abstract: *Mentally ill persons are approached with stigma and families want to abandon them even in the wake of 21st century. It is a severe human right violation. However there are emerging models caring the destitute mentally ill with individual initiative and family collaboration who bring back the human right of the mentally ill person by removing stigma and caring them with dignity and worth. This paper is a case study of a rehabilitation centre at Kottayam in Kerala run by an ordinary person along with his family caring more than 300 mentally ill including children.*

The objective of the study is to find out how the stigma reduction through a grass root community assistant rehabilitation model and enhance human right of the mentally ill persons. A qualitative design with case study methodology is followed.

The result shows that factors like acceptance of the persons with mentally ill as a family member calling him/her son/daughter and treating them so, allowing them the freedom of expression and interaction, exploring their innate abilities and host of others make them to cross the barriers of stigma. It gives back the human rights lost when they were thrown into the streets. The founder of the centre visits schools colleges, temples, churches and other community centres to disseminate information on mental health. The participants of such interaction program visit the rehabilitation center and understand how mental illness is just like any other chronic illness and spread the message back home. The entire process of community involvement enables to recreate a pro human right perspective towards persons with mental illness. Their dignity is regained; care and love in the centre as if in a family pitch their rights back in position. The entire process removes stigma about mentally ill persons and place them in a high position and prepare the society to own the responsibility to care these persons with cognitive deficits. Thus the care of mentally ill ultimately leads to stigma reduction and prepare the families and communities to accept and

care the persons with mental illness. The entire process of stigma reduction contributes to the promotion of human rights of the mentally ill person and creates a model of right based care and rehabilitation of the persons with mental illness.

Key Words: *Care of the Mentally Ill Persons, Human Rights and Stigma Reduction, Acceptance as Family Member, Engagement of the Community*
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Introduction

Unlike any other disorders mental illness is always stigmatizing even in the modern world. Apart from cultural factors, illiteracy, ignorance about mental illness, its symptoms and treatment lead many to consider the persons with mental illness as somebody unwanted in the society. Although considerable attempts are made by academicians and practitioners to help the public to change their perspectives towards mental illness it takes time for a transformation to fix its space.

Social exclusion is major problem in mental illness disability like any other disability or much more due to the stigma attached. Family exclusion and community exclusion expel the mentally ill to the street. The human right and dignity of the person is shattered and forced to lead a life in inhuman conditions. The rehabilitation mission under study is a family centered community based model in Kottayam, Kerala, India is meaningful in this context. The centre is similar to its counter parts across the nation. All such centers were started with individual initiatives driven by a social or spiritual motive to serve the humanity particularly the vulnerable. Hence they picked up the so called socially excluded mentally ill on the street sheltered and cared. The lost dignity is given back and human rights are ensured to the mentally ill in the whole process. It is based on the deprofessionalised or non professional approach of the rehabilitation process emerged and bloomed into success story for the past 20 or more years. The paper discusses the non formal strategies adopted by the individual visionaries in their march to protect and care the destitute mentally ill persons in stigma reduction and regaining the human rights of the persons with mental illness.

A brief review of literature would be helpful to position the problem of exclusion, recovery based rehabilitation and the methods of overcoming the barriers around it.

Community Based Rehabilitation in Mental Health Sector

Community based rehabilitation model began with community support systems in the west, In the mid-1970s, a series of meetings at the National Institute of Mental Health (NIMH) gave birth to the idea of a community support system (CSS), a concept of how services should be provided to help persons with long-term psychiatric disabilities (Turner and TenHoor, 1978). Recognizing that post deinstitutionalization services were unacceptable, the CSS described the array of services that the mental health system needed for persons with severe psychiatric disabilities (Stroul, 1989).

Nowadays there is a broad consensus on the need to shift from the model of care based on the traditional large psychiatric institutions to modern comprehensive community-based models of care, including acute patient units at general hospitals. The main reasons for this shift are the following:

Accessibility to mental health care of people with long term mental disorders is much better with community-based services than with the traditional psychiatric hospitals (Thornicroft and Tansella, 2003).

Community-based services are associated with greater user satisfaction and increased met needs. They also promote better continuity of care and more flexibility of services, making possible to identify and treat more often early relapses, and to increase adherence to treatment (Thornicroft and Tansella, 2003; Killaspy, 2007).

The community-based services better protect human rights of people with mental disorders and prevent stigmatisation of those people (Thornicroft and Tansella, 2003).

Studies comparing community-based services with other models of care consistently show significant better outcomes on adherence to treatment, clinical symptoms, quality of life, housing stability, and vocational rehabilitation (Braun P. et al., 1981; Conway M. et al., 1994; Bond et al, 2001).

Studies suggest that care in the community for acute psychoses is generally more cost effective than care in a hospital, although it is important to note that these results cannot be generalized to all patients requiring admission to psychiatric beds (Goldberg, 1991).

Studies also show that, for patients who require prolonged stays in the hospital, hostel wards provide a cost-effective alternative that is preferred by the patients themselves (Goldberg 1991). Other studies show that, when deinstitutionalisation is correctly developed, the majority of patients who moved to from hospital to the community have less negative symptoms, better social life and more satisfaction (Leff, 1993;1996).

The right to community-based services, expressly recognised in Article 19 of the United Nations Convention on the Rights of People with Disabilities (CRPD), has significant implications for the organisation of mental health services, since it implies that:

1. All persons with disabilities have the right to live in the community, choose their place of residence and have access to residential and domiciliary services as well as other community services;
2. States should facilitate the inclusion and full participation in the community of persons with disabilities;
3. Community services and facilities for the general population should also be available for people with disabilities.

WHO in its report on Psychiatric Rehabilitation consider rehabilitation to improve the skills of the clients and to strengthen the support system related to clients' goals. But should this rehabilitation model controlled by professionals? Studies show that non professional segments have better output in terms of recovery in the entire rehabilitation process.

The development of the concept of a comprehensive community support system, combined with the rehabilitation model's more comprehensive understanding of the impact of severe mental illness, has laid the conceptual groundwork for a new vision for the mental health service system of the 1990s.

1. Recovery can occur without professional intervention. Professionals do not hold the key to recovery; consumers do. The task of professionals is to facilitate recovery; the task of consumers is to recover. Recovery may be facilitated by the consumer's natural support system. After all, if recovery is a common human condition experienced by us all, then people who are in touch with their own recovery can help others through the process. Self-help groups, families, and friends are the best examples of this phenomenon.

It is important for mental health providers to recognize that what promotes recovery is not simply the array of mental health services. Also essential to recovery are non-mental health activities and organizations, e.g., sports, clubs, adult education, and churches. There are many paths to recovery, including choosing not to be involved in the mental health system.

2. A common denominator of recovery is the presence of people who believe in and stand by the person in need of recovery. Seemingly universal in the recovery concept is the notion that critical to one's recovery is a person or persons in whom one can trust to "be there" in times of need. People who are recovering talk about the people who believed in them when they did not even believe in themselves, who encouraged their recovery but did not force it, who tried to listen and understand when nothing seemed to be making sense. Recovery is a deeply human experience, facilitated by the deeply human responses of others. Recovery can be facilitated by any one person. Recovery can be everybody's business (Antony, 1991).

Barriers in Mental Health Rehabilitation

The community based rehabilitation is also not free from barriers. The barriers existing in the disability rehabilitation process also seems to be present in the rehabilitation of the mentally ill persons through community models. The experience in most countries is that the development of community services is a complex process that faces several important barriers. Some of these barriers exist at the policy level, and may occur when there is a lack of adequate mental health policies and legislation, budgets are insufficient or where there is procedural discrimination against persons with mental disorders, in terms of limited or lack of health insurance. Other barriers are found at the level of the health system and include: difficulties in releasing resources from the large institutions (which absorb the greater part of the available funding), resulting in under investment in community-based services; lack of integration of mental health services with the general health system; lack of integration between mental health and social care systems, including poor co-ordination with housing, welfare and employment services; lack of co-ordinated partnership working between statutory and non-statutory mental health services, including the voluntary and independent sectors; and inadequate training of staff across systems (WHO, 2001).

In addition to research showing that individuals with disabling mental disorders receive low levels of vocational services or none at all, a body of research beginning in the 1980s (Robin et al, 1990) has found that large proportions of this population receive no clinical services and that those who do fail to receive adequate care (Lehman et al, 1998, Wang et al, 2000).

Baldwin and Johnson (1998) studied disability-related employment discrimination by examining earning differentials and applying econometric techniques previously used to study race and sex discrimination. After they accounted for productivity differentials related to functional limitations and other productivity related individual characteristics, such as education, occupation, and part-time employment, large unexplained variance in wage differentials between people with and without disabilities remained.

In a qualitative research on barriers of disability they found out the factors responsible for the barriers. In summary the qualitative research suggests disabled people face notable barriers in relation to:

1. **Having Sufficient Choice and Control**
   For example; limits to choice of employment, or choice and independence of young disabled people.
2. **Access and Inclusivity**
   Including around the accessibility of places and spaces and the inclusiveness of mainstream education and the workplace.
3. **Having their Voice Heard**
   Despite being no less likely to want to get involved in improving society, disabled people consistently reported not being listened to.
4. **Stigma and Discrimination**
   Compounding the other challenges, many disabled people are treated unequally because of the stigma attached to their condition.
5. **Participation and Connectedness**
   The research suggests that reduced funding and other pressures are limiting the ability of disabled people to maintain social connections.

Research participants who took part in the qualitative research feel very strongly that there is an urgent need for a change in the attitudes and behaviour of health and social care professionals and staff, through training and education. More specifically, they feel that health and social care professionals need to make more time for disabled people.

They also feel that they need to have more empathy and sensitivity and a better understanding of the social impact of their conditions. Participants feel that disabled people themselves are best placed to deliver such training and awareness-raising effectively. However any organisation seeking to tackle this problem with attitudes need to be aware of the systemic and structural constraints acting on health and social care professionals in terms of many competing priorities for training and limited funding. Along with attitudinal changes a few more suggestion given in various studies are given below. According to Ali Jookhun (2012), some factors to consider in creating an inclusive and accessible society are:

1. Changing our daily attitudes towards disabled persons concerning education, employment, etc. A disabled person ought to get a job not because he/she is disabled, but because he/she deserves a job ; and for this, inclusive environments for enabling education within the society are important together with ensuring that proper equipment/tools for the work are made available.
2. **Creating Accessible Environments**

   Facilitate movement and independency of disabled persons. Supports to enable people with disabilities to flourish must be created. For example : Allow for public transport and schools with accessibility facilities, make ATM accessible to wheelchair users, toilets at work must be designed for disabled, etc. Free transport despite being "free" for all is not 'free' for disabled persons if they can access the facility.
3. **Introduce and Mend Laws to Create Enabling Legislations**

   Laws are meant to protect. Greater protection must be given to those less able to defend themselves. It is shocking to see presumed aggressors not being condemned due to lack of proof (a journalist wrote an interesting article where a presumed rapist was freed due to mental disturbances of a mentally disabled person).
4. **Revamp Existing Institutions for Disabled**

   The Disability Watch - what results has it produced after being launched since a year (launched in December 2011) ? How come with rampant atrocities perpetuated against disabled persons, the Disability Watch is dumb ? The CDU, the Disability Watch and other such institutions are not the toys of Ministries to be used for 'patchwork'. Revamp these institutions, revitalise them and give them controlled autonomy with time-based performance appraisals.

However the models discussed in this paper generates a paradigm shift in the very process of mental health rehabilitation. How people centered family based community model of rehabilitation can adapt an inclusive policy to break the barriers of disability is an experimented reality in such approaches over the past 20 or more years.

Methodology

The objective of the study is to find out how the disability barriers are overcome through a grass root community assistant rehabilitation model. A qualitative design with case study methodology is followed. The case study is based on a single unit but different dimensions in the removal of barriers in disability rehabilitation are discussed.

Case study

Luxurious greenery adorns the ambiance of the village on the outskirts of Kottayam, the first 100% literacy district in India. The villagers are engaged in agriculture and village bound business. A series of building complex could be seen as you travel through the state highway nearby. It accommodates 280 persons with mental illness. It was the great vision of Mr Tomy who brought the mentally ill persons from the street and gave shelter to them. He was compassionate to the poor and needy from childhood. When he was serving in Kottayam medical college he used to give food to the poor patients and later he picked up the persons with mental illness from the streets and gave shelter and care in his own house. Nothing could prevent his commitment and dedication for the cause to give a life different to the rejected and marginalised mentally ill people. His wife and children co-operated with the mission and it grew very fast.

Accepting them as brothers or sisters was the beginning. Non professional intervention began its curing voyage over those feelings of love and compassion. Jesus Christ, the God of inspiration helped him to swim through troubled waters. The roads were full of thorns but turned out to be bed of roses in the smiles of the hundreds given care. There were doctors, engineers and other people of great profile whose mental balance derailed and moved around like a little child. Tomy was ‘Dad’ for them and his wife Mercy became true resemblance of God’s mercy and today she is the ‘Mom’ of everyone over there. Accepting each as family member and live a life under one roof is not an easy task. Their road was one less travelled and the

community realised the sweat and blood behind the whole task. The primary element of breaking the barriers was this acceptance of the clients as family members. It created a wave of healing and majority of the clients are with minimum or no medication.

Tomy was working tirelessly for the past 25 years. He visits schools, colleges and other public institutions and disseminate information about persons with mental illness. He invited the school and college students to visit his home filled with persons having mental illness. They came in groups, boys and girls and witnessed the reality that the so called 'persons with mental illness' go around as 'normal' as anyone else. It opened their eyes and thousands of other people in the society who realised that the persons with mental illness are not a group to be scared but to be cared as one of the family members. They came in groups with cash and kind to support the mission. Several people stayed back to serve as volunteers. You call it 'a movement?' Or 'Innovation?', whatever you name it there is considerable amount of stigma reduction and you witness persons with mental illness live with dignity and worth. Is not the human right ensured to these brethren? Indeed it the process of family based care where you blend both professional and non professional service to get a taste of homely environment and rediscover the rejuvenation of human rights.

Secondly engaging the clients in day to day functioning of the agency was breaking the barriers of disability. It gave them dignity and self esteem. From housekeeping to kitchen and shaving the highly disabled enabled a sense of empowerment among the inmates. Everyone felt a sense of belonging. It helped them to set right their cognitive faculties. There are less incidents of aggressive behaviour among patients. The drug compliance is well maintained. It literally led to recovery process enhancing their human rights.

Third factor is the readiness of the clients to take up responsibilities. The conventional attitude is that the mentally ill person cannot care babies is proved untrue here. They look after babies with extra care. One who observes them get amazed why they are still kept under shelter? In several occasions such persons were rehabilitated back home the attitude of family members may not be conducive. It leads to poor care, inadequate and irregular medication and consequent relapse. Therefore the attitude of the care givers enables them to break the barriers of disability and make them function in socio-biological situations. Witnessing such care model helped many in the whole process of reducing the stigma of families and community.

Fourth factor is the cordial relationship between the inmates which creates a harmonious environment in the centre. Whatever activities undertaken in group there is good cohesion and mutual cooperation which is unlikely even some normal settlements. The readiness to sacrifice for the other, concern towards the needs of other and helping attitude make them more normal than the so called mainstream normal. It gave a new paradigm of facilitating human right to the persons with mental illness.

Finally the self help skills and communication skills they learn in the centre through day today activities make them cross all barriers of disability. The involvement of professionals is minimum whether the weekend Psychiatric consultation, monitoring of medication by nurses and intervention of social workers. Most of the Psychiatrist in the National Institute (NIMHANS, Bangalore) extend their helping hand this deprofessionalised model and support in training and development in the entire process of enhancing human rights to the persons with mental illness in this family care model.

Conclusion

Stigma is manmade. Disability may be natural outcome of an infirmity. However, one should find that the attitude change in the care taker may be the key factor in empowering the mentally ill, to cut across all barriers of stigma in disability care. The centre at the outskirts of Kottayam distinct out in giving an example of how the pro-patient attitude can really make a difference in the mentally ill. Although it is an established fact in such centers, the driving force behind the phenomena yet to be studied. It could be a live model for all professionals working with the rehabilitation of the mentally ill persons pan national.

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Role of Collective Action and Governance in Implementing Sustainable Fishing Practices: A Case Study of Karnataka Marine Fisheries

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Abstract: *In coastal Karnataka two hundred thousand fishing households are directly dependent on marine fishing which provides livelihood, security and minimizes the vulnerability to chronic poverty. The small-scale fisheries employing labour intensive harvesting, processing, and distribution technologies to harvest near-shore fishery resources were contributing less to the output and more to the employment. However, rapid growth of mechanization and expansion of international trade coupled with growing number of non-fishing communities in fisheries sector caused a transformation of fisheries during the past two decades. Macro level assessment of per capita income from fishing shows a declining trend during the last 10 years although the overall net domestic product in the region has been increasing. The declining resources and increasing use of coastal waters for non-fishery related activities have undermined the role of small-scale fisheries and its capacity to provide ecosystem goods and services. The restoration of small scale fishing requires a multi-pronged fishery management approach including community support and action. The recently organized stakeholder consultations with different fishing groups have evolved scope for executing collective management measures. The study is based on the outcome of a number of stakeholder consultations organized during 2016 as part of the national programme of International Collective in Support of Fish workers (ICSF) to disseminate and implement the Food and Agriculture Organization (FAO) "Voluntary Guidelines for Sustainable Small-scale Fisheries". The study is based on expert consultations, meetings with community based organizations and stakeholder consultations. Two prominent community based organizations were consulted regarding the impact of executing the FAO guidelines. The stakeholders consultation have focused on three major action research issues such as identification of measures to minimize the negative impact of implementing FAO guidelines on small-scale fishers, restriction and gradual removal of fuel subsidy to destructive fishing practices, reducing the dependence of women on state sponsored support schemes, integration of*

community based management measures with state fishery regulations, mobilizing community support/social capital for discouraging un-sustainable fishing technologies. The results of the study was helpful in understanding the real issues of governance and collective action required for the implementation of common fishery management regulations such as extended closed seasons and areas, introduction of minimum mesh size, limiting fishing effort through scientific licensing policy.

Key Words: *FAO Guidelines on Small-scale Fisheries, Sustainability, Social Capital, Collective Action, Fishery Management Regulations.*

Introduction

Overexploitation of fisheries in developing, tropical countries represents a particularly intractable problem because of institutional failures, ecological uncertainty, political and socio-economic considerations, market forces and a decline in social capital. Like many nations, India has attempted to both develop and manage fisheries, often with mixed or conflicting results. Many Indian fishers remain mired in poverty while the ecological and economic health of fisheries is at risk. Traditional community institutions that once governed local fisheries have largely been replaced by weak command-and-control measures, which often fail in the face of political, social, technological and economic forces. Fisheries in India also differ greatly, employing different gears across spaces with varying efficiency.

Classical fisheries economic theory predicts that without strict limits on access or effort or clear, secure property rights to the resource, fishers will apply excessive levels of effort in competition with each other. Increasing market pressures as well as so-called development may further diminish individual or collective incentives to self-limit. Conservation by reducing fishing effort becomes irrational for any individual, as uncaught fish today may not be available tomorrow (Gordon 1954). Fishers catch whatever they can in the present, ignoring their effect on future stocks and harvests (Scott 1955). The theoretical "race for fish" ensues, and, in an unregulated fishery, conservation becomes an afterthought.

Trying to limit fishing effort, governments introduce command-and-control regulations such as fishery closures, primarily to prevent overfishing of stocks. Some nations have even attempted complex measures to assign quasi-property rights to fisheries. In India, one of the primary regulatory mechanisms are

monsoon season bans on fishing by some or all gear classes. The ongoing debate about effectiveness of the fishery closures is one of the focuses of this paper. We first discuss the conflicts of executing fishery management regulations as applied to the seasonal closures and then examine effectiveness of fisheries governance in executing policies for sustainable development of the fisheries.

Objectives

1. To review the present status of Marine fisheries in Karnataka.
2. To assess the conflicts in executing fishery closures.
3. To examine the role of collective community action in effective implementation fisheries regulations and policies.

Methodology

Coastal fisheries represent diverse groups of fishers following diverse technologies targeting identical resources in fishing grounds with unequal fishing intensity for the same common property resource leading to conflicts within and outside the community. In order to understand the nature conflicts and resolution mechanism we adopted multiple methods of collecting qualitative and quantitative data. The observed conflicts were validated through five focus group discussions and on stakeholder consultation workshop at the state level guided by International Collective in Support of Fish workers (ICSF) based in Chenai. The ICSF supported expert consultation was organized at Malpe during 2016 as part of the national programme of International Collective in Support of Fish workers (ICSF) to disseminate and implement the Food and Agriculture Organization (FAO) "Voluntary Guidelines for Sustainable Small-scale Fisheries". Two prominent community based organizations were consulted regarding the impact of executing the FAO guidelines. The stakeholders consultation has focused on three major action research issues such as identification of measures to minimize the negative impact of implementing FAO guidelines on small-scale fishers, restriction and gradual removal of fuel subsidy to destructive fishing practices, reducing the dependence of women on state sponsored support schemes, integration of community based management measures with state fishery regulations, mobilizing community support/social capital for discouraging un-sustainable fishing technologies.

Fishing in Karnataka

The fisheries along Karnataka's 300-km coastline include dozens of commercially important species; total potential is estimated at 425,000 metric tons. Fishing remains mostly confined to the shallow coastal shelf, though fishers are expanding into ever-deeper waters as engine sizes and the number of large boats increase.[1] According to the fishery census published in 2012 by the Central Marine Fisheries Research Institute (CMFRI), Karnataka has 30,713 marine fisher families for a total fisher population of 167,429. Roughly 32,000 people actually fish full-time and almost 9,000 more fish part-time or collect fish seed. More than 34,000 others work in jobs such as marketing, net making or processing. Considerable additional labor migrates from other states.

According to CMFRI, Karnataka fisheries host 3,643 mechanized boats, the majority being trawlers.[2] Another 7,518 motorized boats (often modified traditional craft with outboard motors) and 2,862 non-motorized craft also exist in the fishery, though many may be left idle during peak mechanized fishing seasons. Karnataka's fishery infrastructure includes 206 ice plants, 10 freezing plants, 36 cold storage facilities, 16 processing plants and 32 fishmeal extraction plants. Only Gujarat and Maharashtra, India's most developed fishing-states, have more infrastructure (CMFRI 2012).

The technological and economic nature of the fishery has changed drastically in recent decades. In the 1950s, most fishers used small craft and fixed gears such as beach and shore seines. Total catch was low and mostly subsistence — perhaps only 50,000 metric tons (Bathal 2005). The catch went mostly to local markets.

However, in the 1960s and 1970s, Karnataka and other states ambitiously pursued so-called modernization of fisheries, national sales and international exports. Mechanization turned artisanal fisheries into industrial ones, dramatically increasing fish production through the 1990s. The spread of shrimp farming during the 1990s also increased demand for fishmeal produced from pelagics such as sardine further incentivizing fishing. Today's commercial catch includes more than 80 species.

In the mid 1990s, fish production began to dwindle even as fishing effort, space, boats, gears and trip duration increased. A 1980 census counted less than 1,100 mechanized craft in the state (CMFRI 1981), compared to 4,400

counted during the 2005 census (CMFRI 2006), though that number has fallen slightly. Mechanized boat size and power increased from nine meters and 10 horsepower to 20 meters and 350 horsepower or more. In early 2014, fishers reported the arrival of 600 horsepower engines in the fishery. Some trawl fishing trips now last nearly two weeks but many mechanized boats remain concentrated within the state territorial waters.

In recent decades, the motorized fleet has also grown as traditional fishers have added small engines. Governments encouraged the traditional sector to install small outboard engines up to 25 horsepower, allowing them to range farther into the sea. This increases the opportunity for conflict within mechanized gear classes that also fish within territorial waters; many traditional fishers see these larger boats as livelihood threats, though others report abandoning their small craft to become crew on mechanized boats and labor on docks.

According to CMFRI (2013) estimates, Karnataka's annual fish averaged 181,000 metric tons between 1985 and 2005, much below its estimated total annual potential of 425,000 metric tons. Catches have swollen in the last several years; CMFRI data shows annual catches from 2007 to 2011 have been not lower than 280,000 metric tons, with a record of 390,000 metric tons in 2011. High oil sardine catches along the southwest of the country partially explain this boom. Activists argue the cyclical but prolific oil sardine obscures stagnating production (Fernandes and Gopal 2012).

Sustainability is increasingly part of the vocabulary both of officials and fishers (Pillai ed. 2011, field interviews 2012, 2014), as acknowledgement of overcapitalization and potential overfishing spreads. The growing trawl fleet has hurt traditional fishers as well as the trawlers' own catches. Even in 1997, the Karnataka Department of Fisheries reported overfishing in shrimp and other high valued species (GOK). Small-scale fishers complain of trawlers in near shore areas where they are supposedly prohibited. Traditional *rampani* nets, a large community shore seine that once accounted for large portions of the annual catch, have almost disappeared.[3] Traditional and mechanized fishers report good harvest days are becoming less frequent, while Karnataka officials admit that state fisheries are overcapitalized (field interviews 2012, 2014).

State data show a significant decrease in the catch percentage by non-mechanized crafts (i.e. motorized and non-motorized boats), and a consequent

increase in catch percentage by the mechanized fleet. Yet average catch rates for both classes have fallen substantially. The average catch of mechanized units has declined more than 70 percent since a high in 1989-1990, while the average of non-mechanized units has fallen more than 75 percent since a high in 1994-1995. In addition, the overall catch by trawlers — one of the most destructive, indiscriminate gears — has increased, at the expense of other gears. According to statistics provided in the annual reports of state directorate of fisheries, from 1998-1999 to 2006-2007, only trawlers have seen an increase in their percentage of total catch.

Fisheries Regulation in Karnataka: A Historical Perspective

Governance, rulemaking and dispute settlement came mostly from often-caste-based community organizations. For example, older fishers in southern Karnataka report that *mogaveera* village councils enforced a traditional monsoon fishing ban to remove incentives for competition during weather that was dangerous to small craft (interviews 2012).

As noted earlier, fishery development and so-called modernization upended traditional governance. Karnataka focused on increasing fish production for domestic and international markets. Schemes pushed motorization of traditional crafts, introduced mechanized boats and incentivized infrastructure development. In the late 1960s, ice plants and cold storage appeared, and the Dakshina Kannada District Co-operative Fish Marketing Federation began to construct and distribute trawlers. This capital and infrastructure overhaul shook traditional fisher communities that resisted mechanization. Clashes between sectors led to fights, during which traditional fishers burned mechanized boats (Bhatta, Rao and Bhat 2000). Yet the "modernization" process continued, and by 1975, catching mackerel and sardines in Karnataka was an industrial business (Haywood and Curr 1987).

During the 1980s, fishers began to use sonar, mobile phones, radios and GPS navigators. Night fishing, multi-day fishing and monsoon fishing by mechanized boats became regular. Conflicts continued between traditional fishers of near-shore areas, where mechanized boats threatened their sustainability.

Sensing such problems nationally, the central government issued guidelines for reserving areas for different classes of fishing vessels (GOI 1978). Representatives of the *rampani* units, traditional fishers and mechanized boat owners met with officials to discuss fishing zones. In 1978, officials issued the following restrictions (GOK):

1. Rampani units may operate from 15 September to 15 April.
2. Five kilometers from the coast are reserved for rampani and traditional fishers. Small-scale shrimp trawlers may operate up to 1.6 kilometers from the shore only during September.
3. Purse-seine boats may operate beyond eight kilometers from shore.
4. Large trawlers regulated by the central government may operate only beyond 16 kilometers from shore.
5. Night fishing by purse seiners is prohibited.

In 1994, GOK extended the zone reserved for traditional fishers to 10 kilometers from shore, but no restrictions were placed on traditional boats fitted with outboard motors (GOK 1994). Similar spatial demarcations continue to exist today, though their enforcement is questionable.

In 1978, the central government also drafted model fishers legislation for states to follow. GOK passed the Karnataka Marine Fisheries Regulation Act in 1986, creating the present top-down regulatory framework. The act came into force in 1989 and GOK imposed its hallmark rule — a monsoon ban on mechanized fishing for 90 days from June 1 to August 31. Traditional boats fitted with outboard engines remained exempt (GOK 1989). Facing mechanized boat owner outcry, GOK later reduced the ban (which functioned effectively as a fishing season reserved for traditional fishers) from 90 days to 65 days (GOK 2000). The Mogaveera Mahajana Sangha (MMS), the traditional apex caste committee representing more than 140 fishing villages in southern Karnataka, largely acceded to the government order at its 2001 meeting; the MMS resolved that trawl and purse seine boats should not fish from June 6 to August 9, though small boats with engines up to 25 horsepower were exempt. The debate would not end there.

Traditional and mechanized fishers also took the monsoon ban to courts. After officials in Goa reduced the ban there from 90 days to 54 days, a public interest lawsuit in July 2000 asked the Goa bench of the High Court of Bombay to extend the ban to protect the growth of juvenile fish. In September 2002 the court ordered Goa officials to ban both mechanized and motorized craft from fishing within the territorial waters from June 10 to August 15 or *Narlipoornima,* whichever is earlier. The court also called for suspending mechanized vessel licenses, beach patrols, seizure of illegal catch, blocking of fuel sales from jetty pumps and cancelling licenses for fish transport vehicles.

The High Court also took issue with different rules in different states and asked the central government to adopt a fishing ban for the entire west coast. In December 2002, the central Ministry of Agriculture banned monsoon fishing in the EEZ beyond territorial waters of the west coast (including Tamil Nadu) and directed states to agree on ban dates for their jurisdictions (GOI 2003). State ministers gathered in February 2003 in New Delhi though a uniform period never materialized.

Separately, traditional fishers began identifying customary and statutory rules that could offer legal protection from uncertainty in the federal process. In 2003, four traditional fishers from Karwar of Uttara Kannada District petitioned the High Court of Karnataka to prevent fishing by mechanized and motorized boats during the monsoon. In an interim response, the court in July 2003 ordered Karnataka officials to allow only boats without engines to fish during the monsoon. The state issued the ban days later. This went further than many small-scale fishers wanted, as given widespread motorization of traditional craft. Other traditional fishers asked the MMS to pressure the government to consider livelihood implications and again permit boats with small engines to fish during the monsoon. The state conceded, but the High Court of Karnataka, in final judgment in 2004, reversed the government and ordered a complete ban. Traditional fishers formed the Karnataka Coastal Traditional Fishers Association (KCTFA) and successfully lobbied the government to once again allow fishing by boats with engines up to 10 horsepower.

In 2005, influential mechanized fishers convinced Karnataka officials to reduce the ban period from 65 days to just 45 days (GOK 2005a). The KCTFA opposed the additional 20 days for mechanized fisheries and after protests and lobbying both sides reached compromise in June 2005 of a 57-day fishing ban of 57 days for all boats with engines above 25 horsepower. The state government (GOK 2005b) fixed this agreed-to ban from June 15 to August 10. However, that same year, the Supreme Court of India responded to a petition from the Goa Environment Federation by ordering a uniform ban in all west coast states from June 10 to August 15 (67 days), exempting boats with engines only up to 10 horsepower (Supreme Court of India 2005). The Karnataka government then temporarily followed the Supreme Court order, lowering the horsepower exception and extending the ban, but strong lobbying from mechanized fishers reduced the ban to 57 days again.

Mechanized boat owners still argue for a ban of only 45 days on all boats with engines, regardless of size, while traditional fishers want to raise the exception to 25 horsepower and extend the ban to 67 days. Traditional fishers say small engines are needed to travel quickly during adverse weather or range farther away from degraded inshore waters. They also argue the fiberglass boats promoted by governments are bigger and more difficult to manage without engines. Both sides continue to lobby officials on occasion (KCTFA 2006a, 2006b, 2007a, 2007b, 2007c, field interviews 2012).

Despite the Supreme Court's order, neither the ban period nor exemptions were made uniform across states as local politics would inevitably lobby states to essentially defy the court. The door remained open to conflicts, particularly on the west coast (Chari 2014), leading up to the uniform ban period beginning in 2015. The monsoon season is a powerful ecological force in Karnataka fisheries, and the current ban from June 1 to July 31st exempts only small boats up with engines up to 10 horsepower. This idles approximately a quarter of the fishing fleet, though it also acts as a reserved season for largely traditional fishers. There are strong incentives to go to sea during this season, particularly for small fishers whose livelihoods are under threat from social, technological and economic change.

We find that there is less-than-complete justification for the bans as a way to protect breeding species. And, given the uncertainty over fisheries in India, the bans represent protections based on the precautionary principle. We note that these benefits extend to all fishers. Furthermore, the ban continues to act as a reserved fishing season for remaining traditional fishing population (Sehara, Pannikar and Karbhari 1992), who rely upon that time for basic sustenance.[4] Even some fishers who work on mechanized boats also return to traditional craft during this time. There may also be others in the fishery that feels the pinch of the ban, such as idle mechanized crew members and or fishmongers. We, like Vivekanandan et al. (2010) and Mohamed et al. (2013), argue for other policies (e.g. poverty benefits or alternative job creation) to address these problems without attacking a generally accepted piece of fishery governance. That is not to say that this or other regulations need no modifications. Given the above analysis, we would actually support lengthening the ban coupled with compensation for those truly suffer. But in reality the fishing ban during monsoon period has failed to achieve its prime objective as thee is a absence of community involvement in its implementation.

As a result of failure of command and control/top-down approach in implementing the conservation methods, FAO in the year 2013 issued the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries. And, as part of the national programme of International Collective in Support of Fish workers (ICSF) Trust to disseminate and implement the Food and Agriculture Organization (FAO) "Voluntary Guidelines for Securing Sustainable Small-scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines)" a state-level workshop was planned and organized by the Coastal Karnataka Fishermen Action Committee on 6 November, 2016 at Malpe, Udupi district. The Coastal Karnataka Fisher men Action Committee, promoted by the apex community organization of marine fishing communities of Karnataka (Moagaveera Mahajana Sabha), took initiatives to involve the representatives of village-level fisher groups by holding pre-workshop meetings in all the three coastal districts in Karnataka—Dakshina Kannada, Udupi and Uttara Kannada. The participants in the workshop included the office bearers of sixty-three associations spread across three districts (Dakshina Kannada, Udupi and Uttara Kannada) of coastal Karnataka which are affiliated to the Coastal Karnataka Fishermen Action Committee, including the Traditional Fishermen Association, Trawl Boat Fishermen Association, Purse-seine Boat Fishermen Association, Deep-sea Boat, Fish Workers Association, fisheries cooperatives, fisherwomen associations, joint director and assistant director of the fisheries department, government officials of Coastal Regulation Zone (CRZ), forest department officials, officials of Central Marine Fisheries Research Institute (CMFRI), representatives of NGOs, president and secretaries of fishermen village.

The Aims and Objectives of the Stakeholder Consultation Workshop

1. Integrate the different forms of fishery management regulations for implementation in order to minimize its negative impacts on small-scale fishers.
2. Modify the present fuel subsidy scheme to benefit small-scale fishers and prohibit destructive fishing practices.
3. Make fisherwomen less dependent on state support schemes through self-empowerment mechanism.
4. Integrate community-based management with increasing diversity of fishing communities.

5. Ensure minimum fishing space for small-scale fishers with increasing non-fishery activities both on the coast and also on the sea.
6. Provide more credible and easily available data on fish catch and allied information for evolving scientific management policies.
7. Ensure a better monitoring and reporting system of fish catch and other climate-related parameters.
8. Mobilize capital and technology and involvement of fishers in transforming present bottom trawling into more sustainable fishing technology which involves huge funding mobilization and involvement of community-based organizations.

The discussions were made on five issues as suggested in the SSF guidelines.

1. Governance of tenure in small-scale fisheries and resource management,
2. Social development, employment and decent work,
3. Value chains, post-harvest and trade,
4. Gender equality, and
5. Disaster risks and climate change.

The group discussions were summarized below which reflect the real concern of the fishers and their understanding of the problems. On the issue of Customary Tenure Rights, the group opined that in most coastal areas, beach space available for fishing activities had declined drastically due to erosion, tourism, setting up industries, climate change, disasters (natural and human made), and other allied reasons. It threatened the livelihood of traditional fishermen as they do not get space for operating shore-seines and also for landing their vessels. They complained that though there are spaces in some areas, such spaces are not available to the fishing activities, especially for fish drying, curing and processing, mainly due to the development of tourism and establishment of industries in the areas. In the past, government reserved (notified) some of the coastal land for fish curing purposes, but today such land are diverted for non-fishing activities. Most of the coastal lands are controlled by the port department; as a result there is a scarcity of land for constructing basic infrastructural facilities at the fishing harbour. They complained that due to the discharge of industrial effluents [Udupi Power Corporation Limited (UPCL), Baden Aniline and Soda Factory

(BASF), Mangalore Refinery and Petrochemicals Limited (MRPL)], pollution level has increased. The Single Point Moring of MRPL, naval base-Seabird projects has led to a decline in the fishing space as areas where fishing is prohibited has increased, thus reducing the fertile area for fish production. It was emphasized that the government shouldn't allow net manufacturing units to manufacture the destructive nets. Fishermen from Karwar complained that the district administration evacuated the sheds in the coastal area, but such lands are not available to fishermen. They pointed out that women were not given preferential rights in tenure rights. Increased sand mining adversely affected the fish production. At Malpe port area whenever the fish curing-land would be leased out, the fisherwomen should be given the preference as they depend on such land for fish drying activities. Asked about what changes have affected the customary tenure rights, the group opined that there is no coordination among various departments of the government and as a result they failed to implement the policies of the government. The group agreed that though we have CRZ Act, it has not been implemented effectively. In the coastal area, permissions are given for developing resorts but not for constructing houses for fishermen. The group demanded that in the coastal area, there must be a reserve space for traditional fishing activities and also for the activities of fisherwomen.

The group reported that they had customary management systems related to scheduling of fishing activities, sequencing of gear use, sale of fish catch, owner-crew relations, controlling destructive fishing in their area and used to take decisions relating to fisheries, including fishing, covering the activities of women, but these systems are no longer functioning effectively. About the government-implemented management measures, the group stated that the sixty-one days fish ban has been in practice and implemented effectively. Though there are rules about Monitoring, Control and Surveillance (MCS) systems, fishing zones, mesh size regulations, destructive fishing, such rules are not implemented. The group reported that by creating more awareness about all such rules and with the cooperation of fishers these could be implemented. They felt that CRZ Notification 2011 is still to be implemented. They opined that under Marine Fisheries Regulation (MFR) Act, when the license is given for fishing boats, it should be for five years, and thereafter it should be renewed every year. But at present the license is operational for only a year and has to be renewed every year. About the implementation of the government-led management measures, the group opined that

management measures are not implemented effectively as the government does not consider the opinions of the fishers and does not allow fishers to contribute while framing policies. The group felt that there is a need for strengthening all organizations and cooperatives of fishers. All the associations should come together under one platform with proper coordination and discuss their problems to compel the government to meet their demands.

The second Group members on Value Chains, Post Harvest and Trade and Gender Equity group members observed that they have their organizations but they were not given a chance to be present in the local decision-making processes relating to fisheries. They remarked that though a few capacity development training programmes were organized for a limited number of people to produce good quality fish and fishery products for both domestic and export markets, there is no support after training and no follow-up from the government. They stated that in most of the landing centres, processing and storage areas and fish markets there is no adequate and suitable basic infrastructure, amenities and services to meet their business and personal needs. The group members spoke about losses in fish supply chains which in turn results in increase in their costs and reduces their incomes. To reduce the loss of quality of fish, the group suggested that fisherwomen must be given big-size icebox and there must be a cold-storage facility at landing centres. Further, they stated that though they are given the icebox through government schemes, they are not available equitably to all of them. The group stated that there is no women group engaged in supplying fish and fishery products to international markets and they are willing to take up such activities, provided there is a support and assistance from the government. The members found that as a result of export of fish to international markets, fisherwomen could not get sufficient fish to trade in the local market which in turn affected their food security. They complained that no timely and adequate market information is available to them to earn better returns. They suggested that at the landing centres fishermen should give preference to fisherwomen while auctioning/selling fish.

The group opined that fear of losing livelihood kept the women away from decision-making process. Further, lack of information, awareness and coordination also constrained the women's equitable participation in decision-making process. They stated that changes in the fisheries sector substantially affected their livelihood in the form of non-availability of fish in adequate quantity, decline in coastal space for fish processing activities, competition

form men traders and growing number of fish retailing shops. The women head loaders found it difficult to sell the fish due to two-wheeler and four-wheeler men retailers. Even in the marketplaces, women lose customers due to an increase in the number of men retailers who cover every nook and corner of the villages and cities. The group complained that as such, there are no specific government programmes/schemes which provide social security and health security to fisherwomen. Schemes like Matsya Mahila Swavalambana Yojane, Savings Cum-Relief Scheme are not big enough to meet or compensate the needs of the fisherwomen. Group accident insurance scheme and distress relief fund are not reaching the people properly. They suggested that there must not be any age restriction while sanctioning benefits (compensation/insurance) to the injured or deceased fish worker under any social security measures. They also articulated the urgent need to formulate a policy to provide rights over coastal land, social security measures (specific to fishermen and fisherwomen engaged in fishing and related activities) and also to extend a credit facility like in the agriculture sector. The group found that though there are organizations at different levels to provide support in their activities, these are not functioning effectively. Proper coordination is required among them.

One of the groups observed that before sanctioning the setting up of an industry in coastal areas, the government needs to discuss the matter with the fishermen organization by taking them into confidence and take suitable measures to retain and develop the fisheries. Steps must be taken to avoid sea and air pollution. Due to insufficient flow of water into sea during the rainy season, the quantum of nutrients available to fish has declined. Therefore, the government should take sufficient measures to retain the forest areas to get rainwater.

Conclusion

Our first order conclusion is that policy desperately needs a directional shift. Top-down management is prone to failure (Kompas and Gooday 2007), and we advocate reviving community management systems, which could assure territorial and livelihood security to coastal fishers. True decentralization of management and development to such locally-based institutions could better support sustainable use and long-term health of natural resources and appropriateness of development (Ostrom 1990, Scott 1999).

International development agencies and even the central government of India have recognized that trust, reciprocity, cooperation and social networks of

local community institutions can lead to economically and environmentally sustainable development. For monsoon bans, officials should strongly consider working through community institutions to locally tailor bans to be most effective for various fisher classes and regionally fisheries, while also brokering agreements across larger geographies to prevent inter-regional conflicts. This also means involving the fishing community in designing and monitoring spatial reservations for different classes. Though not a simple task, we believe this is a viable alternative. Including representatives from fishing communities in the policy process should strengthen public support and buy-in. Simply put, participatory management should be a priority for the government.

Monitoring and research should bring community-level organizations to the same table with government and scientists for joint evaluation and assessment. Fisheries management must link with economic sectors such as construction, industry, tourism and agriculture. Even broad monsoon fishing ban may have little impact if other threats to fishery health remain. A coordinating forum — one that would incorporate all stakeholders — is sorely lacking.

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The Future Outlook of Nigerian Agricultural Sector Growth in the Light of Global Financial Developments-Discourse for Nigeria Green Alternative

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Abstract: *This empirical research investigated the future outlook of Nigerian Agricultural Sector Growth in the light of global financial developments using linear and symmetric price transmission mechanism model (ECM). The study made use of annual time series data covering GDP-Agriculture and its sub-sectors which spanned from 1990-2012. The findings showed that long-run association exit between agriculture and its sub-sectors with the mother sector establishing long-run equilibrium with its sub-sectors, though the convergence rate was moderate as indicated by the attractor coefficient. Furthermore, results showed that all the sub-sectors have positive influence on GDP-Agriculture with crop sub-sector having a lead influence when compared to other sub-sectors. Therefore, the study recommends that government should adopt adjustment strategies that hinges on shoring-up gross agriculture revenue to compensate for the dwindling oil revenues given that the prospect for the country economy depend on the policies articulated for the medium-to-long term and the seriousness with which they are implemented.*

Key Words: *Agriculture; Economy; Growth; ECM; ARIMA; Nigeria.*

Introduction

The economic aspirations of Nigeria have remained that of altering the structure of production and consumption patterns, diversifying the economic base and reducing reliance on oil, with the aim of putting the economy on the part of sustainable, all-inclusive and non-inflationary growth. The implication is that while rapid growth in output, as measured by the real gross domestic

product (GDP), is important, the transformation of the various sectors of the economy is even more critical. This is consistent with the growth aspirations of most developing countries, as the economy structure is expected to change as growth progresses.

Since 1999, the economic growth of Nigeria has risen substantially, with annual average of 7.4 percent in the last decade. But the growth has not been inclusive, broad-based and transformational. The implication of this trend is that economic growth in Nigeria has not resulted in the desired structural changes that would make agriculture the engine of growth, create employment, promote technological development and induce poverty alleviation. The economy has been import dependent with very little non-oil exports: it relies heavily on crude oil and gas exports with other sectors trailing far behind. The crude oil accounts for about 90 percent of foreign exchange earned by the country while non-oil exports account for the balance. In recent times, the economy has been susceptible to shocks in the oil industry which have been caused by either developments in the international crude oil market or the restiveness in the Niger Delta region of the country. However, Agriculture which was the major economy driver before the era of black gold or oil boom has been abandoned to the rural poor. Government expenditure outlays that are dependent on oil revenues have more or less dictated the pace of growth of the economy. Looking back, it is clear that the economy has not actually performed to its full potential, particularly in the face of its rising population.

Research Methodology

The present study used deflated price annual time series data covering Agriculture sector, crop, livestock, fishery and forestry and sub-sectors spanning from 1990-2012, sourced from CBN database. The data were synthesized using simple regression model, ADF unit root, Elliot-Rothenberg-Stock (ERS) ADF-GLS test, and linear and symmetric price mechanism model (ECM). The empirical models used are given below:

1. Simple regression and Engel-Granger ECM model

Consider a multivariate co-integration model as follows:

$$GDP = \delta_0 + \delta_1 Agriculture + \delta_2 Industry + \delta_3 Services + \varepsilon_t \quad \ldots\ldots\ldots\ldots (1)$$

Where;

GDP = Gross Domestic Product

$ð_0$ = Intercept

$ð_{1-3}$ = Coefficient

$ε_t$ = Pure random walk

Co-integration of the multiple variables can be tested if all the variables display the same order of integration. The revenue adjustment mechanism between these variables, measured by Equation (1), was estimated through the Ordinary Least Squares (OLS) approach. ADF unit root test was applied to the residual of the estimation. These variables are said to be co-integrated if their residual is stationary, suggesting that there is a revenue adjustment mechanism between these multivariate series, which makes them converge to their long-term equilibrium relationship. In addition, short-term integration tests enable checking whether revenue responses on the variables are instantaneous. The short-term relationship is derived from the Granger (1981) representation theorem in the form of an Error-Correction Model (ECM) and is presented as follow:

$$\Delta GDP = á_0 + á_1 \Delta Agriculture + á_2 \Delta industry + á_3 \Delta Services + á_4 ε_{t-1} + V_t \quad \ldots\ldots\ldots\ldots\ldots (2)$$

Where;

Δ = First difference

$á_0$ = Intercept

$á_{1-4}$ = Coefficient of variable

$ε_{t-1}$ = Lagged value of the residual derived from Equation (1); and,

V_t = White noise

2. Augmented Dickey Fuller Test

The Augmented Dickey-Fuller test (ADF) is the test for the unit root in a time series sample (Blay *et al.,* 2015; Singh, *et al.,* 2016; Sadiq *et al.,* 2016a). The autoregressive formulation of the ADF test with a trend term as cited by Beag and Singla (2014); Mahalle *et al.* (2015) is given below:

$$\Delta p_t = \alpha + p_{t-1} + \sum_{j=2}^{it} \beta i \Delta p_{it-j+t} + \mathcal{E} \ldots\ldots\ldots\ldots\ldots (1)$$

Where, p_{it} is the price in market *i* at the time *t,* "p_{it} $(p_{it} - p_{t-1})$ and *á* is the intercept or trend term.

3. ARIMA Model

A generalization of the ARIMA models which incorporates a wide class of non-stationary time-series is obtained by introducing the difference into the model. The simplest example of a non-stationary process which reduces to a stationary one after differencing is Random Walk. A process $\{y_t\}$ is said to follow an integrated ARMA model, denoted by ARIMA (p, d, q), if $\nabla^d y_t = (1-\beta)^d \mathcal{E}_t$ is ARMA (p, q), and the model is written below (Lama *et al.*, 2015; Sadiq *et al.*, 2016b):

$$\varphi(\beta)\,(1-\beta)^d y_t = \theta\,(\beta)\,\mathcal{E}_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (22)$$

Where, $\bullet t \sim WN(0, \sigma^2)$, and WN indicates white noise. The integration parameter d is a non-negative integer. When $d = 0$, ARIMA (p, d, q) = ARMA (p, q).

Forecasting Accuracy

For measuring the accuracy in fitted time series model, mean absolute prediction error (MAPE), relative mean square prediction error (RMSPE), relative mean absolute prediction error (RMAPE) (Paul, 2014) and R^2 were computed using the following formulae:

$$\text{MAPE} = 1/T \sum \{A_t - F_t\} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (23)$$

$$\text{RMPSE} = 1/T \sum \{(A_t - F_t)^2 / A_t\} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (24)$$

$$\text{RMAPE} = 1/T \sum \{(A_t - F_t) / A_t\} \text{ X } 100 \quad \ldots\ldots\ldots\ldots\ldots\ldots (25)$$

$$\mathbf{R^2} = 1 - \frac{\sum_{i=1}^{n} (A_{ti} - F_{ti})^2}{\sum_{i=1}^{n} A_{ti}^2} \quad \text{(Sadiq } \textit{et al.,} \text{ 2017)} \quad \ldots\ldots\ldots\ldots\ldots (26)$$

Where, $\mathbf{R^2}$ = coefficient of multiple determination, A_t = Actual value; F_t = Future value, and T = time period(s)

Results and Discussion

Estimates of Long-run Effects Using Simple Regression Model (Equation 1)

The regression of a non-stationary time series variables may cause a nonsense regression as evidenced by the coefficient of multiple determination R^2 (0.998) which is greater than Durbin-Watson statistic (0.794) as shown in Table 1a. A nonsense regression is not desireable given that it is not ideal for policy making and cannot be used for long-run prediction. However, the residuals of the simple regression (Equation 1) was found to be stationary at level as indicated by the ADF τ-statistics which was greater than the Engel-Granger critical value at 5% significance level (Table 1b), indicating that the variables are co-integrated and the double logarithm OLS regression is not spurious,

thus, a long-run model which can be used for policy making and also ideal for policy making. The stationarity of the residual variable implies that these variables have long-run association or they move together in the long-run: shared one stochastic trend. A further perusal of Table 1a indicates that all the stimulus variables or agricultural sub-sectors included in the model *viz.* crop, livestock, fishery and forestry sub-sectors have positive influence on the total agricultural revenue of the country in the long-run. For long-run prediction, it implies that 100 percent increase in the revenues that accrue to these agricultural sub-sectors *viz.* crop, livestock, fishery and forestry sub-sectors will increase the country total agricultural revenue by 88.3, 6.5, 4.1 and 1.1%, respectively. Therefore, it can be inferred that the crop sub-sector will have a dominant effect on the total agricultural revenue formulation, with the sub-sector being trailed from far by the livestock and fishery sub-sectors; while forestry trailed behind with a dismal performance.

Table 1a: Results of Simple Regression Showing Long-run Effects

Variable	Coefficient	Standard error	t-value
Intercept	0.21	0.031	6.774***
Crop	0.883	0.0052	169.91***
Livestocks	0.065	0.0061	10.73***
Fishery	0.041	0.0033	12.39***
Forestry	0.011	0.0031	34.68***
R^2	0.998		
R^2-Adjusted	0.991		
D-W stat	0.794		
AIC	-13.302		
SIC	-13.105		
HIC	-13.253		

Note: ***, **, * significance at 1, 5 and 10% levels respectively

Table 1b: ADF Unit Root Test on Residual

Variable	τ-statistic	Engel-Granger Critical Value		Decision
		5%	10%	
Residual (U)	-3.36	-3.34	-3.04	Stationary at Level I(0)

Note: * indicate that unit root at the level or at was rejected at 5% significant level

Estimates of Short-run Effects Using Error Correction Model (ECM)
The basic idea of co-integration was to identify the long-run relationship between variables. If there was a long-run relationship between the variables, then divergence from the long-run equilibrium path is bounded. If variables are found to be co-integrated we can specify an error correction model and estimate it using standard methods and diagnostic test. Also, since these variables were found to be integrated in the long-run i.e there is co-movement or long-run association between these variables, they are likely to establish long run equilibrium, thus, the need to develop a short-run model which capture both the long-run and short-run equilibriums. The results of the ERS (Elliot-Rothenberg-Stock) unit root test applied to the logarithm transformed variables at level shows that all the variables have unit root as indicated by the estimated t-statistics values in absolute term which were lower than their respective t-critical values at 5 percent confidence level, thus, accepting the null-hypothesis of non-stationarity and rejecting the alternative hypothesis of non-presence of unit root. Furthermore, the results of the ERS unit root test applied to all the variables, at first difference shows all the variables to be devoid of unit root as indicated by the estimated t-statistic values in absolute term which were higher that their respective t-critical value at 5% confidence level, thus, rejecting null hypothesis of non-stationarity in favour of the alternative hypothesis of non-presence of unit root (stationary) (Table 2a). Therefore, it implies that these variables were integrated of order one I(1), thus justifying the application of Error Correction Model (ECM). However, it is worth to mention that the reason for the application of the ERS (Elliot-Rothenberg-Stock) test also termed ADF-GLS test against the ADF test which is the most widely and commonly used unit root test was due to Type II error inherent in the estimated ADF test results (though not reported in the Table) which clearly showed that the ADF test had lost its power to test for stationarity due to the presence of structural points (SAP and post-SAP periods) in the captured data. It is because of the tendency of ADF to lose

its power to test for stationarity, Maddalla and Kim (1998) as cited by Gujarati *et al.*(2012), Maddalla and Lahiri (2013) advocated that all the traditional unit root test models (DF, ADF and PP tests) should be discarded in order to avoid the problem of Type I and II errors. The results of the short-run model which capture both the long-run and short run equilibrium is shown in Table 2b. The attractor coefficient termed the error correction term (ECT) of the Agriculture revenue (Total) against the agricultural sub-sectors was found to be significant and negatively signed, implying that the GDP-Agriculture established a long-run equilibrium with all the agriculture sub-sectors. The attractor coefficient is above the long-run equilibrium and tends to move towards the level of the sub-sectors in order to re-establish equilibrium. The estimated attractor coefficient was -0.489, indicating that the GDP-Agriculture absorbed 48.9 percent of the shocks in order to maintain a long-run equilibrium annually. It can be inferred that the GDP-Agriculture corrects its previous error from the long-run equilibrium due to any short-run equilibrium at the speed of 48.9 percent per annum i.e it adjust at the speed of 48.9% from disequilibrium to equilibrium in the long-run, which will take approximately 6 months and 26 days to re-establish long-run equilibrium with its sub-sectors. Therefore, it can be inferred that there was long-run causality running from agricultural sub-sectors jointly to the GDP-Agriculture. The results showed that the speed of convergence of the GDP-Agriculture towards the long-run equilibrium with its sub-sectors was moderate, and this can be attributed to partial efficiency of the agricultural programmes in the country i.e policy inconsistency, bureaucratic delay, poor programme implementation, corruption etc. The results of the short-run equilibrium show that each of the sub-sectors *viz.* crop, livestock, fishery and forestry have short-run causal effect on the GDP-Agriculture. In other words, the crop, livestock, fishery and forestry sub-sectors positively influence the total revenue that accrues to agriculture sector (GDP-Agriculture) in the short-run. For policy implication, a 100% increase in the revenue that accrues to crop, livestock, fishery and forestry sub-sectors will increase the total GDP-Agriculture by 88.5, 6.4, 4.0 and 1.1%, respectively (Table 2b). An important observation from this study is that the long-run and short run elasticities were the same. Therefore, in the light of the recent macroeconomic challenges, government should adopt adjustment strategies that hinges on increasing non-oil revenues to compensate for the dwindling oil revenues because agricultural revenues can stand as the main driver of economic growth over the short-medium-long term.

Table 2a: Unit Root Tests

Variables	t-statistics	t-critical value (5%)	
Ln(Agriculture)	-0.813	-3.19	Non-stationary I(0)
ΔLn(Agriculture)	-3.72		Stationary I(1)
Ln(Crop)	-0.80	-3.19	Non-stationary I(0)
ΔLn(Crop)	-3.74		Stationary I(1)
Ln(Livestocks)	-1.14	-3.19	Non-stationary I(0)
ΔLn(Livestocks)	-3.45		Stationary I(1)
Ln(Fishery)	-1.13	-3.19	Non-stationary I(0)
ΔLn(Fishery)	-3.81		Stationary I(1)
Ln(Forestry)	-0.56	-1.96	Non-stationary I(0)
ΔLn(Forestry)	-1.974		Stationary I(1)

Note: * Indicate that Unit Root at the level or 1st difference was rejected at 5% significance

D : 1st difference

Table 2b:

Variable	Coefficient	Standard error	t-value
Intercept	0.124	0.111	1.117^{NS}
ΔLn (Crop)	0.885	0.0041	217.39***
ΔLn(Livestocks)	0.064	0.0051	12.51***
ΔLn(Fishery)	0.040	0.0029	13.92***
ΔLn(Forestry)	0.011	0.0006	18.85***
ECT_{t-1}	-0.489	0.2453	-1.993*
R^2	0.9999		
R^2-Adjusted	0.9993		
AIC	-13.64		
SIC	-13.39		
HIC	-13.58		

Note: ***, **, * significance at 1, 5 and 10% levels respectively
NS: non-significant

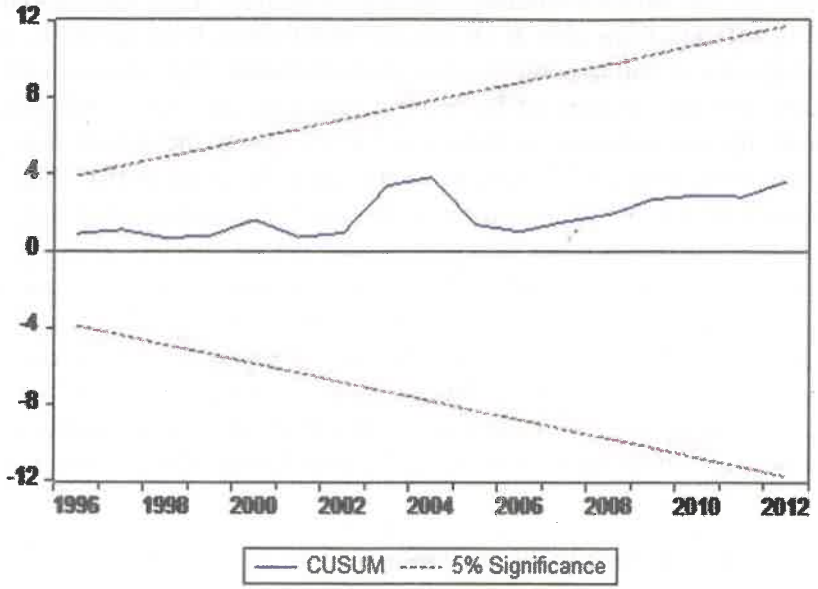
Diagnostic Testing

Table 2c shows the diagnostic statistics results of the ECM model. The test of autocorrelation showed that the residuals were not serially correlated as indicated by the Breusch-Godfrey Lagrange Multiplier (LM) statistic which was not different from zero at 10 percent significance level ($p>0.10$), thus the acceptance of null hypothesis of no autocorrelation. The Arch test results revealed that the variance of the current residuals and that of the lagged residuals do not correlate as indicated by the Q-statistic which was not different from zero at 10 percent significance level ($p>0.10$), thus the acceptance of null hypothesis of no Arch effect. The stability test depicted in Figure 1 shows that the cusum line was within the boundary of 5% significance level, implying that there was no structural break in the equation: the models was not misspecified. Furthermore, the result of the normality test showed that the residuals were normally distributed as indicated by Jarque-Bera statistic which was not different from zero at 10 percent significance level ($p<0.10$). Therefore, based on the outcome of the diagnostic statistics, it can be inferred that the ECM model used was the best fit and valid for prediction.

Table 2c: ECM Diagnostic checking

Test		Statistic	P-value
Autocorrelation	Breusch-Godfrey LM test (F-stat)	1.0442	0.5197
	Breusch-Godfrey LM test (Obs. R^2)	15.726	0.2041
Arch Effect	Q-stat	2.664	0.103
Normality	Jarque-Bera	1.016	0.6018

Figure 1 : Stability Test



Forecasting Using ARIMA

Various combinations of the ARIMA models were tried after the first differencing of each variable series, and based on the smallest AIC value the best ARIMA model was selected. Of all the ARIMA models tested, ARIMA (1,1,0) model proved to be the best for almost all the variables except livestocks sub-sector which proved that ARIMA (0,1,1) to be the best given that it has the lowest AIC value (Table 3a).

Table 3a: AIC and BIC Values of Different ARIMA Models

Variable		1,1,1	1,1,0	0,1,1
Agriculture	AIC	270.17	268.25**	268.34
	SBC	273.44	270.43	270.52
	Log likelihood	-132.08	-132.12	-132.17
Crop	AIC	271.54	269.60**	269.67
	SBC	274.81	271.78	271.85
	Log likelihood	-132.78	-132.80	-132.83
Livestock	AIC	265.36	264.18	263.49**
	SBC	268.64	266.36	265.67
	Log likelihood	-129.68	-130.09	-129.75
Fishery	AIC	267.01	265.01**	265.24
	SBC	270.28	267.19	267.42
	Log likelihood	-130.50	-130.50	-130.62
Forestry	AIC	252.85	251.91**	253.49
	SBC	256.12	254.09	255.67
	Log likelihood	-123.42	-123.95	-124.75

Note: ** indicates best ARIMA

Out of the total 22 data points (1990 to 2012), the first 17 data points (from 1990 to 2007) were used for model building, while the remaining 5 data points (from 2008 to 2012) were used for model validation. One-step ahead forecasts of the revenue for each variable along with their corresponding standard errors using naïve approach for the period 2008 to 2012 with respect to the fitted models were computed (Table 3b).

Date	Agriculture		Crop		Livestock		Fishery	
	Actual	Forecast	Actual	Forecast	Actual	Forecast	Actual	Forecast
2008	2818.53	2697.14	2818.08	2696.99	2869.19	2735.02	2755.65	2609.47
2009	3063.90	3040.26	3069.44	3038.60	3065.84	3114.02	2963.09	2962.29
2010	3249.69	3269.07	3254.01	3276.29	3267.52	3206.97	3157.01	3143.70
2011	3458.87	3428.33	3459.50	3432.43	3515.29	3470.48	3391.73	3332.01
2012	3849.10	3647.93	3864.30	3646.83	3804.30	3709.30	3672.30	3583.68

Date	Forestry	
	Actual	Forecast
2008	2760.18	2643.03
2009	2924.85	3000.09
2010	3095.11	3083.29
2011	3302.65	3257.45
2012	3489.30	3490.99

The forecasting ability of the selected ARIMA models of revenue series for the economic variables were judged on the basis of R^2, the mean absolute prediction error (MAPE), root mean square error (RMSE) and relative mean absolute prediction error (RMAPE) values (Table 3c). A perusal of Table 3c shows that the RMAPE of each variable is less than 5 percent, indicating the accuracy of the models used.

Table 3c: Validation of Models

Variables	ARIMA model	R^2	MAPE	RMSPE	RMAPE(%)
Agriculture	1,1,0	0.99	71.47	3.26	2.1
Crop	1,1,0	0.99	74.84	3.62	2.21
Livestock	0,1,1	0.99	57.27	2.22	1.75
Fishery	1,1,0	0.99	61.73	2.20	1.99
Forestry	1,1,0	0.99	10.75	1.39	0.41

Source: Authors computation, 2017

One step ahead out of sample forecast of the revenue for the economic variables selected during the period of the year 2013 to 2024 were computed. The absolute data points are shown in Table 3d and also were depicted in Figure 2a-2e to visualize the performance of the fitted model. A cursory review shows that the revenue of each variable would be marked by an increase, which is an indication of good prospect for the country economy. Under normal growth the forecasted trend will prevail; while under high and low growth the future trend of revenues for each variable will not exceed the upper and lower confidence limits, respectively. It can be observed from the forecasted results that crop sub-sector will have the highest contribution to the country GDP-Agriculture, while the remaining sub-sectors trailing behind. Under normal growth, the forecasted annual revenue growth rate for GDP-Agriculture, crop, livestock, fishery and forestry sub-sectors will be 3.6, 3.5, 3.5 and 3.4%, respectively. In the case of high growth, the annual revenue growth rate for GDP-Agriculture, crop, livestock, fishery and forestry sub-sectors are estimated to be 4.7, 4.4, 4.6 and 5.1%, respectively; and while under low growth, the estimated revenue growth rate for GDP-Agriculture, crop, livestock, fishery and forestry will be 2.1, 2.4, 2.1 and 1.1%, respectively. Therefore, since the country anticipated growth exceed the future outlook, onus lies on the stakeholders to implement sound policies to make agricultural sector the main driver of the economy due to the low oil prices which leads to decline in fiscal revenues, vulnerability to slow global economic recovery and global financial development.

Date	Agriculture			Crop production			Livestock		
	LCI	Forecast	UCI	LCI	Forecast	UCI	LCI	Forecast	UCI
2013	3917.9934	4118.7760	4319.5585	3929.2912	4136.4551	4343.6191	3847.3379	4026.8586	4206.3793
2014	3981.8701	4334.7613	4687.6524	3991.3899	4352.1480	4712.9061	3861.4331	4195.3967	4529.3603
2015	4043.6660	4526.8345	5010.0030	4052.9330	4543.8069	5034.6808	3927.0873	4363.9347	4800.7822
2016	4112.9498	4708.2582	5303.5677	4123.0222	4725.2353	5327.4485	4012.7231	4532.4728	5052.2224
2017	4191.4752	4884.9389	5578.4025	4202.9123	4902.3091	5601.7058	4109.8732	4701.0108	5292.1485
2018	4278.5429	5059.5072	5840.4714	4291.5783	5077.5291	5863.4799	4214.7606	4869.5489	5524.3372
2019	4372.8752	5233.1347	6093.3943	4387.5721	5251.9602	6116.3482	4325.3095	5038.0869	5750.8644
2020	4473.2346	5406.3433	6339.4519	4489.5766	5426.0553	6362.5341	4440.2336	5206.6250	5973.0164
2021	4572.8752	5579.3652	6580.1458	4596.5240	5600.0075	6603.4911	4558.6707	5375.1631	6191.6554
2022	4688.0991	5752.3040	6816.5090	4707.5807	5773.8989	6840.2171	4680.0092	5543.7011	6407.3931
2023	4801.1298	5925.2059	7049.2819	4822.1006	5947.7643	7073.4281	4803.7967	5712.2392	6620.6817
2024	4917.1671	6098.0912	7279.0153	4939.5799	6121.6187	7303.6576	4929.6874	5880.7772	6831.8670
GR %	2.1	3.6	3.5	2.1	3.6	4.7	2.4	3.5	4.4

Date	Fishery			Forestry		
	LCI	Forecast	UCI	LCI	Forecast	UCI
2013	3691.3391	3882.8504	4074.3617	3525.9392	3663.0421	3800.1450
2014	3730.7082	4063.3432	4395.9783	3557.6694	3827.7811	4097.8927
2015	3782.2709	4232.2369	4682.2029	3582.9825	3986.2407	4389.4988
2016	3847.3839	4396.6544	4945.9249	3609.0039	4140.3204	4671.6369
2017	3923.8437	4559.3446	5194.8455	3639.0569	4291.3453	4943.6338
2018	4009.2105	4721.3682	5433.5259	3674.5355	4440.2396	5205.9436
2019	4101.5215	4883.1345	5664.7475	3715.8481	4587.6477	5459.4473
2020	4199.3192	5044.8016	5890.2840	3762.9036	4734.0193	5705.1349
2021	4301.5391	5206.4304	6111.3216	3815.3718	4879.6679	5943.9640
2022	4407.3980	5368.0444	6328.6907	3872.8224	5024.8122	6176.8021
2023	4516.3095	5529.6526	6542.9958	3934.8002	5169.6049	6404.4096
2024	4627.8250	5691.2587	6754.6924	4000.8630	5314.1522	6627.4414
GR %	2.1	3.5	4.6	1.1	3.4	5.1

LCI: Lower Confidence Interval; UCL: Upper Confidence Interval

ARIMA Diagnostic Checking

The model verification is concerned with checking the residuals of the model to see if they contained any systematic pattern which still could be removed to improve the chosen ARIMA. The results of the autocorrelation tests for each variable showed the residuals to be purely random as indicated by the Ljung-Box Q-statistics tests which were not significantly different from zero at 10 percent probability level. Also, the Arch effect tests showed no arch effects in the residuals as evidence by Arch-Lagrange multiplier (LM) test statistics which were not different from zero at 10 percent probability level. The normality tests for each variable showed that the residuals were normally distributed as evidence by Jarque-Bera test statistics which were not different from zero at 10 percent probability level (Table 3e). Therefore, these proved the selected model to be the best fit and appropriate model for forecasting.

Table 3e: Diagnostic Checking for Best ARIMA Models

Variables	ARIMA model	Autocorrelation test (Ljung-Box Q)	Arch test (LM)	Jarque-Bera Normality test (Chi^2)
Agriculture	1,1,0	0.254 (0.614)^{NS}	7.780 (0.455)^{NS}	1.641 (0.4402)^{NS}
Crop	1,1,0	0.2102 (0.647)^{NS}	4.413 (0.353)^{NS}	1.715 (0.424)^{NS}
Livestock	0,1,1	0.1468 (0.702)^{NS}	1.487 (0.829)^{NS}	1.674 (0.433)^{NS}
Fishery	1,1,0	0.0985 (0.754)^{NS}	1.987 (0.738)^{NS}	0.949 (0.622)^{NS}
Forestry	1,1,0	1.2556 (0.263)^{NS}	2.873 (0.579)^{NS}	3.484 (0.175)^{NS}

Note : ***, **, * significance at 1, 5 and 10% respectively
NS : non-significant
( ) : p-value

Conclusion and Recommendation

This research investigated the future outlook of Nigerian agricultural sector growth in the light of global financial developments using linear and symmetric price transmission mechanism model. The results showed that the residual of the OLS regression was stationary at a level, indicating that GDP-Agriculture and its sub-sectors were co-integrated. Furthermore, it was observed that the GDP-Agriculture established a long-run equilibrium with its sub-sectors, and tends to correct any error from the equilibrium caused by any shock from the short-run equilibrium at a moderate rate annually. The agriculture sub-sectors were found to exert positive influence on the GDP-Agriculture revenue formation. Also, it was observed that the future outlook of the GDP-Agriculture and its sub-sectors will witness an increasing trend with the forecasted growth rate ranging from 3.4-3.6%. Therefore, in the light of the recent macroeconomic challenges, study recommends that government should adopt adjustment strategies that hinges on increasing GDP-agriculture revenue to compensate for the dwindling oil revenues given that its sub-sectors can stand as the main driver of the economy development over the medium term.

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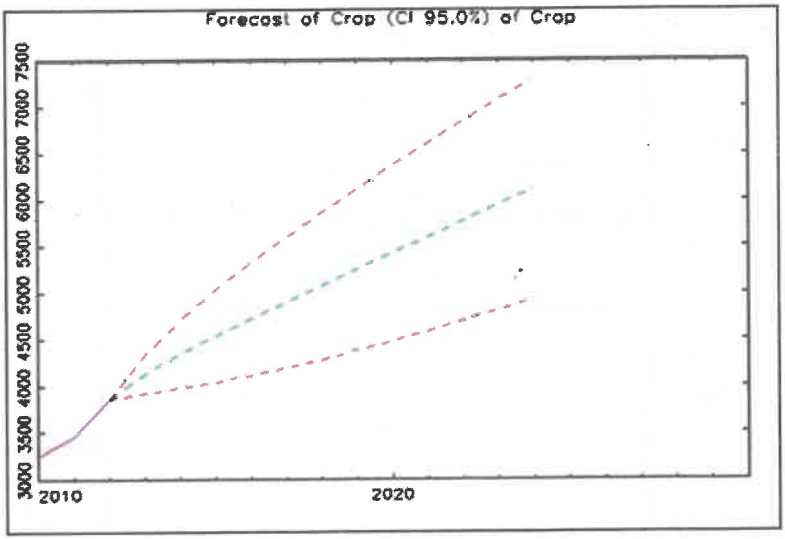
APPENDIX


Forecast of Crop (CI 95.0%) of Crop
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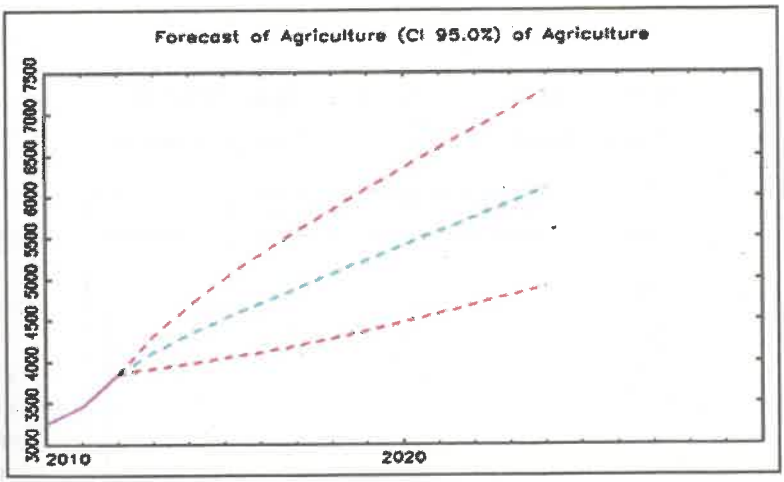
Forecast of Agriculture (CI 95.0%) of Agriculture
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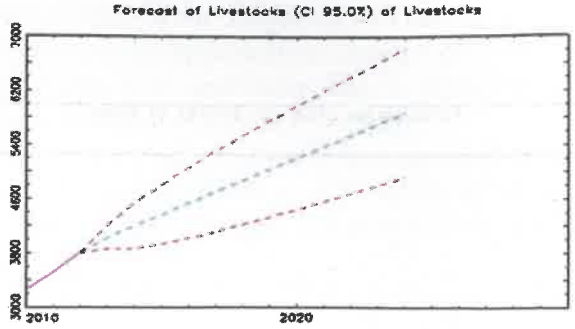

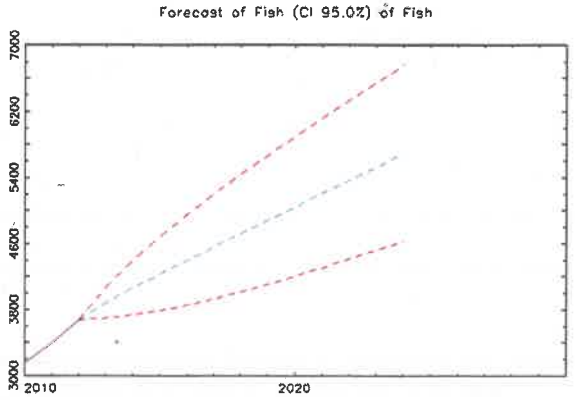

Row 1: Figure 2a: Agriculture; Figure 2b: Crop

Row 2: Figure 2c: Livestock; Figure 2d: Fishery

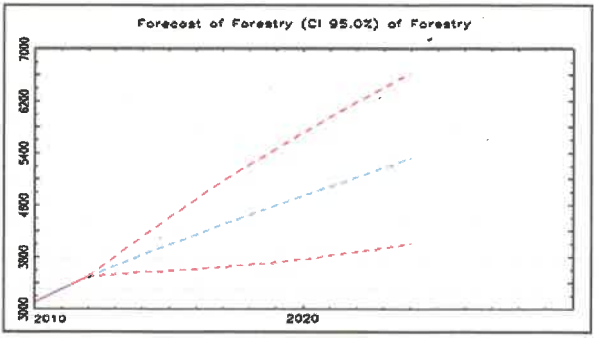

Figure 2e: Forestry

The Milky Way - Our Home in the Universe

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Abstract : *Aakasha Ganga, Via Lactea or the Milky Way is our home in the Universe. The discovery of the telescope by Galileo Galilei had facilitated the sky watchers to notice a variety of geometrical forms in the sky. The use of photographic techniques have expanded our knowledge about galaxies. Galaxies can be grossly put into one of the 3 types: elliptical, spiral and irregular galaxies. Milky way is one among billions of galaxies present in the universe and it is spiral galaxy. Newtons law of gravitation explains the planetary motions in solar system. But to explain the motion of sun and other stars in galaxy one has to modify Newtonian gravity dynamics. Development of quantum mechanics, particle physics and the measurement of stellar velocities at unprecedented accuracies would help to unravel the mystery of the formation of Milky Way in near future.*

Key Words : *Galaxy, Telescope, Nebulae, Milky Way, Newtonian Dynamics, constellaction.*

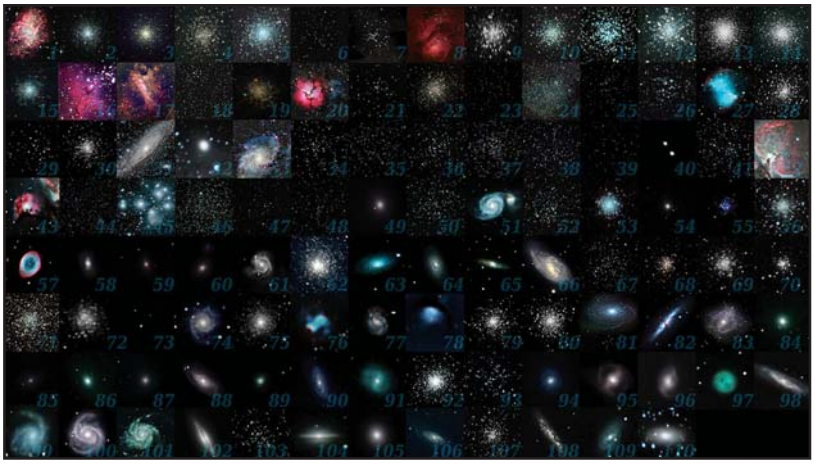
Figure 1 : The Milky Way

Credits: Astronomy Picture of the Day

Aakasha Ganga, *Via Lactea* or the Milky Way — all mean the same thing — the name given to our home in the Universe by different ancient civilizations. Who can miss the dark and white patchy band passing over our head in the summer skies? Some imagined it as a band of milk while the others related it to a river. After millennia of pondering over what it is, it is only around a century ago that a clear picture of this band has emerged, thanks to a new generation of astronomers, powerful telescopes and progress in the theoretical physics. The band constitutes neither milk nor a river, but light from millions of stars that are scattered by the intervening dust particles. This understanding marked the birth of modern astronomy.

The discovery of the telescope by Galileo Galilei (1610) had facilitated the sky watchers to notice a variety of geometrical forms in the sky. It was the French comet hunter Charles Messier (1730-1817) who catalogued for the first time 110 objects that always remained in the same constellation. He had no interest in these catalogued objects, but compiling these "nuisance" objects into a catalogue helped him to identify the comets. Unlike the objects he catalogued, comets moved from one constellation to the other in a matter of days. Little did he realize at that time that his catalogue would turn out to be an important collection of objects for future generations. More than a 100

Figure 2 :



year later, Edwin Hubble (1889-1953) and other astronomers realized that the catalogue contains several kinds of nebulae - planetary nebulae (e.g. M57 – ring nebula), star-forming nebulae (M42 - Orion nebula), supernova remnants (M1 - Crab nebula), stellar clusters (M45 - the Pleiades), spiral (e.g. M31 - Andromeda), elliptical (M104 – Sombrero) and irregular-shaped (M82 – Cigar galaxy) nebulae.

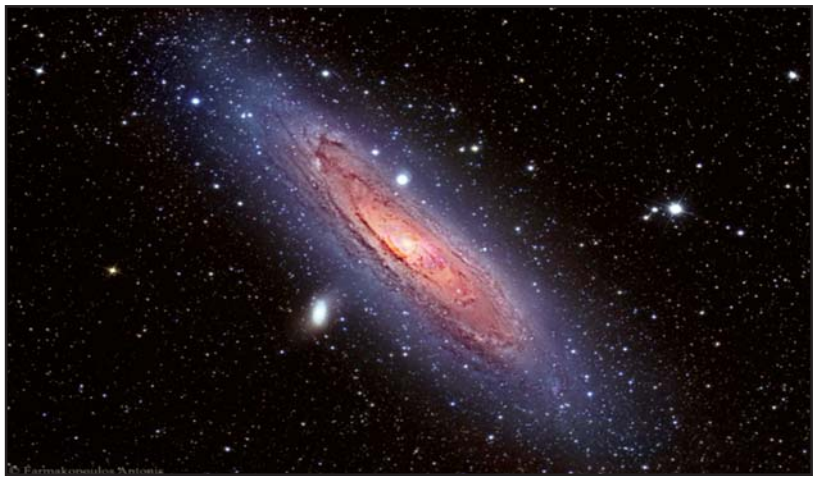
Development of photographing techniques at the focal plane of large telescopes such as the 100-inch Hooker telescope at the Palomar observatory allowed Hubble to distinguish the spiral, elliptical and irregular-shaped nebulae from the rest of the Messier objects. Of great interest were the so-called spiral nebulae; Andromeda being the best example. Hubble could see several individual stars in the images of this galaxy, and some of these stars seemed to vary in strength in different photographic plates. He soon established that these stars are variable in intensity and the variability is periodic, similar to the stars known as Cepheid variables. From studies of these stars in the Large Magellanic Cloud (LMC), it was known that the larger the period, brighter is the star when it is in its maximum. These variable stars paved the way to determine the distances, for the first time, to faraway stars. All Cepheids in Andromeda were fainter than those in the LMC immediately suggesting that Andromeda is at a farther distance than the LMC.

The idea prevailing at that time was that the Milky Way constituted the whole Universe; i.e. everything that we see, including the objects such as Andromeda and the LMC, belonged to the Milky Way. The basic problem was the complete ignorance of the size scale of the Milky Way. Thus, inspite of knowing the distances to Andromeda and the LMC, it wasn't possible to consider them as separate entities, each by its own right a galaxy like the Milky Way. Finally, the issue was settled in a "great debate" (1920) between Harlow Shapley and Heber Curtis, the latter challenging the prevailing idea of Milky Way constituting the whole Universe. As the arguments of the debate reached the wider astronomical community, efforts were made to put to test the different arguments without prejudice

As the arguments of the debate reached the wider astronomical community, efforts were made to put to test the different arguments without prejudice. These tests conclusively showed that the Milky Way is just one among the

so called spiral nebulae, and each one of these objects are called galaxies. Thus our home, the Milky Way is a galaxy, one among the millions of galaxies that are present in the Universe.

Figure 3 :

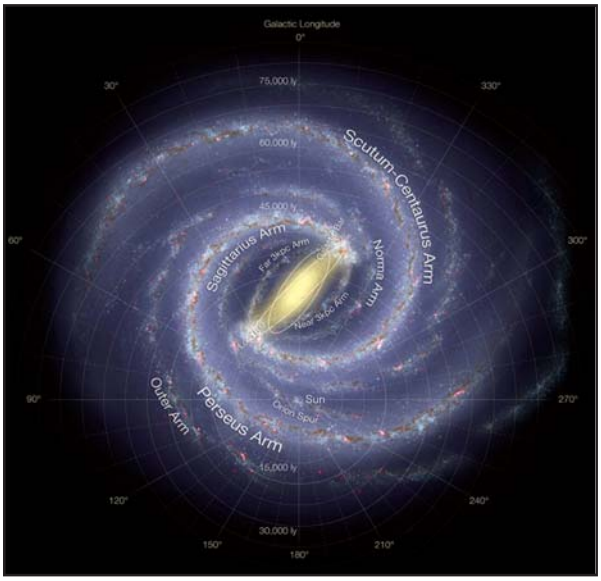


Though there exist millions of galaxies, every one of these can be grossly put into one of the 3 types; elliptical, spiral and irregular galaxies. Elliptical galaxies are spherical systems somewhat similar to inflated balloons, whereas the latter two classes are flat systems dominated by a thin disc. The dark and white patchy band that characterized the Milky Way from the ancient times is the disc seen edge-on. Actually, the Milky Way galaxy is not just the patchy band but instead contains every star that we see by naked eye in the night sky. In addition to stars, the Milky Way contains gas and dust particles, which are the raw material from which stars that illuminate the nebulae such as that seen in the constellation of Orion are formed. At the center of the flat disc resides a dense spherical bulge and the whole disc is surrounded by a sparsely populated large spherical halo. Both the bulge and halo contain some of the oldest stars in the Universe. At the very center of the bulge, there lies a black hole that weighs around 4 million times the mass of the sun. The Milky Way is estimated to contain around 100 billion stars similar to the Sun.

Figure 4 :

Where are we located in the Milky Way? The Sun is located in the Galactic disc at about halfway between the center and the edge. The Sun rotates around the center of the Milky Way, very much similar to how the Earth rotates around the Sun in the solar system. However, the orbit of the Sun is around 2 billion times larger than the orbit of the Earth (27000 light years vs 8 light minutes), and takes around 200 million years to go around once compared to one year that the earth takes to come back to the same position in its orbit. Both systems are governed by the Newton's law of gravitation. However, there seems to be a fundamental difference between the solar system and the Galactic disk; while in the Solar system almost the entire mass is concentrated in the Sun, in the Galaxy it is more smoothly distributed in its disc. Painstaking observations over several decades have revealed that the gravitational force exerted by the stars in the Milky Way is not strong enough to maintain the Sun and the stars in their orbits. There seems to exist a matter, known as dark matter, that contributes to gravitational force but do not emit any electromagnetic radiation. All known fundamental particles interact with other particles and emit electromagnetic radiation, and hence the dark matter should be made up of a yet-to-be discovered Weakly Interacting Massive Particle (WIMP). Powerful accelerators of particles such as the Large Hadron Collider (LHC) at the CERN (Europe) are presently searching for the existence of such a particle.

Figure 5 :



The failure to detect any candidate for dark matter has prompted some groups of astronomers to question the validity of Newton's gravitational law at astronomical scales. It should be remembered that the gravitational law has been tested only at the scale of the Solar system, but is assumed to hold over much larger scales following the fundamental principle of physics namely "The Physical Laws are Universal''. So going against this fundamental principle is like undoing all that has been learnt over the last few centuries. Thus, the wider astronomical community is skeptical over this seemingly outrageous suggestion. This new theory of gravitation is being called as the Modified Newtonian Dynamics (MOND), wherein beyond a certain scale, the gravitational force falls as the inverse of the distance, rather than the inverse of the square of the distance. At the scale of the Solar system, the MOND recovers the Newton's gravitational law. With MOND, observed rotational velocities of the Sun and stars can be perfectly explained without invoking any dark matter. It is very well established that all spiral galaxies have rotational patterns very similar to that of the Milky Way, and hence

require dark matter under Newton's gravitational law, and no dark matter with MOND. This new law is awaiting to be tested by rigorous experiments in the near future.

Do the millions of galaxies that we see today have similar structure as the Milky Way? How are these galaxies formed? These are some of the fundamental questions that are being addressed by the current astronomers and astrophysicists. There are two competing theories to explain the formation of galaxies. The traditional idea put forth by the English astrophysicist Donald Linden-Bell (1935) and collaborators 55 years ago was that the Milky Way formed from a huge cloud of gas, that slowly evolved into the current structure almost without getting affected by its neighbours. This theory is losing ground to a competing theory, in which galaxies grow in time by snatching gas and stars from their neighbours. The Milky Way is caught in the act of looting gas from what was once upon a time a little galaxy like the companion galaxy of Andromeda, but now seen as a large loop in the sky in the Sagittarius constellation.

Figure 6 :

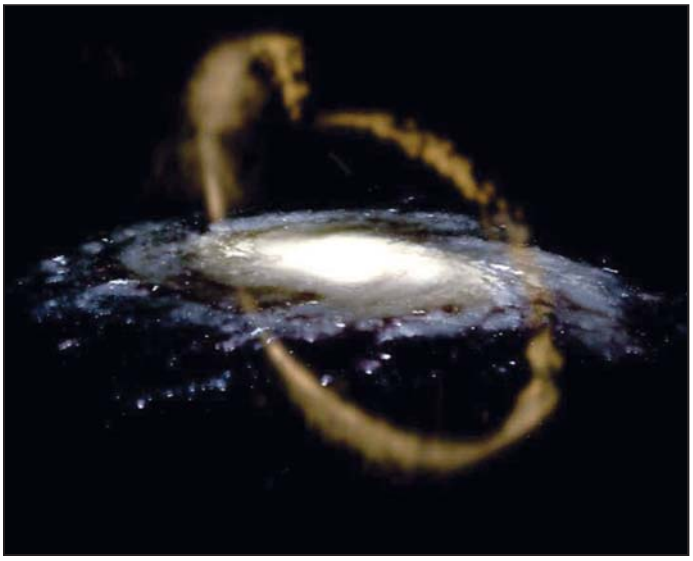
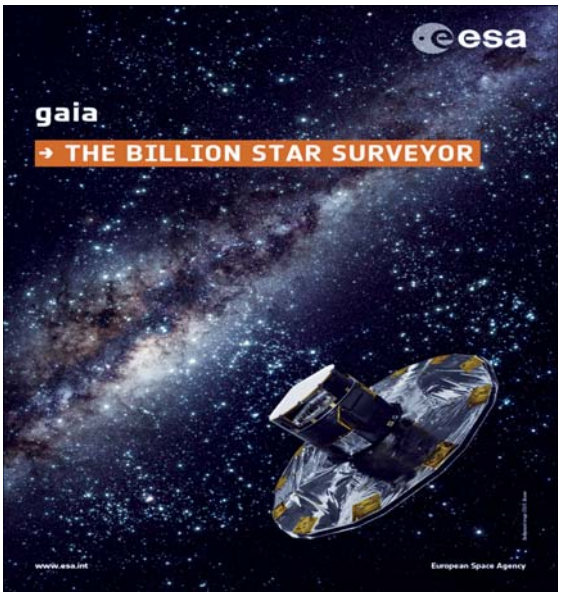


Figure 7 :

Whether galaxies formed stars quietly from the gas that they always had right from the beginning, or whether stars and gas are violently looted from the neighbouring smaller galaxies could be checked by analyzing the motions of the stars. Stars are expected to move around the Galactic center in regular orbits in the former picture, whereas the random motions would have importance in the latter scenario. Ever since the humanity started looking up at the sky, stars have hardly moved with respect to each other, i.e. the constellations have retained the same form since they were named by the Greeks. For example, the Orion constellation looks like a hunter even today. However, comparing the positions of stars in photographs taken today with those taken around 50 years ago, astronomers were able to measure minute movements that suggest non-negligible random motions of stars.

However, techniques of comparing current photographs of the sky with ancient photographs could detect motions of stars that are in the vicinity of the Solar system. Two years ago, European astronomers launched a satellite, known as GAIA, to measure the stellar movements with an unprecedented accuracy even at the outer edges of the Milky Way. After the completion of the mission in 5 years, motions of 1 billion stars in the Milky Way would be known. These data would allow to discover the complete story of the formation of the Milky Way, and would also put to test the alternative theory of gravitation.

Figure 8 :



The ancient observers couldn't understand the Universe due to their inability to interpret the dark bands in the sky. A century after the nature of the dark band was understood, we are now confronted with a mysterious dark matter whose nature is completely unknown. Development of quantum mechanics nearly a century ago, paved the way for understanding the nature of stars. We hope that the developments in particle physics and the measurement of stellar velocities at unprecedented accuracies would help to unravel the mystery of the formation of Milky Way in near future.

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